No. 413PA21 TENTH DISTRICT

SUPREME COURT OF NORTH CAROLINA

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NORTH CAROLINA LEAGUE OF CONSERVATION VOTERS, INC., et al., COMMON CAUSE v. REPRESENTATIVE DESTIN HALL, in his official capacity as Chair of the House Standing Committee on Redistricting, et al.	)	From Wake County 21 CVS 015426 21 CVS 500085
REBECCA HARPER, et al., COMMON CAUSE v. REPRESENTATIVE DESTIN HALL, in his official capacity as Chair of the House Standing Committee on Redistricting, et al.	)	

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JOINT BRIEF OF PLAINTIFFS-APPELLEES

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JOINT BRIEF OF PLAINTIFFS-APPELLEES

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INTRODUCTION

In February 2022, this Court invalidated the General Assembly's congressional and state legislative redistricting plans as "extreme partisan outliers" and held that, under our State's Constitution, a lawful remedial plan must give "voters of all political parties substantially equal opportunity to translate votes into seats across the plan." *Harper v. Hall*, 380 N.C. 317, 2022-NCSC-17, ¶¶ 27, 163, 182, *cert. granted sub nom. Moore v. Harper*, 142 S. Ct. 2901 (2022) (mem.). Applying N.C. Gen. Stat. § 120-2.4(a), the Court gave the General Assembly an "opportunity to submit new congressional and state legislative districting plans." (R p 3823)[1] These new maps, the Court emphasized, must "ensure that the channeling of 'political power' from the people to their representatives … is done on equal terms," "so that ours is a 'government of right' that 'originates from the people' and speaks with their voice." *Harper*, 2022-NCSC-17, ¶ 223 (quoting N.C. CONST. art. I, § 2). The Court remanded the case to the trial court "to oversee the redrawing of the maps by the General Assembly or, if necessary, by the court." *Id.*

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[1] References in this Brief are made to documents in the printed record ("R") and Rule 9(d) exhibits ("Doc. Ex."), and the Appendix ("App."). References to the trial court's judgment of 23 February 2022, reproduced at R pp 4866–89 and App. 49–72, are given by paragraph number in the court's findings of fact ("FOF") and conclusions of law ("COL").

The General Assembly was given two weeks to "remedy [the] defects identified by [this C]ourt." N.C. Gen. Stat. § 120-2.4(a); R pp 3823–24. But instead of working to draw a congressional plan that respected North Carolinians' "right to vote on equal terms," *Harper*, 2022-NCSC-17, ¶ 148 (quoting *Stephenson v. Bartlett*, 355 N.C. 354, 378, 562 S.E.2d 377, 393 (2002) ("*Stephenson I*")), the General Assembly again enacted an unconstitutional plan. That plan—S.L. 2022-3, or the "Remedial Congressional Plan"—created such a large and persistent partisan skew that one independent expert characterized it as a "very lopsidedly Republican" plan with "***substantial*** pro-Republican bias" that should "be viewed as a pro-Republican partisan gerrymander." (R p 5040–42 (emphasis in original))

The trial court, drawing on the work of three Special Masters, found that the Remedial Congressional Plan contained a "partisan skew" that was "not explained by the political geography of North Carolina." App. 60, FOF 35. The court "conclude[d] that the Remedial Congressional Plan does not satisfy the Supreme Court's standards" and, pursuant to N.C. Gen. Stat. § 120-2.4(a1), "modif[ied] the … Plan to bring it into compliance with the Supreme Court's order." App. 69–70, COL 7–8.

On appeal, the Legislative Defendants seek to relitigate the trial court's findings and demand that this Court defer to the Legislative Defendants' own choice of remedy. Neither effort has merit. The trial court's findings about the

Remedial Congressional Plan are based on competent evidence and are conclusive on appeal. And because there is no "significant likelihood" that the plan will "give the voters of all political parties substantially equal opportunity to translate votes into seats," it is not entitled to deference or a presumption of constitutionality. *Harper*, 2022-NCSC-17, ¶ 163.

Indeed, the Legislative Defendants' arguments are especially meritless because the trial court ***in fact exhibited*** substantial deference to the General Assembly. In line with N.C. Gen. Stat. § 120-2.4(a), the trial court afforded the General Assembly "a reasonable opportunity" to "adopt[] a substitute" redistricting plan rather than "devis[ing] … its own plan." *Wise v. Lipscomb*, 437 U.S. 535, 540 (1978). When the trial court weighed the plan the General Assembly enacted, the court presumed that the General Assembly had acted in good faith, notwithstanding its history of unconstitutional partisan gerrymanders, and "g[ave] deference to the General Assembly." R p 4893; App. 58, FOF 27. The trial court required only that the General Assembly ***actually*** "cure [the] constitutional … defects" this Court had found. *Upham v. Seamon*, 456 U.S. 37, 43 (1982). And when the trial court found the General Assembly had failed to do so, it acted—again, pursuant to N.C. Gen. Stat. § 120-2.4—to institute a limited remedy "to ensur[e] that … [P]laintiffs were relieved of the burden of" only those "injuries [that] [P]laintiffs established." *North Carolina v. Covington*, 138 S. Ct. 2548, 2554 (2018). "Being mindful that the

Constitution of North Carolina provides that the General Assembly has the responsibility of redistricting," the trial court's Special Masters "worked solely with" their expert advisor Dr. Bernard Grofman and his assistant "to amend the Legislative Defendants' [plan]," rather than accepting one of the Plaintiffs' plans or devising its own plan from whole cloth. (R pp 4893–94)

The Legislative Defendants' attacks on the trial court's restrained, deferential orders utterly fail, particularly given the standard of review. The judgment below should be affirmed.

ISSUES PRESENTED

1. Did competent evidence support the trial court's decision that the Remedial Congressional Plan fails to satisfy the standard this Court set, where the work of every single expert showed that the plan failed to provide voters substantially equal voting power?
2. Did the trial court act within its broad discretion in denying the motion to disqualify two of the Special Masters' expert advisors, where the communications at issue were immediately disclosed, where those communications sought publicly available information, and where the work of those experts was not material to the trial court's conclusions?

STATEMENT OF THE CASE

This brief addresses the Legislative Defendants' appeal of the remedial order entered by a three-judge panel of the Superior Court in Plaintiffs'

consolidated challenge to the General Assembly's 2021 congressional redistricting plan.

A. Trial Court Liability-Phase Proceedings

On 16 November 2021, Plaintiffs North Carolina League of Conservation Voters, Inc., et al. ("*NCLCV* Plaintiffs") filed an action challenging the General Assembly's 2021 congressional, House, and Senate redistricting plans ("2021 Enacted Plans"), along with a motion for a preliminary injunction. (R pp 30–127) Two days later, Plaintiffs Rebecca Harper et al. ("*Harper* Plaintiffs") filed a challenge to the 2021 Enacted Congressional Plan and also sought preliminary injunctive relief. (R pp 128–76, 208) On 19 November 2021, the Chief Justice assigned Judges A. Graham Shirley, Nathaniel J. Poovey, and Dawn M. Layton to serve on a "Three-Judge Panel for Redistricting Challenges, as defined in N.C.G.S. § 1-267.1." (R p 177) The three-judge panel consolidated the two actions and denied Plaintiffs' request for injunctive relief. (R pp 867–69, 883)

On 8 December 2021, this Court reversed the three-judge panel's ruling and issued a preliminary injunction barring the General Assembly from using the 2021 Enacted Plans and moving the primary election to 17 May 2022. (R pp 893–95) The Court ordered the three-judge panel to issue a final judgment on Plaintiffs' claims by 11 January 2022. (R p 894) On remand, *Harper* Plaintiffs amended their complaint to include challenges to the 2021 Enacted

Senate and House Plans. (R pp 897–964) Plaintiff-Intervenor Common Cause sought and obtained permission to intervene in the consolidated actions. (R pp 965, 1237)

From 3 January to 6 January 2022, the three-judge panel held a bench trial and heard evidence from expert and fact witnesses from the parties. (R p 3523) On 11 January 2022, the panel issued its liability ruling. (R p 3769) The panel found that the 2021 Enacted Plans "resiliently safeguard electoral advantage for Republican[s]" and ensure that Republicans retain majorities in North Carolina's congressional delegation and the General Assembly even "when voters clearly prefer the other party." (R pp 3577, 3579–80) The panel also found that the 2021 Enacted Plans were among the most "extreme" gerrymanders possible and were more "carefully crafted for Republican advantage" than 99.9999% of possible congressional maps, 99.9% of possible Senate maps, and 99.9999% of possible House maps. (R pp 3574–75, 3577) Nonetheless, the panel entered judgment for Defendants, holding that partisan-gerrymandering claims are not justiciable under the North Carolina Constitution. (R pp 3753, 3769)

B. Liability-Phase Appeal

All Plaintiffs appealed, and this Court reversed. (R pp 3772, 3776, 3780) Pursuant to N.C. Gen. Stat. § 120-2.3, this Court held that the 2021 Enacted Plans were unconstitutional partisan gerrymanders in violation of the North

Carolina Constitution's Free Elections Clause, Equal Protection Clause, and Free Speech and Assembly Clauses. R pp 3818–24; *Harper*, 2022-NCSC-17, ¶ 94. The Court explained that these constitutional provisions prohibit the General Assembly from "diminish[ing] or dilut[ing] any individual's vote on the basis of partisan affiliation" because the "fundamental right to vote includes the right to enjoy 'substantially equal voting power and substantially equal legislative representation.'" (R p 3820 (quoting *Stephenson I*, 355 N.C. at 382, 562 S.E.2d at 396)) "Based on the trial court's factual findings," this Court "conclude[d] that the congressional and legislative maps enacted" by the General Assembly were "unconstitutional beyond a reasonable doubt" under the Free Elections Clause, the Equal Protection Clause, and the Free Speech and Assembly Clauses and "enjoin[ed] the use of these maps in any future elections." (R pp 3819–20)

The Court also rejected the Legislative Defendants' arguments that a presumption of constitutionality applied to the General Assembly's gerrymandered plans. As the Court held, where the "General Assembly diminished and diluted the voting power of voters affiliated with one party on the basis of party affiliation," the "plan is subject to strict scrutiny" and is presumed "unconstitutional unless the General Assembly can demonstrate that the plan is 'narrowly tailored to advance a compelling government interest.'" R p 3821 (quoting *Stephenson I*, 355 N.C. at 377, 562 S.E.2d at 393);

Harper, 2022-NCSC-17, ¶¶ 180–181. "Achieving partisan advantage incommensurate with a political party's level of statewide voter support," the Court explained, "is neither a compelling nor a legitimate governmental interest." R p 3821; *Harper*, 2022-NCSC-17, ¶ 161.

The Court held that in the redistricting context, a presumption of constitutionality applies ***only*** if "there is 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." *Harper*, 2022-NCSC-17, ¶ 163. And while the Court identified several methods and metrics that could indicate unconstitutional gerrymandering, the Court expressly declined to "identify an exhaustive set of metrics or precise mathematical thresholds which conclusively demonstrate or disprove the existence of an unconstitutional partisan gerrymander." *Id.* Instead, the Court explained, the ultimate inquiry is always whether a plan treats voters equally, *id.* ¶ 169, such that voters of all political parties have "substantially equal opportunity to translate votes into seats across the plan," *id.* ¶ 163.

The Court rejected the Legislative Defendants' arguments that the federal Constitution's Elections Clause forbids North Carolina courts "from reviewing a congressional districting plan" that "violates the state's own constitution." *Id.* ¶ 175. The Court first held that the Legislative Defendants did not preserve this argument for appeal—noting that this argument was "not

presented at the trial court"—and then ruled that in any event, the argument failed on the merits, because it was "inconsistent with nearly a century of precedent of the Supreme Court of the United States" and "repugnant to the sovereignty of states, the authority of state constitutions, and the independence of state courts." *Id.*

Finally, the Court rejected the Legislative Defendants' separation-of-powers arguments, explaining that under longstanding precedent, "[i]t is the state judiciary that has the responsibility to protect the state constitutional rights of the citizens," *id.* ¶ 118 (quoting *Corum v. Univ. of N.C.*, 330 N.C. 761, 783, 413 S.E.2d 276, 290 (1992)), and that the legislature's "power to apportion legislative and congressional districts … is subject to other 'constitutional limitations,' including the Declaration of Rights," *id.* ¶ 119.

Consistent with its duty under North Carolina law, and in accordance with the procedures set forth by the General Assembly for the judicial review of congressional redistricting plans in N.C. Gen. Stat. §§ 120-2.3 and 120-2.4, this Court's Order and Opinion identified the defects in the 2021 Enacted Plans and directed the three-judge panel to conduct remedial proceedings. R pp 3816–24; *Harper*, 2022-NCSC-17, ¶¶ 27–72, 178–216. The Court ordered that "[i]n accordance with N.C.G.S. § 120-2.4(a), the General Assembly shall have the opportunity to submit new congressional and state legislative districting plans that satisfy all provisions of the North Carolina Constitution" and,

pursuant to the remedial process set forth in Section 120-2.4(a), the "trial court will approve or adopt compliant congressional and state legislative districting plans" by 23 February 2022. R pp 3823–24; *see Harper*, 2022-NCSC-17, ¶ 223.

C. Trial Court Remedial Proceedings

On 17 February 2022, the General Assembly enacted new congressional, House, and Senate plans. (R pp 4185, 4868) While the Remedial House Plan was enacted with bipartisan support, the Remedial Congressional and Senate Plans were passed on a party-line basis, with only Republican lawmakers voting in support. R pp 4876, 4878, 4881; S.L. 2022-2; S.L. 2022-3; S.L. 2022-4. The General Assembly provided that all three plans would be "contingent upon [their] approval or adoption by the Wake County Superior Court." SL-2022-2 § 2; SL-2022-3 § 2; SL-2022-4 § 2.

The trial court appointed Justice Robert F. Orr (Ret.), Justice Robert H. Edmunds, Jr. (Ret.), and Judge Thomas W. Ross (Ret.) to serve as Special Masters to assist with assessing and potentially developing remedial plans. (R pp 4179–80) Consistent with this Court's order, the Special Masters engaged four expert advisors—Dr. Bernard Grofman of the University of California, Irvine, Dr. Tyler Jarvis of Brigham Young University, Dr. Eric McGhee of the Public Policy Institute of California, and Dr. Samuel Wang of Princeton University—to assist. (R p 4871)

The parties submitted comments to the three-judge panel, along with expert reports, addressing whether the proposed remedial plans complied with the standard set forth by this Court in its liability-phase ruling. (R pp 4618–54, 4678–857) Plaintiffs explained that the Remedial Congressional Plan failed to do so (R pp 4445–607, 4738–857) and submitted alternative proposed remedial plans (R pp 4445–607).

NCLCV Plaintiffs' expert, Dr. Moon Duchin, found that, based on recent electoral scenarios, under the Remedial Congressional Plan, Republicans could win a majority of North Carolina's 14 congressional seats even if they ***lost*** the statewide vote by a 3.72-point margin; Democrats, by contrast, could not win a majority of seats unless they won statewide by a 2.32-point margin. (R p 4808) Likewise, Dr. Duchin found that the plan translates Democratic statewide vote majorities into seat majorities just 31.25% of the time, while translating Republican statewide vote majorities into seat majorities 100% of the time. (R p 4808) Common Cause and *Harper* Plaintiffs' experts, Drs. Jonathan Mattingly and Gregory Herschlag, concluded that the Remedial Congressional Plan would deliver Republicans on average 1.575 more seats than it would deliver Democrats, given an identical vote share. (R p 4756)

All three experts agreed that on a whole host of metrics—mean-median difference, efficiency gap, close-votes-close-seats, and partisan bias—the Remedial Congressional Plan consistently fails common thresholds of partisan

favoritism. (R pp 4756, 4813) All three experts also agreed that this degree of skew was unnecessary and that Plaintiffs' alternative maps treated both parties far more fairly while also excelling on traditional districting principles such as compactness and respect for counties. (R pp 4757, 4808, 4813, 4819)

On 23 February 2022, the Special Masters issued a report and recommendation, as well as reports from each of the four expert advisors. (R p 4890) Even after "giving appropriate deference to the General Assembly," the Special Masters concluded that its "proposed remedial congressional plan fails to meet the threshold of constitutionality." (R p 4893) Their expert advisors reinforced that conclusion. Dr. Grofman found that the Remedial Congressional Plan would on average deliver Republicans 55.27% of seats in a tied election, showing a "***substantial*** pro-Republican bias." (R pp 5037, 5041 (emphasis in original)) Dr. Grofman concluded that the evidence "strongly suggest[s] the conclusion that this congressional map should be viewed as a pro-Republican partisan gerrymander." (R p 5042) Each of the three other Special Masters' expert advisors agreed that the Legislative Defendants' plan would disproportionately favor Republicans. (R pp 5060, 5081, 5114)

On the same day, the trial court issued its remedial order, approving the Remedial House and Senate Plans but finding that the Remedial Congressional Plan did not comply with the standard this Court had set. App. 59–60, FOF 34–35; App. 69–70, COL 3–8. In accordance with N.C. Gen. Stat.

§ 120-2.3, the trial court detailed the defects in the Remedial Congressional Plan that made it an unconstitutional partisan gerrymander, adopting the findings of the Special Masters and drawing on the work of their expert advisors. App. 58–60, FOF 26–27, 34–35; App. 69–70, COL 7–8.

Because the General Assembly did not act to remedy the defects that this Court identified in the 2021 Enacted Congressional Plan, the trial court moved to adopt a constitutionally compliant congressional map, as required by N.C. Gen. Stat. § 120-2.4(a), and this Court's liability-phase ruling. App. 70, COL 8–11. The trial court declined to adopt any of Plaintiffs' proposed remedial plans. App. 70, COL 8. Instead, the court modified the General Assembly's Remedial Congressional Plan "to bring it into compliance with the Supreme Court's order"—creating what this brief refers to as the "Modified Remedial Congressional Plan." App. 70, COL 80. Those modifications by the Special Masters and their expert Dr. Grofman dramatically improved the plan's scores on every metric of partisan advantage. (R pp 4894, 4902) Dr. Grofman concluded that the Modified Remedial Congressional Plan "is the most non-dilutive plan in partisan terms of any map that has been submitted to the Court." (R p 4902)

The trial court also denied the Legislative Defendants' motion to disqualify two of the Special Masters' expert advisors. After their engagement, Drs. Wang and Jarvis sent emails to three of Plaintiffs' experts to seek publicly

available data pertinent to the remedial-plan analyses of two of the Special Masters' experts. (R p 4898) In particular, Dr. Wang contacted Drs. Mattingly and Wesley Pegden to request publicly available "background information pertaining to the earlier analysis of the 2021 Redistricting Plan." (R p 4899) Dr. Jarvis contacted Drs. Mattingly and Herschlag seeking the same. (R p 4899) Upon discovering the communication, *Harper* Plaintiffs' counsel immediately notified all parties and the court. (R p 4608) The Legislative Defendants moved to disqualify Drs. Wang and Jarvis. (R p 4655) After the Special Masters determined that "the information sought by Dr. Wang and by Dr. Jarvis was publicly available" and that their work "was not determinative of any recommendations made by the Special Masters," the trial court denied the motion. R p 4899; App. 45–46.

D. Remedial Appeal and U.S. Supreme Court Proceedings

Later that day, on 23 February 2022, the Legislative Defendants filed a notice of appeal from the trial court's remedial ruling and moved for a stay of the Modified Remedial Congressional Plan. (R p 5143) This Court denied the stay motion that evening. *Harper v. Hall*, 868 S.E.2d 95, 97 (N.C. 2022) (mem.). The appeal remained pending.

Two days later, on 25 February 2022, the Legislative Defendants filed a motion in the U.S. Supreme Court seeking an emergency stay of the Modified Remedial Congressional Plan. LD Emergency App. for Stay Pending Pet. for

Writ of Certiorari, *Moore v. Harper*, No. 21A455 (U.S. Feb. 25, 2022). The Legislative Defendants asserted that the federal Constitution's Elections Clause barred North Carolina courts from reviewing the General Assembly's congressional redistricting plan for compliance with the North Carolina Constitution and from adopting a remedial map. *Id.* at 10–24. The Legislative Defendants also argued to the U.S. Supreme Court that this Court had violated separation-of-powers principles under North Carolina law, even though this Court had repeatedly rejected those same separation-of-powers arguments. *Id.* at 17–22; *Harper*, 2022-NCSC-17, ¶¶ 112–120 (citing cases).

Plaintiffs and the State Defendants opposed the stay application, explaining that this Court and the trial court had followed North Carolina law, including the General Assembly's own statutes allowing North Carolina courts to review and modify congressional districting plans. State Resp'ts Resp. in Opp'n to Emergency Appl., *Moore v. Harper*, No. 21A455 (U.S. Mar. 2, 2022); *NCLCV* Resp'ts Resp. in Opp'n to Emergency Appl., *Moore v. Harper*, No. 21A455 (U.S. Mar. 2, 2022); *Harper* Resp'ts Resp. in Opp'n to Emergency Appl., *Moore v. Harper*, No. 21A455 (U.S. Mar. 2, 2022); Resp't Common Cause Opp'n to Emergency Appl., *Moore v. Harper*, No. 21A455 (U.S. Mar. 2, 2022). On 7 March 2022, the U.S. Supreme Court denied the stay application. Order, *Moore v. Harper*, No. 21A455 (U.S. Mar. 7, 2022).

On 17 March 2022, the Legislative Defendants filed a petition for a writ of certiorari in the U.S. Supreme Court, again invoking the federal Elections Clause. Pet. for Writ of Certiorari, *Moore v. Harper*, No. 21-1271 (U.S. Mar. 17, 2022). The Legislative Defendants again misconstrued North Carolina law and ignored that the General Assembly had expressly authorized state-court review of redistricting plans in N.C. Gen. Stat. §§ 120-2.3 and 120-2.4. *Id.* at 31–38. Plaintiffs and the State Defendants again opposed. State Resp'ts Br. in Opp'n, *Moore v. Harper*, No. 21-1271 (U.S. May 20, 2022); *NCLCV* Br. in Opp'n, *Moore v. Harper*, No. 21-1271 (U.S. May 20, 2022); *Harper* Br. in Opp'n, *Moore v. Harper*, No. 21-1271 (U.S. May 20, 2022); Common Cause Br. in Opp'n, *Moore v. Harper*, No. 21-1271 (U.S. May 20, 2022). On 30 June 2022, the U.S. Supreme Court granted the petition, even as the Legislative Defendants' appeal of the trial court's remedial ruling remained pending in this Court. *Moore v. Harper*, 142 S. Ct. 2901 (2022) (mem.).

On 13 July 2022, the Legislative Defendants filed a motion asking this Court to dismiss the appeal of the Modified Remedial Congressional Plan that they had filed more than four months before. LDs' Mot. to Dismiss Appeal, *Harper v. Hall*, No. 413PA21 (N.C. July 13, 2022). *NCLCV* and *Harper* Plaintiffs opposed the motion to dismiss, on the grounds that the Legislative Defendants were seeking to prevent this Court from correcting the Legislative Defendants' misconstruction of North Carolina law in the U.S. Supreme

Court—namely, preventing the Court from clarifying that North Carolina statutes expressly authorize North Carolina courts to review congressional districting maps and adopt constitutionally compliant maps if the General Assembly fails to do so. *Harper* & *NCLCV* Pls.' Resp. in Opp'n to Mot. to Dismiss Appeal & Cross-Mot. for Summ. Affirmance, *Harper v. Hall*, No. 413PA21 (N.C. July 18, 2022). On 28 July 2022, this Court deferred ruling on the motion to dismiss. Order, *Harper v. Hall*, No. 413PA21 (N.C. July 28, 2022). Four days later, the Legislative Defendants filed their opening brief in this appeal, omitting any mention of the Elections Clause argument that they had previously raised before this Court, and which was the basis for their petition for certiorari in the U.S. Supreme Court.

On 29 August 2022, the Legislative Defendants continued to misconstrue North Carolina law in their merits brief in the U.S. Supreme Court and asserted that the North Carolina courts had "nullif[ied] the General Assembly's chosen 'Regulations' of the 'Manner of holding Elections,' U.S. Const. art. I, § 4, cl. 1." Pet'rs Br. 50, *Moore v. Harper*, No. 21-1271 (U.S. Aug. 29, 2022) ("*Moore* Pet. Br."); *accord* Pet'rs Mot. for Leave to Dispense with Preparation of a J.A. 1, *Moore v. Harper*, No. 21-1271 (U.S. Aug. 19, 2022).

STANDARD OF REVIEW

On appeal, "[c]onclusions of law are reviewed de novo." *Dickson v. Rucho*, 367 N.C. 542, 551, 766 S.E.2d 238, 245 (2014), *summarily vacated on*

other grounds, 575 U.S. 959 (2015). The trial court's factual findings are binding so long as they are "supported by competent evidence, even if … there is evidence to the contrary." *Tillman v. Comm. Credit Loans, Inc.*, 362 N.C. 93, 100–01, 655 S.E.2d 362, 369 (2008) (alteration in original) (quoting *Lumbee River Elec. Membership Corp. v. City of Fayetteville*, 309 N.C. 726, 741, 309 S.E.2d 209, 219 (1983)).

SUMMARY OF ARGUMENT

In its liability-phase ruling, this Court set forth a clear standard for evaluating districting plans: A plan must afford "voters of all political parties substantially equal opportunity to translate votes into seats across the plan." *Harper*, 2022-NCSC-17, ¶ 163. Competent evidence supports the trial court's conclusion that the Remedial Congressional Plan fails to meet this standard. Each of the Special Masters and each of their expert advisors agreed that the Remedial Congressional Plan systematically advantages Republican voters over Democratic voters. And as shown by the far more evenhanded modified map developed by the Special Masters themselves, this partisan skew is not preordained by North Carolina's political geography.

Similarly unavailing is the Legislative Defendants' resort to the presumption of constitutionality and the separation of powers. This Court has already explained that a districting plan is entitled to a presumption of constitutionality only if "there is a significant likelihood that [it] will give the

voters of all political parties substantially equal opportunity to translate votes into seats." *Id.* The Remedial Congressional Plan fails to satisfy that standard and, under this Court's decision, is presumptively ***un***constitutional and subject to strict scrutiny. *Id.* ¶ 170.

Nor is there merit to the Legislative Defendants' contention that the trial court committed reversible error when it declined to disqualify two of the Special Masters' expert advisors for seeking publicly available information from Plaintiffs' experts. The Special Masters found that the communications from the two advisors did "not appear to be made in bad faith" and that the two advisors' analysis "was not determinative of any recommendations made by the Special Masters to the court." (R p 4899) The Legislative Defendants come nowhere close to identifying any actual bias on behalf of the assistants, let alone on behalf of the Special Masters themselves.

Finally, the Legislative Defendants' tactical decision to waive their federal Elections Clause argument in their opening brief has consequences: The Legislative Defendants have abandoned this argument not only with respect to the Remedial Congressional Plan, but also with respect to this Court's interlocutory decision invalidating the 2021 Enacted Congressional Plan. Moreover, if this Court chooses to grant the Legislative Defendant's motion to dismiss this appeal rather than resolving it on the merits, it should clarify the terms of dismissal to avoid prejudice to Plaintiffs. In particular, the

Court should make clear that any dismissal leaves in effect the trial court's final order adopting the Remedial Congressional Plan and renders that order a final judgment, and that the final judgment precludes the Legislative Defendants from relitigating all issues necessary to the outcome, including any argument under the federal Elections Clause.

ARGUMENT

I. Competent Evidence Supports the Trial Court's Finding that the Remedial Congressional Plan Fails to Satisfy the Standard this Court Set.

The trial court correctly held that "the Remedial Congressional Plan does not meet [this Court's] requirements" because it contains a degree of "partisan skew" that is "not explained by the political geography of North Carolina." App. 58–60, FOF 26, 34–35. The Legislative Defendants do not and cannot meet their heavy burden of showing that ***no*** competent evidence supports the court's finding of an unnecessary partisan skew. *Tillman*, 362 N.C. at 100–01, 655 S.E.2d at 369. The Legislative Defendants contend, incorrectly, that this Court's opinion set forth "statistical ranges" that definitively establish a plan's constitutionality. LD Br. 20–21. But even if those statistical ranges were controlling, the trial court found that the Remedial Congressional Plan failed to meet them. Competent evidence supported those findings, and they are "conclusive" on appeal. *Tillman*, 362 N.C. at 100, 655 S.E.2d at 369.

Indeed, overwhelming record evidence shows that the Remedial Congressional Plan systematically advantages voters of one political party over another. And overwhelming evidence likewise confirms that this skew did not derive from political geography: The trial court had before it multiple plans that give "voters of all political parties substantially equal opportunity to translate votes into seats" while performing better on traditional districting principles—one modified plan developed by the Special Masters and Dr. Grofman, and two plans proposed by Plaintiffs. *Harper*, 2022-NCSC-17, ¶ 163.

A. Redistricting Plans Must Provide Voters of All Political Parties Substantially Equal Opportunity to Translate Votes into Seats.

This Court set forth a clear standard in its liability-phase ruling: Redistricting plans must "give … voters of all political parties substantially equal opportunity to translate votes into seats." *Id.*; R pp 3821–22. As the Court explained, that standard requires districting plans to treat voters symmetrically, regardless of partisan preference: Voters who prefer one party in a given election "are entitled to have substantially the same opportunity to elect[] a supermajority or majority of representatives as the voters of the opposing party would be afforded if they comprised [the same] percentage of the statewide vote." *Harper*, 2022-NCSC-17, ¶ 169.

Thus, the Court held that a redistricting plan is "presumptively constitutional" only if the evidence shows that "there is a significant likelihood"

that "voters of all political parties [will have] substantially equal opportunity to translate votes into seats across the plan." *Id.* ¶ 163. By contrast, if the plan fails to treat all voters equally, "mak[ing] it systematically more difficult for a voter to aggregate his or her vote with other likeminded voters," strict scrutiny applies, and the plan is constitutional only if the General Assembly can prove that the plan's partisan skew is "necessary to promote a compelling governmental interest"—such as keeping districts compact and respectful of "political subdivisions" like counties. *Id.* ¶¶ 170, 180.

In evaluating whether a districting plan is entitled to a presumption of constitutionality, this Court explained that courts may consider various statistical approaches and metrics. *Id.* ¶¶ 163, 180. But this Court made clear that it was not "identify[ing] an exhaustive set of metrics or precise mathematical thresholds which conclusively demonstrate or disprove the existence of an unconstitutional partisan gerrymander." *Id.* ¶ 163. That is because "there are multiple reliable ways of demonstrating the existence of an unconstitutional partisan gerrymander" and various "combination[s] of these metrics" that can "demonstrate[] ... a significant likelihood" that a plan affords "voters of all political parties substantially equal opportunity to translate votes into seats." *Id.* "What matters," the Court explained, "is that each voter's vote carries roughly the same weight when drawing a districting plan that translates votes into seats in a legislative body." *Id.* ¶ 169.

B. The Trial Court's Findings Are Supported by Competent Evidence.

The Legislative Defendants do not address the constitutional standard this Court adopted. Instead, they focus on two statistical thresholds: a mean-median difference of less than 1% and an efficiency gap of 7% or less. But competent evidence supports the trial court's finding that the Remedial Congressional Plan exceeded even those thresholds. Competent evidence also shows that the plan violates the ultimate constitutional standard set by this Court.

1. Competent Evidence Shows the Remedial Congressional Plan Fails to Treat Voters of Both Parties Equally.

To begin, the trial court found that the plan failed to satisfy even the two statistical thresholds that the General Assembly now urges should be treated as conclusive—a mean-median difference of less than 1% and an efficiency gap of 7% or less. App. 59, FOF 34. As a result, the trial court held that the Remedial Congressional Plan "does not meet the … standards and requirements in [this Court's] Remedial Order and full opinion," even on the Legislative Defendants' interpretation, and is "subject to strict scrutiny." App. 70, COL 9. That finding is amply supported by "competent evidence" in the record and must be upheld. *Tillman*, 362 N.C. at 101, 655 S.E.2d at 369.

Three of the four Special Masters' expert advisors reported efficiency-gap values for the Remedial Congressional Plan of more than 7%. Dr. Wang

found an average efficiency gap of 7.4%. (R p 5079) Dr. Jarvis found an average efficiency gap of 8.8%. (R p 5115) And Dr. McGhee found an efficiency-gap range of 6.4% to 7.6%. (R p 5054) The final expert—Dr. Grofman—found an efficiency gap so close to 7% that he concluded that "the legislative map drawers … sought to draw a congressional map that just narrowly pass[ed] a supposed threshold test for partisan gerrymandering" and warned the Special Masters and the trial court that this figure was not "proof that there is no vote dilution" in the plan. (R p 5042)

Likewise, ample evidence shows that the Remedial Congressional Plan's mean-median difference exceeded 1%. Dr. McGhee calculated a mean-median score range of 1.1% to 1.6%. (R p 5054) Dr. Jarvis examined 11 statewide elections and found that the mean-median difference exceeded 1% in four elections. (R p 5114) In the ten elections Dr. Wang examined, the mean-median difference averaged 1.2% and exceeded 1% five times. (R p 5080) And again, Dr. Grofman, the only Special Masters' expert advisor to find a mean-median score consistently below 1%, warned that this finding in isolation carried little weight and could "present a misleading picture of the partisan consequences of the map as a whole." (R pp 5030, 5039) Ample competent evidence thus supports the finding that the Remedial Congressional Plan exceeds the thresholds the Legislative Defendants urge should apply.

Moreover, the holistic analysis this Court's opinion ***actually*** requires—which considers the additional metrics this Court identified as probative, like "partisan symmetry analysis" and "comparing the number of representatives that a group of voters of one partisan affiliation can plausibly elect with the number of representatives that a group of voters of the same size of another partisan affiliation can plausibly elect"—overwhelmingly confirms that the Remedial Congressional Plan does not give voters "substantially the same opportunity to elect[] a supermajority or majority of representatives as the voters of the opposing party would be afforded if they comprised [the same] percentage of the statewide vote." *Harper*, 2022-NCSC-17, ¶¶ 169, 180. The work of every expert below—including the Legislative Defendants' expert—shows that the Remedial Congressional Plan fails this standard.

Dr. Grofman found that the Remedial Congressional Plan would on average give Republicans 55.27% of seats in a tied election, showing a "***substantial*** pro-Republican bias." (R pp 5037, 5041 (emphasis in original)) As Dr. Grofman concluded, the plan is "very lopsidedly Republican," and the evidence as a whole "strongly suggest[s] the conclusion that this congressional map should be viewed as a pro-Republican partisan gerrymander." (R pp 5040, 5042) Indeed, Dr. Grofman powerfully underscored that point. The Remedial Congressional Plan created "6 Republican leaning districts that, based on averaged recent data will, barring a political tsunami, elect Republicans; 3

Democratic leaning districts that will, barring a political tsunami, elect Democrats; and 5 competitive districts." (R p 5040) To illustrate the partisan skew of a map with twice as many Republican-leaning districts as Democratic-leaning districts (six to three), Dr. Grofman suggested a "sports analogy":

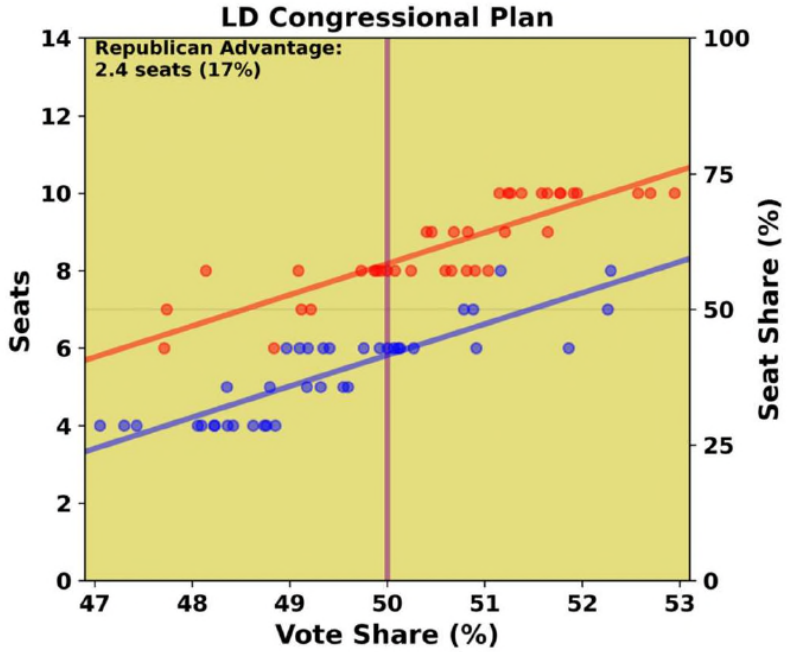
> Imagine a playoff series of 14 games of which a majority (9 of 14) have already been played, with five games still to go. The team that has won only 3 of the 9 games would need to win all five of the remaining games in order to win the series, and it would need to win four of the five just to get a tie. If the teams were evenly matched in the remaining games of the series the likelihood of winning all five is under 5%.

(R pp 5040–41) Statistical analysis, Dr. Grofman explained, confirmed that the bias in the Remedial Congressional Plan was "extreme." (R p 5041)

Consistent with Dr. Grofman's conclusion, Dr. McGhee found that the Remedial Congressional Plan retains about half of the unconstitutional bias in the invalidated congressional plan and thus "still favor[s] Republicans." (R p 5060) Dr. Wang concluded that the "Legislative Defendants' remedial plan contains an average advantage of approximately 1.7 Congressional seats for Republicans, and this advantage persists across a wide range of likely scenarios that may arise." (R p 5081) And Dr. Jarvis found that the Remedial Congressional Plan nearly always gives Republicans an extra seat in a tied election—creating a persistent two-seat advantage (with eight Republican seats to only six Democratic seats). (R p 5114)

These findings are consistent with the work of the parties' experts. *NCLCV* Plaintiffs' expert, Dr. Duchin, evaluated how the Remedial Congressional Plan would have translated votes into seats under every single statewide contested partisan election over the last decade. (R p 4808) She found that Democrats would not win a majority of North Carolina's 14 congressional seats unless they won statewide by a 2.32-percentage-point margin. (R p 4808) By contrast, Republicans could win a majority of seats even if they ***lost*** the statewide vote by a 3.72-point margin. (R p 4808) In nearly tied elections decided by less than one percentage point, the plan created an average of 5.8 Democratic seats and 8.2 Republican seats. (R p 4808) This asymmetry persisted even when voters across the state clearly prefer one party over another. (R p 4808) The result was a persistent 2.4-seat advantage for Republicans, across a wide variety of electoral environments.

Figure 1: Vote Shares & Seat Shares Under the Remedial Congressional Plan in Recent Statewide Elections

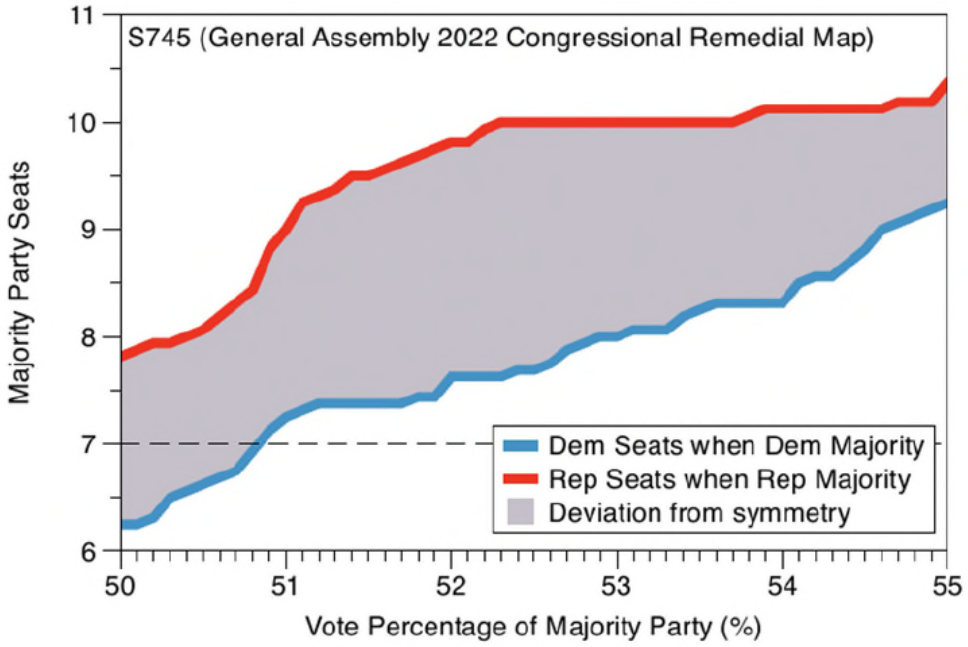


Source: R pp 4785, 4808.

The experts for Common Cause and *Harper* Plaintiffs—Drs. Mattingly and Herschlag—found the same problem. They tested the partisan symmetry of the Remedial Congressional Plan by taking 16 recent elections and then applying a "uniform swing" to see how the plan's seat shares would have changed had the vote share been somewhat different in each election, across the entire state. (R p 4755) Both concluded that Republicans would on average win 1.575 more congressional seats than Democrats given an identical vote share. (R pp 4756–57) To illustrate this bias, Drs. Mattingly and Herschlag averaged the seat results of their uniform-swing analysis for each given vote share. (R p 4757) As Figure 2 shows, unlike a symmetrical map, where the

blue and red lines would coincide, the Remedial Congressional Plan consistently gives Republicans a significant seat advantage.

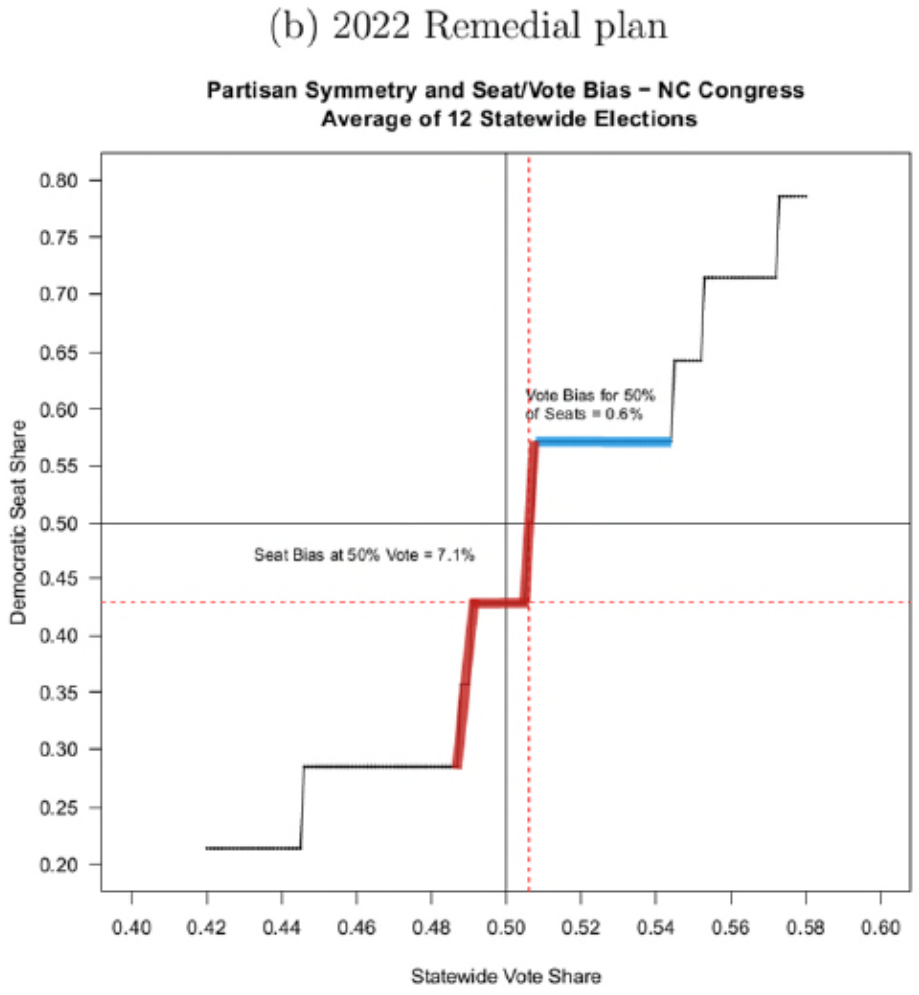
Figure 2: Vote Shares & Average Seat Shares Under Uniform-Swing Analysis



Source: R p 4757.

Even the Legislative Defendants' expert, Dr. Michael Barber, confirmed this discrepancy. He evaluated partisan symmetry in the Remedial Congressional Plan and found that when Democrats increase their vote share to nearly 55%, they win only eight congressional seats. (R p 4394) By contrast, as Figure 3 illustrates, when Republicans increase their vote share to just 51%, they win ***ten*** congressional seats. (R p 4394)

Figure 3: Dr. Barber's Partisan-Symmetry Analysis Based on Selected Elections



Source: R p 4745.

All this evidence supports the trial court's conclusion that the "Remedial Congressional Plan does not meet the … standards and requirements in [this Court's February 2022] Remedial Order and full opinion" and is thus presumptively unconstitutional and "subject to strict scrutiny." App. 70, COL 9.

2. Competent Evidence Supports the Trial Court's Finding that the Remedial Congressional Plan Fails Strict Scrutiny.

Competent evidence also supports the trial court's finding that this substantial partisan skew failed strict scrutiny. *See* App. 60, FOF 35; App. 70, COL 10. In evaluating whether partisan skew is narrowly tailored to serve a compelling government interest, the trial court was tasked with "assessing whether the mapmaker adhered to traditional neutral districting criteria" such that "a meaningful partisan skew ***necessarily results*** from North Carolina's unique political geography." *Harper*, 2022-NCSC-17, ¶ 163 (emphasis added); *see also id.* ¶ 163 n.15 ("[A]dherence to neutral districting criteria primarily goes to whether the map is justified by a compelling governmental interest ...."). As the trial court found, the plan's "partisan skew ... is not explained by the political geography of North Carolina," and thus the plan failed strict scrutiny. App. 60, FOF 35. The Legislative Defendants cannot carry their burden of showing that this finding was unsupported by competent evidence. In fact, the record renders the trial court's finding inescapable.

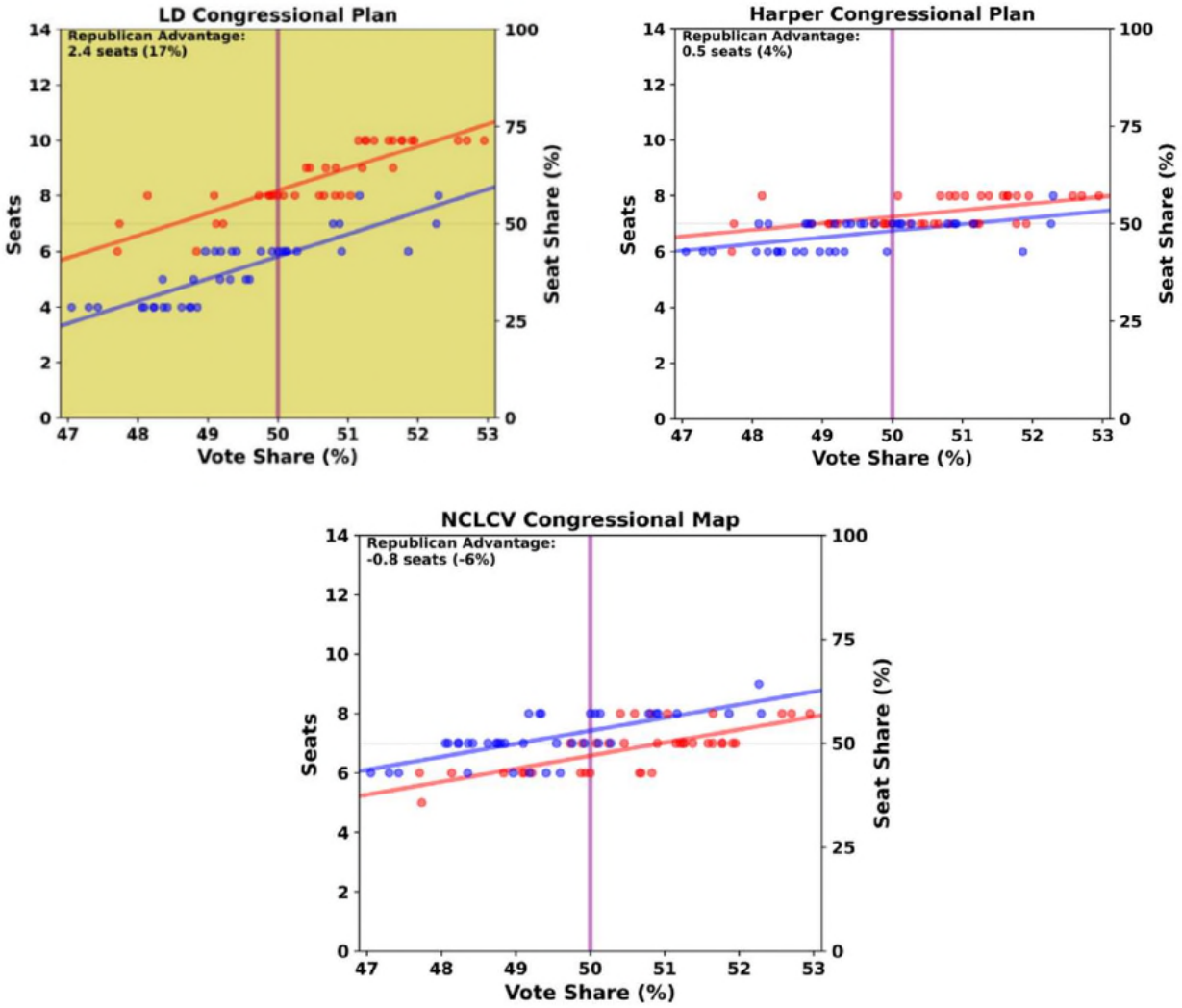
Dispositive evidence confirming this point comes from the Special Masters' Modified Remedial Congressional Plan, which dramatically reduced the Remedial Congressional Plan's partisan skew while maintaining adherence to traditional neutral districting principles. Upon finding that the Remedial Congressional Plan "fails to meet the threshold of constitutionality,"

the Special Masters, with Dr. Grofman's assistance, modified the plan to reduce its substantial partisan bias. (R p 4893) As the Special Masters explained, the Modified Remedial Congressional Plan reduced the efficiency gap from to 0.63%, the seat bias to 0.28%, and the vote bias to 0.10%—improving each of these metrics by better than 90%—all while "maintaining the number of county splits [and] retaining equal population, compactness, and contiguity, as well as respecting municipal boundaries." (R p 4902) Based on Dr. Grofman's calculations, the Special Masters' remedial plan "is the most non-dilutive plan in partisan terms of any map submitted to the Court" (R p 4902).

In addition, Plaintiffs submitted two congressional maps that treat voters of both parties fairly while meeting or exceeding the Remedial Congressional Plan's adherence to traditional neutral districting principles. Dr. Grofman explained that "it is … clear that the legislatively proposed congressional map is much more extreme with respect to partisan bias" than the more neutral maps proposed by Plaintiffs. (R p 5041) Dr. McGhee found that Plaintiffs' alternative maps created "less than half" the Republican advantage than the Remedial Congressional Plan did. (R p 5061) Dr. Wang reviewed Plaintiffs' proposed congressional maps and found that both reduced seat partisan asymmetry, partisan bias, and the efficiency gap when compared to the Remedial Congressional Plan. (R p 5082)

These conclusions were buttressed by analysis from Plaintiffs' experts. Dr. Duchin concluded that both of Plaintiffs' maps reduced bias on every single metric she studied. (R p 4813)

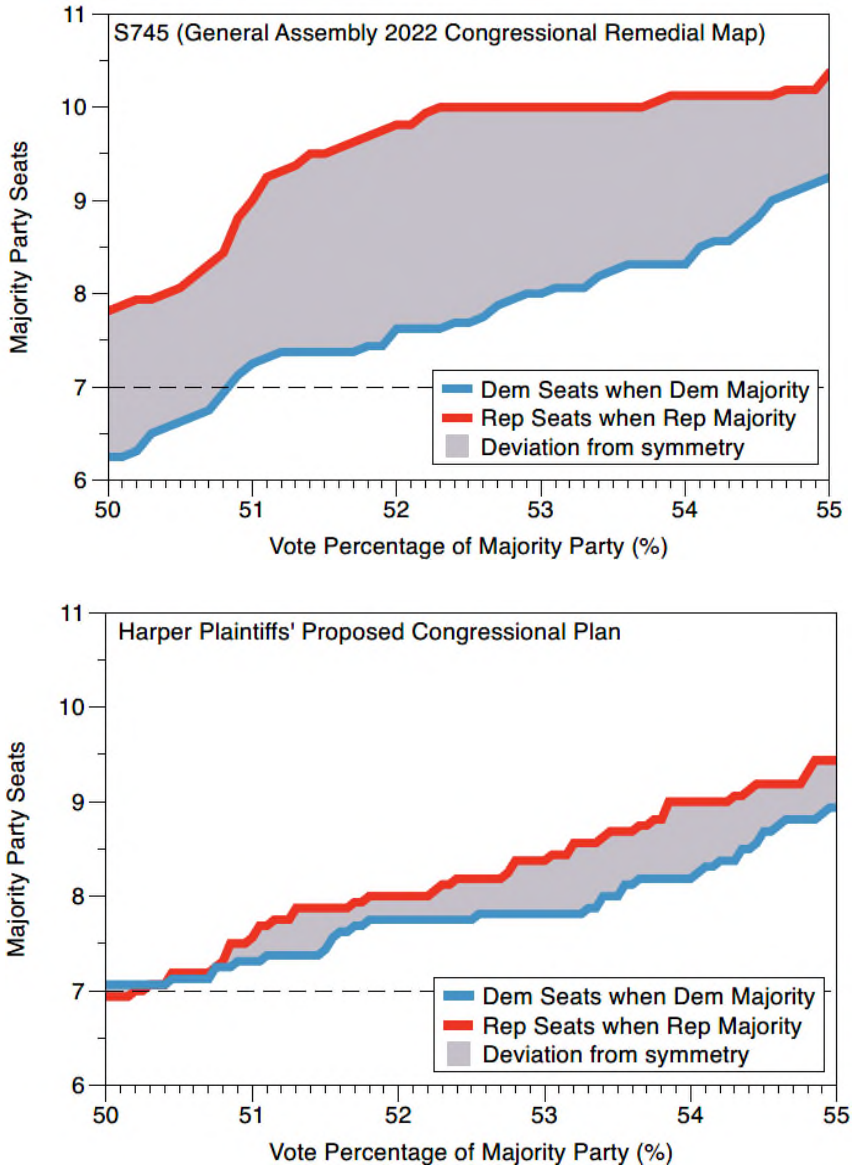
Figure 4: Seat Advantage Under Remedial Congressional Plan and Plaintiffs' Proposed Maps



Source: R pp 4785, 4808.

Likewise, *Harper* Plaintiffs' experts, Drs. Mattingly and Herschlag, concluded, based on their uniform-swing analysis, that the *Harper* proposed map came far closer to symmetry than did the Remedial Congressional Plan.

Figure 5: Partisan Symmetry Under Remedial Congressional Plan and Harper *Plaintiffs' Proposed Map*



Source: R p 4757.

And like the Modified Remedial Congressional Plan, Plaintiffs' plans were similar or superior to the Remedial Congressional Plan on traditional districting principles.[2]

In short, nothing about North Carolina's political geography justifies—much less necessitates—the partisan skew in the Remedial Congressional Plan. The Legislative Defendants do not argue otherwise. Nor do they identify any other compelling governmental interest that could justify the partisan skew in the Remedial Congressional Plan. The trial court therefore properly determined that this map failed strict scrutiny.

C. The Legislative Defendants' Efforts to Second-Guess the Trial Court's Factual Findings Are Unavailing.

The Legislative Defendants raise several arguments to try to overturn the trial court's findings of fact. None succeeds.

Principally, the Legislative Defendants argue that the trial court clearly erred when it found that the "Remedial Congressional Plan is not satisfactorily

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[2] In particular, the *NCLCV* and *Harper* maps had average Reock compactness scores of 0.47 and 0.45, respectively, and an average Polsby-Popper compactness score of 0.38 and 0.36 (where higher numbers indicate more compact districts). (Doc. Ex. 15518, 15691) These scores well exceeded the Remedial Congressional Plan's average Reock score of 0.38 and Polsby-Popper score of 0.30. (Doc. Ex. 13478) Likewise, whereas the Remedial Congressional Plan split 45 municipalities, the *NCLCV* and *Harper* maps split only 27 and 37, respectively. (Doc. Ex. 13528, 15457–72, 15649) And each of Plaintiffs' plans split no more counties than did the Remedial Congressional Plan. (Doc. Ex. 13507–13, 15449–52, 15631)

within the statistical ranges set forth in the Supreme Court's full opinion." App. 59, FOF 34. Per the Legislative Defendants, when the trial court evaluated whether the Remedial Congressional Plan satisfied those "statistical ranges," it had to limit itself to the Legislative Defendants' own calculations. LD Br. 18–31.

This argument fails, first, because it ignores, and inverts, the standard of review. The trial court's findings of fact in this case are "conclusive on appeal if supported by competent evidence, ***even if ... there is evidence to the contrary***." *Tillman*, 362 N.C. at 100–01, 655 S.E.2d at 369 (alteration in original) (emphasis added) (quoting *Lumbee River Elec. Membership Corp.*, 309 N.C. at 741, 309 S.E.2d at 219). The question on appeal is thus not whether the Legislative Defendants submitted evidence to support their position. It is whether any competent evidence supports the trial court's conclusion that the Remedial Congressional Plan fails to meet the standard this Court set. That question has a straightforward answer: Substantial expert evidence supported the trial court's conclusion that the Remedial Congressional Plan did not have an efficiency gap of less than 7% or a mean-median difference of less than 1% and did not give voters of both parties equal opportunity to translate votes into seats. *Supra* pp. 23–30.

The Legislative Defendants' arguments also underscore why this Court expressly eschewed "identify[ing] an exhaustive set of metrics or precise mathematical thresholds." *Harper*, 2022-NCSC-17, ¶ 163.

If the General Assembly had the power to select the metrics for partisan fairness, along with the sets of elections and other parameters to use when calculating those metrics, then it would be free to ignore the principled standard this Court set. While the Legislative Defendants admit that "analytical choice makes an impact," LD Br. 28, they insist that any "analytical choice" made by the General Assembly is immune from judicial review, regardless of any data manipulation embedded within that choice. Such manipulation is precisely what the Legislative Defendants accomplished here, where they reduced their efficiency-gap and mean-median difference figures substantially by cherry-picking certain statewide elections, but nonetheless produced a plan with an exceptional partisan skew. *Infra* pp. 38–39. The potential for such manipulation underscores why this Court instead grounded its liability-phase ruling on constitutional principle and emphasized that the dispositive question is always whether a districting plan "will give the voters of all political parties substantially equal opportunity to translate votes into seats across the plan." *Harper*, 2022-NCSC-17, ¶¶ 163, 180; *supra* pp. 21–22.

Given all that, the Legislative Defendants' observations that the various experts below each used different methods and sets of elections, *see* LD Br. 25–

29, only underscores the importance of a holistic view of the competent evidence. The diversity of available methods is a feature, not a bug. Far from a reason to discard these experts' work, the fact that six different experts used a variety of methodologies and independently found values higher than those asserted by the Legislative Defendants is a powerful reason to question the Legislative Defendants' claims that their remedial plan complied with even the two statistical thresholds they now urge this Court to rely on to the exclusion of all other analyses. The same is true of the Legislative Defendants' unsupported suggestion that the trial court should simply have accepted the General Assembly's reported statistics because legislators used a program called Maptitude. If anything, the fact that every one of the Special Masters' expert advisors disagreed with the Maptitude calculation merits affording less weight to these reported statistics.

Moreover, as the Legislative Defendants themselves admit, Maptitude calculations depend on the electoral data that the user selects, and the General Assembly selected a limited set of 12 elections. LD Br. 7, 25; Doc. Ex. 11641, 15416. Notably, in selecting those elections, the General Assembly omitted two up-ballot races—the 2016 races for Governor and Attorney General—where the Remedial Congressional Plan would have translated statewide Democratic vote majorities into Republican seat majorities. (Doc. Ex. 15416; R p 4808)

The Legislative Defendants imply that Dr. Mattingly omitted these same elections in evaluating the 2021 Enacted Plans. LD Br. 7. But Legislative Defendants cite a portion of Dr. Mattingly's report that analyzes cluster-specific results under state legislative plans. LD Br. 7; R pp 2593–627. To evaluate the 2021 Enacted Congressional Plan as a whole, Dr. Mattingly used a broader set of 16 elections that included the two contests that generated counter-majoritarian results, and which the Legislative Defendants now omit. (R pp 2639, 4746) As the Legislative Defendants concede, using Dr. Mattingly's 16 elections would push the mean-median difference and the efficiency gap beyond the Legislative Defendants' own thresholds. LD Br. 29; *see also* R pp 4746, 4758. Notably, Dr. Duchin evaluated every single one of the 52 statewide contested partisan races over the last decade (R p 4808) and concluded that the Remedial Congressional Plan has an efficiency gap of 9.3% and a mean-median difference of 1.5% (R p 4813).

The Legislative Defendants also incorrectly assert that the trial court "approved" their methods and therefore was required to accept the Legislative Defendants' cherry-picked metrics on remand. LD Br. 23, 26, 29. The trial court did no such thing. It merely held that the Legislative Defendants had acted permissibly in considering some partisan data during the redrawing. App. 56, FOF 15. The court did not endorse the relevance or persuasiveness of the specific electoral data the Legislative Defendants used. Nor did it hold, as

the Legislative Defendants now claim, that the metrics on which the Legislative Defendants now rest their entire case alone sufficed to demonstrate the constitutionality of the Remedial Congressional Plan.

Finally, the Legislative Defendants incorrectly argue that the trial court made no finding on the mean-median difference and efficiency gap in the Remedial Congressional Plan. LD Br. 22. But as an initial matter, neither this Court's liability-phase ruling nor N.C. Gen. Stat. § 120-2.4 required the trial court to enumerate the mean-median difference or efficiency gap for any proposed plan. More to the point, the trial court ***did*** enumerate its findings on those statistics: It found that the mean-median difference exceeded 1% and that the efficiency gap was not "less than 7%," and it relied on those findings to hold that the Remedial Congressional Plan does not satisfy the "standards and requirements" that this Court established. App. 59, FOF 34, 68; App. 70, COL 9.

Given all this, the Legislative Defendants fail to carry their heavy burden to show that no competent evidence supports the decision below.

II. The Legislative Defendants' Deference Arguments Do Not Support Overturning the Decision Below.

A. The Trial Court Correctly Determined that the Remedial Congressional Plan Was Not Presumptively Constitutional.

For three reasons, this Court should reject the Legislative Defendants' invocations of deference and arguments that the trial court failed to apply a

"presumption of constitutionality" to the Remedial Congressional Plan. LD Br. 14–18.

First, this Court's liability-phase ruling explained exactly when a plan is "presumptively constitutional": namely, if "there is a significant likelihood that the districting plan will give the voters of all political parties substantially equal opportunity to translate votes into seats." *Harper*, 2022-NCSC-17, ¶ 163. This Court emphasized that this framework for analyzing the General Assembly's plans would apply specifically during the litigation's remedial phase. *Id.* ¶ 223. After this Court found the 2021 Enacted Congressional Plan unconstitutional, the trial court was required on remand to determine whether any remedial plan enacted by the General Assembly satisfied "all provisions of the North Carolina Constitution" before accepting it. *Id.* ¶ 178. The trial court understood that it could approve or adopt only "***compliant*** congressional and state legislative districting plans." (R p 3823 (emphasis added)) So did the General Assembly, which expressly stated that its congressional plan was "contingent upon its approval or adoption by the Wake County Superior Court." S.L. 2022-3 § 2. Because the Remedial Congressional Plan did not meet that standard, it is not entitled to a presumption of constitutionality.

Second, the Court need not decide whether the General Assembly was entitled to deference, because the trial court gave the Legislative Defendants more than their due and ***afforded*** them deference: The Special Masters'

findings—which the trial court adopted in full, App. 58, FOF 27—show that even after "giving appropriate deference to the General Assembly," the Special Masters found "that the proposed remedial congressional plan fails to meet the threshold of constitutionality." (R p 4893)

Third, the Legislative Defendants' invocations of deference are especially meritless because they were ***already*** found to have engaged in intentional discrimination in enacting all three of the now-invalidated 2021 plans. This Court held that the "Legislative Defendants presented no evidence at trial to disprove[] the extensive findings of fact of the trial court[] to the effect that the enacted plans are egregious and intentional partisan gerrymanders, designed to enhance Republican performance." *Harper*, 2022-NCSC-17, ¶ 8. Hence, if anything, the standard for assessing their proposed remedy should be ***more*** stringent than in the liability phase, to ensure that the constitutional harm has been fully cured. *See Stephenson v. Bartlett*, 357 N.C. 301, 307, 314, 582 S.E.2d 247, 251, 254 (2003) ("*Stephenson II*") (affirming trial-court holding that "the 2002 revised redistricting plans are constitutionally deficient" because the plans "fail to attain 'strict compliance' with [*Stephenson I*]").

Following analogous findings of intentional discrimination in districting, courts have placed the burden on the legislature to show that its proposed remedial plan will be effective in eliminating the prior discrimination. *See League of Women Voters of Fla. v. Detzner*, 172 So. 3d 363, 371 (Fla. 2015)

(holding that "[o]nce a direct violation of the Florida Constitution's prohibition on partisan intent in redistricting was found, the burden should have shifted to the Legislature to justify its decisions in drawing the congressional district lines"); *see also, e.g.*, *Gannon v. State*, 368 P.3d 1024, 1043 (Kan. 2016) (per curiam) ("[W]e reject the State's claims that the presumption of constitutionality that generally applies to our initial review of statutes should extend to the remedial phase."); *DeRolph v. State*, 699 N.E.2d 518, 518–19 (Ohio 1998) (mem.) (holding, at the remedial phase, that the "state has the burden of production and proof and must show by a preponderance of the evidence that the constitutional mandates have been satisfied").

The case law the Legislative Defendants rely on is inapposite: *State ex rel. Martin v. Preston*, 325 N.C. 438, 385 S.E.2d 473 (1989), was a ***liability***-phase decision in which the Court considered the constitutionality of an apportionment act in the first instance; the Court was not reviewing the constitutionality of a proposed ***remedial*** plan, as is the case here. *See id.*, 325 N.C. at 449, 385 S.E.2d at 479. And here, the evidence before the trial court satisfied even the standard the Legislative Defendants incorrectly seek to derive from *Preston*, as it demonstrates that the Remedial Congressional Plan

was "plainly and clearly" unconstitutional. *Id.*, 325 N.C. at 449, 385 S.E.2d at 478.[3]

B. The Degree of Deference the Legislative Defendants Urge Would Violate the Separation of Powers.

To buttress their arguments for deference and a presumption of constitutionality, the Legislative Defendants invoke the "separation of powers." LD Br. 14, 15, 17, 23, 32, 34. They suggest that, when North Carolina courts review and remedy unconstitutional redistricting plans, they endanger the separation of powers—and that the only way to vindicate our State's separation of powers is to treat as conclusive the General Assembly's

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[3] None of the other cases that the Legislative Defendants cite support their contentions. In *Abbott v. Perez*, 138 S. Ct. 2305 (2018), the U.S. Supreme Court was motivated by a concern about ***federal*** "intrusion" into state redistricting, *id.* at 2324 (quoting *Miller v. Johnson*, 515 U.S. 900, 915 (1995)). And its comment that federal courts should apply a "presumption of legislative ***good faith***" to state redistricting plans does not help the Legislative Defendants here. *Id.* The trial court ***did*** presume the General Assembly's good faith, and this Court's liability-phase ruling identified when districting plans are entitled to a presumption of constitutionality. Indeed, in enacting the plans at issue in *Perez*, the legislature was enacting remedial plans developed ***by a federal court***. *Id.* at 2325. Thus, even if *Perez* applied here, the case would support only a presumption of good faith for the future enactment of the ***Modified*** Remedial Congressional Plan.

The Legislative Defendants' remaining cases do not involve redistricting. *See Wayne Cnty. Citizens Ass'n for Better Tax Control v. Wayne Cnty. Bd. of Comm'rs*, 328 N.C. 24, 399 S.E.2d 311 (1991) (challenge to installment purchase contract); *N.C. State Bd. of Educ. v. State*, 371 N.C. 170, 814 S.E.2d 67 (2018) (challenge to public education bill); *State v. Bryant*, 359 N.C. 554, 614 S.E.2d 479 (2005) (criminal matter); *Jenkins v. State Bd. of Elections*, 180 N.C. 169, 104 S.E. 346 (1920) (challenge to law affecting absentee ballots).

"analytical choice[s]." LD Br. 28. These arguments failed before this Court in the liability phase, and the Court should reject them again. *Harper*, 2022-NCSC-17, ¶ 113 (rejecting the argument that "reapportionment is committed to the sole discretion of the General Assembly" as "flatly inconsistent with our precedent interpreting and applying constitutional limitations on the General Assembly's redistricting authority").

1. The Legislative Defendants' Separation-of-Powers Arguments Ignore the Statutes Authorizing North Carolina Courts to Review and Remedy Unlawful Districting Plans.

To begin, the Legislative Defendants' arguments conflict with the North Carolina statutes specifically authorizing judicial review of congressional redistricting. The General Assembly has enacted statutes authorizing three-judge courts like the trial court below to hear "action[s] challenging the validity of any act … that … redistricts … congressional districts," N.C. Gen. Stat. § 1-267.1(a); to issue "judgment[s] declaring unconstitutional … any act … that … redistricts … congressional districts," *id.* § 120-2.3; and to implement "an interim districting plan" if the General Assembly does not "remedy any defects" in its plan within two weeks, *id.* § 120-2.4(a), (a1). Those statutes expressly authorize North Carolina's courts to review whether congressional districting plans comply with the North Carolina Constitution, and to remedy plans that violate the North Carolina Constitution as interpreted by North Carolina's

courts. North Carolina's courts do not endanger the separation of powers when they carry out judicial review that the General Assembly has expressly and specifically authorized. Far from suggesting that congressional districting plans deserve any special deference from North Carolina's courts, these statutes confirm that the normal standards of judicial review apply.

Plaintiffs expect that the Legislative Defendants will argue in reply that these statutes do not authorize judicial review; that they only "govern the ***procedure*** that applies in whatever districting challenges may be authorized by other, substantive provisions of law"; and that they are "best read as … govern[ing] [only] a ***federal*** constitutional challenge brought in state court." *Moore* Pet. Br. 47–48 (emphasis in original). The Legislative Defendants have raised those arguments in the U.S. Supreme Court in their attempt to resist the plain language and implication of the above-cited North Carolina statutes, which foreclose their federal Elections Clause claims: Because the General Assembly itself via these statutes has "prescribed" judicial review of, and remedies for, congressional districting plans that violate the state constitution, the North Carolina courts' actions in this case comported with the federal Elections Clause even under the Legislative Defendants' own interpretation of that Clause. *See generally Harper* and *NCLCV* Plaintiffs-Appellants' Resp. in Opp. to Mot. to Dismiss Appeal at 4–5, 6–8 (July 18, 2022) ("MTD Opp.").

But the Legislative Defendants' strained interpretation of these state statutes is incorrect. These statutes on their face contemplate, and authorize, that North Carolina state courts will (for example) issue "judgment[s] declaring unconstitutional … any act … that … redistricts … congressional districts," N.C. Gen Stat. § 120-2.3, and implement "an interim districting plan" if the General Assembly does not "remedy any defects" in its plan within two weeks, *id.* § 120-2.4(a), (a1). These statutes, moreover, are not limited to federal constitutional challenges but apply equally to state constitutional challenges. That is why North Carolina's courts have acted pursuant to these statutes to hear state constitutional challenges to congressional districting plans. *E.g.*, *Common Cause v. Lewis*, No. 18 CVS 014001, 2019 WL 4569584 (N.C. Super. Sept. 3, 2019).

Indeed, *Stephenson v. Bartlett*, 358 N.C. 219, 595 S.E.2d 112 (2004) ("*Stephenson III*"), forecloses the Legislative Defendants' crabbed interpretation of these statutes and underscores how these statutes vindicate, rather than undermine, the separation of powers. There, this Court applied those statutes to a *state* constitutional challenge to legislative districts (contradicting the Legislative Defendants' arguments that they apply only to federal challenges). And in rejecting the argument that these statutes violated the separation of powers, this Court explained that "[i]n passing these statutes, the General Assembly has recognized the unique nature of these infrequent

but potentially divisive cases [*i.e.*, redistricting cases] and has set out a workable framework for judicial review that reduces the appearance of improprieties" and "allow[s] the General Assembly to exercise its proper responsibilities." *Id.*, 358 N.C. at 229–30, 595 S.E.2d at 119. That understanding of these statutes—that they establish a "framework for judicial review"—cannot be squared with the Legislative Defendants' argument that these statutes only concern narrow questions of venue and procedure. *Id.* These statutes affirm that this State's courts may continue, with the General Assembly's blessing, to review and remedy unlawful redistricting plans.

These on-point statutes, and this Court's interpretations of them in the face of a prior constitutional challenge, are fatal to the Legislative Defendants' separation-of-powers arguments in this Court. And only this Court, as the ultimate arbiter of the meaning of North Carolina's statutes, can authoritatively interpret the statutes that the Legislative Defendants continue to mischaracterize. *See* MTD Opp. at 6–8; *cf. Berger v. N.C. State Conf. of NAACP*, 142 S. Ct. 2191, 2202 (2022) (interpreting North Carolina law absent guidance from this Court and concluding that state law authorizes "legislative leaders [to] defend laws" in federal court as state agents).

2. The Legislative Defendants' Arguments Undermine Rather than Vindicate the Separation of Powers.

Even aside from these dispositive statutes, the Legislative Defendants' arguments are inconsistent with North Carolina's constitutional separation of powers and would undermine the North Carolina Constitution's fundamental guarantees on all matters related to redistricting.

By asserting that courts should defer to the "mathematical analysis" and metrics "politically chosen by the General Assembly," LD Br. 18, 23—instead of independently evaluating whether an apportionment plan provides North Carolina's citizens substantially equal voting power—the Legislative Defendants propose a framework that would effectively prevent the judiciary from performing its core constitutional duty: to "construe the limits on the powers of the branches of government created by our Constitution." *Comm. to Elect Dan Forest v. Emps. Pol. Action Comm.*, 376 N.C. 558, 2021-NCSC-6, ¶ 14. The result of such an approach is contrary to the separation of powers. *See* N.C. CONST. art. I, § 6; *Cooper v. Berger*, 376 N.C. 22, 44, 852 S.E.2d 46, 63 (2020) ("A violation of the separation of powers clause occurs when one branch of government attempts to exercise the constitutional powers of another or when the actions of one branch prevent another branch from performing its constitutional duties."). Indeed, the General Assembly itself recognized as much when it provided that the Remedial Congressional Plan's effectiveness

would be "contingent upon its approval or adoption by the Wake County Superior Court." SL-2022-3 § 2; *see also* SL-2022-2 § 2; SL-2022-4 § 2. The Legislative Defendants again cannot claim that the trial court endangered the separation of powers by carrying out the review the General Assembly itself prescribed.

The Legislative Defendants' approach would also run contrary to the framework set forth by this Court in evaluating unconstitutional partisan gerrymandering. In its liability-phase ruling, this Court referenced one-person, one-vote as a framework for developing specific metrics to assess unconstitutional partisan gerrymandering in a "reasoned elaboration of increasingly precise standards." *Harper*, 2022-NCSC-17, ¶ 168 (citing *Brown v. Thomson*, 462 U.S. 835, 842–43 (1983)). As this Court recognized, it is the courts (and not legislators) that work to develop a "body of doctrine on a case-by-case basis" to arrive at "detailed constitutional requirements in the area of ... apportionment." *Reynolds v. Sims*, 377 U.S. 533, 578 (1964); *Harper*, 2022-NCSC-17, ¶ 163 ("As in *Reynolds*, '[l]ower courts can and assuredly will work out more concrete and specific standards for evaluating state legislative apportionment schemes in the context of actual litigation." (alteration in original) (quoting *Reynolds*, 377 U.S. at 578)).

In developing one-person, one-vote jurisprudence, federal courts over time established a 10% threshold for presumptively constitutional "minor

deviations" in state-legislative apportionment plans—but they decidedly did not defer to legislatures to decide what amount of deviation was permissible under the Fourteenth Amendment. *See Brown*, 462 U.S. at 842 ("Our decisions have established, as a general matter, that an apportionment plan with a maximum population deviation under 10% falls within this category of minor deviations.").[4] The Court should similarly reject the Legislative Defendants' requests for blind deference to the General Assembly's choice of metrics here.

III. The Trial Court Did Not Abuse Its Discretion in Declining to Disqualify Two of the Special Masters' Expert Advisors.

A. The Trial Court's Decision Must Be Upheld Unless the Trial Court Abused Its Discretion.

The trial court's denial of the motion to disqualify two of the Special Masters' four expert advisors, Drs. Wang and Jarvis, is reviewed for abuse of discretion. *State v. McGrady*, 368 N.C. 880, 893, 787 S.E.2d 1, 11 (2016); *Point Intrepid, LLC v. Farley*, 215 N.C. App. 82, 86, 714 S.E.2d 797, 800 (2011). "A ruling committed to a trial court's discretion is to be accorded great deference and will be upset only upon a showing that it was so arbitrary that it could not

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[4] The U.S. Supreme Court's decision in *Evenwel v. Abbott*, 578 U.S. 54 (2016), further supports this conclusion. In *Evenwel*, the Court rejected the claim that the federal Constitution's Equal Protection Clause requires equalizing districts' voter-eligible populations (instead of total populations) based upon an analysis of the constitutional history of the Clause and the Court's own precedent, not any notion of "legislative deference"—a phrase that appears nowhere in the opinion. *Id.* at 64–73.

have been the result of a reasoned decision." *In re Proposed Foreclosure of a Claim of Lien Filed on George*, 377 N.C. 129, 2021-NCSC-35, ¶ 23.

B. The Trial Court Did Not Abuse Its Discretion in Denying the Motion to Disqualify.

The Legislative Defendants fail to show that the trial court's denial was "manifestly unsupported by reason" as is necessary to demonstrate an abuse of discretion. *Davis v. Davis*, 360 N.C. 518, 523, 631 S.E.2d 114, 118 (2006). The Special Masters' Report, which the trial court reviewed and adopted in its order denying the motion to disqualify (App. 45–46), sets forth the numerous and well-reasoned grounds to deny the motion to disqualify Drs. Wang and Jarvis.

First, the Special Masters found that "the analysis provided by Drs. Wang and Jarvis ... was not determinative of any recommendations made by the Special Masters to the court." This, standing alone, justifies the decision to deny the motion. R p 4891; *see Point Intrepid*, 215 N.C. App. at 89, 714 S.E.2d at 802 ("We examine the facts of the present case to determine whether [the special master's] neutrality was impacted by any ex parte communications.").

Second, as the Special Masters found, the communications "were solely for the purpose of proceeding as quickly as possible within the abbreviated time frame allotted for the remedial process" and "do not appear to be made in bad

faith." (R p 4891) The Special Masters and their expert advisors had a mere five days to evaluate the Remedial Congressional Plan, and only two days to review Plaintiffs' comments on that plan. (R pp 4869, 4871, 4874) In this context, it is clear that the two experts in question—university professors who routinely make research data part of the public domain—were simply seeking to locate relevant public information as quickly as possible.

Third, there is no possibility that there could have been any bad faith. As the Special Masters found, the information sought was all "background information pertaining to the earlier analysis of the 2021 Redistricting Plans" performed by the experts at the liability phase of the case and was publicly available at the time. (R p 4891)

And finally, when the communications were discovered, Plaintiffs promptly disclosed all emails, and the communications ceased immediately, leaving no possibility that other communications could have occurred. (R p 4608)

All of these facts—which the Legislative Defendants fail to account for or rebut—provide ample reason for the trial court's decision.

The Legislative Defendants' core argument is a mere assertion that the brief communications between Drs. Wang and Jarvis and plaintiffs' experts about publicly available information somehow "biased the recommendations made by the Special Masters" and that the communications "materially

violated" the trial court's order. LD Br. 34. They also try to impute the purported (but in fact nonexistent) bias of the Special Masters' expert advisors to the Special Masters themselves—based not on any action by the Special Masters, but instead on the ***trial court's*** denial of the Legislative Defendants' motion to disqualify. LD Br. 36 ("The superior court's decision to keep Drs. Wang and Jarvis as assistants to the Special Masters shows the improper bias against Legislative Defendants in the Special Masters' determination of the unconstitutionality of the congressional plan.").

But none of the Legislative Defendants' conjecture actually speaks to the basis on which they could plausibly have sought recusal, *i.e.*, that Drs. Wang and Jarvis's conduct somehow interfered with ***the Special Masters'*** ability to serve as "neutral arbiter[s]," *In re Search Warrant Issued June 13, 2019*, 942 F.3d 159, 181 & n.19 (4th Cir. 2019), or could prompt an "informed observer" to "reasonably ... question [the Special Masters'] impartiality" based on their assistants' conduct, *In re Brooks*, 383 F.3d 1036, 1046 (D.C. Cir. 2004); *see also* FED. R. CIV. P. 53(a)(2). Again, the Special Masters stated that "though the analysis provided by Drs. Wang and Jarvis was helpful and consistent with the analysis of our other expert advisors, it was not determinative of any recommendation made by the Special Masters to the court." (R p 4891) The Legislative Defendants fail to address or rebut this reasoning or to show that the trial court's acceptance of it was an abuse of discretion.

The Legislative Defendants also assert that "a substantial amount of work was completed by Drs. Wang and Jarvis contemporaneously with their communications with Plaintiffs' experts." LD Br. 37. This is irrelevant: The time entries were not before the trial court when it evaluated the motion to disqualify. Moreover, the Legislative Defendants do not explain how the entries would indicate bias in their analysis. The Legislative Defendants simply claim that Dr. Jarvis's time entries show "that his analysis was not independent, and his analysis of the congressional plans was wholly reliant on Dr. Mattingly and Dr. Herschlag's opinions." LD Br. 37.[5] This is incorrect. In fact, Dr. Jarvis's time entries itemize both a search for "other available NC ensemble data" and an independent check to "[e]valuate properties, quality, and suitability of this dataset for the current problem." LD Br. 37 (citing Dr. Jarvis's time entries). This argument evaporates especially quickly given that all the substantive information shared by Drs. Mattingly and Herschlag was available on their website (R p 4891) and so accessible to the Special Masters' advisors regardless—a fact the Legislative Defendants omit in their brief.

The principal case upon which the Legislative Defendants rely, *Point Intrepid, LLC v. Faley*, 215 N.C. App. 82, 714 S.E.2d 797 (2011), confirms the

[5] The Legislative Defendants make no claims about Dr. Wang's time entries, presumably because they provide no support for this unavailing argument.

weakness of their argument. In *Point Intrepid,* the Court of Appeals considered the plaintiffs' appeal of an order requiring payment of the fees for a third-party expert. The plaintiffs argued that the third-party experts' communications with counsel about the facts of the case biased him as a third-party expert. *Id.*, 215 N.C. App. at 83, 714 S.E.2d at 798. The Court of Appeals rejected the contention that ex parte communications were automatically prejudicial where they discussed facts known to all parties in the litigation; instead, a court must "examine the facts of the present case to determine whether [the special master's] neutrality was impacted by *ex parte* communications" at issue. *Id.*, 215 N.C. App. at 89, 714 S.E.2d at 802.

The *Point Intrepid* court thus explained that establishing bias turns on the substance of the ex parte communications, rather than the mere fact of their existence. *Id.*, 215 N.C. App. at 88–89, 714 S.E.2d at 802 (collecting cases); *cf. Weaver Inv. Co. v. Pressly Dev. Assocs.*, 234 N.C. App. 645, 660, 760 S.E.2d 755, 764 (2014) ("[D]efendants merely assert that there were contacts between plaintiffs and the expert; defendants present no evidence that such contacts were improper."). As discussed above, there is no indication that the substance of the communications here—which concerned only publicly available information—created or reveals any bias by Dr. Wang or Dr. Jarvis, and Legislative Defendants certainly did not show that any bias influenced the Special Masters' recommendations.

The communications at issue here were limited, focused on efficiently locating publicly available information, and had no effect at all on the recommendations ultimately adopted by the Special Masters. (R p 4891) Accordingly, the Legislative Defendants have failed to show any error in the trial court's denial of their motion, much less an abuse of discretion. *See Point Intrepid*, 215 N.C. App. at 91, 714 S.E.2d at 803 ("We find Plaintiffs' argument unconvincing and believe the trial court did not abuse its discretion in deciding this e-mail did not bias Johnson as a neutral third-party expert.").

IV. The Legislative Defendants Have Abandoned Their Elections Clause Argument.

In prior briefing before this Court concerning the 2021 Enacted Congressional Plan, the Legislative Defendants contended that the federal Constitution's Elections Clause, U.S. CONST. art. I, § 4, cl. 1, "bar[red] plaintiffs['] claims against the congressional plan." LD Response Br. 183–84, *Harper v. Hall*, No. 413PA21 (N.C. Jan. 28, 2022). This Court's opinion properly rejected that argument, both because it "was not presented at the trial court" and because it failed on the merits. *Harper*, 2022-NCSC-17, ¶ 175. At the stay stage, the Legislative Defendants again raised the Elections Clause in contesting the trial court's adoption of the Modified Remedial Congressional Plan, this time contending that by "selecting its own remedial congressional map the trial court is likely violating federal law." LD Mot. for Temp. Stay at

19, *Harper v. Hall*, No. 413PA21 (N.C. Feb. 23, 2022). Again, the argument made no headway with this Court. *See Harper*, 868 S.E.2d at 97. The Legislative Defendants have continued to press their Elections Clause arguments in the U.S. Supreme Court in a brief filed on 29 August 2022—arguing that this Court violated the Elections Clause by "nullifying" the 2021 Enacted Congressional Plan and "replac[ing]" it "with regulations of [this Court's] own devising, based on vague state constitutional provisions purportedly vesting the state judiciary with power to prescribe whatever rules it deems appropriate to ensure a 'fair' or 'free' election." *Moore* Pet. Br. i; *see id.* at 3–4, 49–50.

In their opening brief here, however, the Legislative Defendants strategically declined to raise any Elections Clause arguments (after this Court deferred ruling on their motion to dismiss their appeal, and after *Harper* and *NCLCV* Plaintiffs revealed the gamesmanship that the Legislative Defendants sought to achieve, *see* MTD Opp. 3–6).

That tactical choice has consequences. By choosing not to raise their Elections Clause argument in their opening brief in this appeal, the Legislative Defendants have abandoned their argument. *See* N.C. R. APP. P. 28(a) ("Issues not presented and discussed in a party's brief are deemed abandoned."); *McKinnon v. CV Indus., Inc.*, 228 N.C. App. 190, 196, 745 S.E.2d 343, 348 (2013) (applying Rule 28(a) to deem argument abandoned, even if issue is

referenced in "passing," if appellant makes "no specific argument" addressing alleged error).

More than that, as a matter of North Carolina law, the Legislative Defendants have abandoned their Elections Clause argument not only with respect to the Modified Remedial Congressional Plan at issue in this appeal, but also with respect to this Court's February 2022 interlocutory decision invalidating the 2021 Enacted Congressional Plan and remanding this case to the trial court for a remedial phase. Upon entry of final judgment in this case, all prior opinions and interlocutory orders in this case merge into that final judgment: "North Carolina, of course, takes the traditional view that interlocutory orders are subject to change and to direct attack throughout the proceedings in which entered; that unless changed or vacated [s]ua sponte or on direct party attack they are merged in any final judgment; and that they are thereafter subject to attack ***only as an incident to attack upon the final judgment***." *Yale v. Nat'l Indem. Co.*, 602 F.2d 642, 647 (4th Cir. 1979) (emphasis added) (citing *Skidmore v. Austin*, 261 N.C. 713, 136 S.E.2d 99 (1964)). By leveling no "attack upon the final judgment" under the Elections Clause, the Legislative Defendants forfeited their ability to challenge prior orders on that ground.

Given that the Legislative Defendants have continued to press their federal Elections Clause arguments in the U.S. Supreme Court, including as

to the Modified Remedial Congressional Plan ***specifically***, even after trying to tactically abandon those arguments in this Court, Plaintiffs respectfully submit that it would be appropriate for this Court to clarify that those arguments have been waived as a matter of North Carolina law.

V. If this Court Dismisses This Appeal, Its Dismissal Order Should Impose Certain Terms Clarifying the Effect of Dismissal.

Harper and *NCLCV* Plaintiffs have opposed the Legislative Defendants' motion to dismiss this appeal and continue to do so for the reasons detailed in their opposition brief. *See* MTD Opp. 1–8. They maintain that the Court should decide this case on the merits and should affirm the trial court's judgment. But in the event the Court disagrees and grants the motion to dismiss, Plaintiffs reiterate their request that the Court exercise its authority to grant dismissal only "upon such terms as … fixed by the appellate court." N.C. R. APP. P. 37(e)(2).

In particular, if the Court declines Plaintiffs' primary request to decide this appeal on the merits, Plaintiffs respectfully request that the Court impose certain "terms" aimed to avoid prejudice to Plaintiffs, and to prevent Legislative Defendants from benefiting from their gamesmanship in dismissing their appeal. *See generally* MTD Opp. 12–13.

First, applying the principles discussed above, any order dismissing the Legislative Defendants' appeal could make clear that the dismissal leaves in

effect the trial court's final order adopting the Modified Remedial Congressional Plan and renders that order a final judgment, with all "interlocutory orders … merg[ing] in [that] final judgment." *Yale*, 602 F.2d at 647 (citing *Skidmore*, 261 N.C. 713, 136 S.E.2d 99)). And this Court's dismissal order could clarify that by dismissing their appeal—and by filing an opening brief that does not even mention the federal Constitution's Elections Clause—the Legislative Defendants, as a matter of North Carolina law, have abandoned any argument that the trial court's final judgment, or any prior orders in this case, violate the Elections Clause. *See* N.C. R. APP. P. 28(a); *McKinnon*, 228 N.C. App. at 196, 745 S.E.2d at 348.

Second, any dismissal order could also memorialize that, as a matter of North Carolina law, the trial court's final judgment both (1) collaterally estops the Legislative Defendants from "relitigat[ing] … issues actually litigated and necessary to the outcome" of the judgment and (2) is *res judicata* as to "all matters, either fact or law, that were or should have been adjudicated" in connection with the final judgment. *Thomas M. McInnis & Assocs., Inc. v. Hall*, 318 N.C. 421, 428–29, 349 S.E.2d 552, 556–57 (1986).

In particular, the Court could make clear that, under North Carolina law, these doctrines preclude relitigation of the Legislative Defendants' argument that the federal Constitution's Elections Clause barred the invalidation of the 2021 Enacted Congressional Plan or the implementation of

the Modified Remedial Congressional Plan. *See King v. Grindstaff*, 284 N.C. 348, 360, 200 S.E.2d 799, 808 (1973) (*res judicata* and collateral estoppel apply between state and federal courts). These doctrines apply even if the Legislative Defendants attempt to relitigate the Elections Clause issue within this same litigation. *See Save Our Rivers, Inc. v. Town of Highlands*, 341 N.C. 635, 638, 461 S.E.2d 333, 335 (1995) (according *res judicata* effect to an unappealed "holding of the Court of Appeals in this case").

With respect to the Elections Clause issue, the trial court's order meets all requirements for collateral estoppel and *res judicata*. For collateral estoppel, dismissal of the appeal will render the trial court's remedial order "a final judgment on the merits." *Thomas M. McInnis*, 318 N.C. at 428–29, 349 S.E.2d at 557. The Elections Clause issue was "actually litigated and necessary to" the final judgment, having been raised by the Legislative Defendants for the first time in the appeal from the trial court's initial order denying Plaintiffs' challenge to the 2021 Enacted Congressional Plan, LD Response Br. 183–84, *Harper v. Hall*, No. 413PA21 (N.C. Jan. 28, 2022); again in contesting the trial court's entry of the Modified Remedial Congressional Plan (R p 4640); and again in seeking an emergency stay of the trial court's remedial order, LD Mot. for Temp. Stay at 19, *Harper v. Hall*, No. 413PA21 (N.C. Feb. 23, 2022). The argument was rejected at all three stages prior to the trial court's entry of final judgment against the Legislative Defendants.

The Legislative Defendants are therefore estopped from relitigating their Elections Clause argument in any pending or future litigation involving these same parties or their privies. *See Thomas M. McInnis*, 318 N.C. at 428–29, 349 S.E.2d at 557.

The trial court's final judgment is likewise subject to *res judicata* effect: If the appeal is dismissed, the trial court's order will be a "final judgment on the merits," and the Legislative Defendants' Elections Clause argument was one of the "matters, either fact or law, that were or should have been adjudicated" leading up to the final judgment. *Id.*, 318 N.C. at 428, 349 S.E.2d at 557. The Legislative Defendants are therefore barred from relitigating their Elections Clause argument in any pending or future case where Plaintiffs or their privies assert the same cause of action. *See id.*; 19 STRONG'S NORTH CAROLINA INDEX § 164, Westlaw (4th ed. Database updated Aug. 2022).

CONCLUSION

For the foregoing reasons, *NCLCV* Plaintiffs, *Harper* Plaintiffs, and Plaintiff-Intervenor Common Cause respectfully request that this Court affirm the trial court's order and judgment rejecting the Remedial Congressional Plan and adopting the Modified Remedial Congressional Plan.

Respectfully submitted this 6th day of September, 2022.

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This the 6th day of September, 2022.

Electronically Submitted
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Attorney for NCLCV Plaintiffs

No. 413PA21 TENTH DISTRICT

SUPREME COURT OF NORTH CAROLINA

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NORTH CAROLINA LEAGUE OF CONSERVATION VOTERS, INC., et al., COMMON CAUSE v. REPRESENTATIVE DESTIN HALL, in his official capacity as Chair of the House Standing Committee on Redistricting, et al.	)	From Wake County 21 CVS 015426 21 CVS 500085
REBECCA HARPER, et al., COMMON CAUSE v. REPRESENTATIVE DESTIN HALL, in his official capacity as Chair of the House Standing Committee on Redistricting, et al.	)	

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APPENDIX TO JOINT BRIEF OF PLAINTIFFS-APPELLEES

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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%.

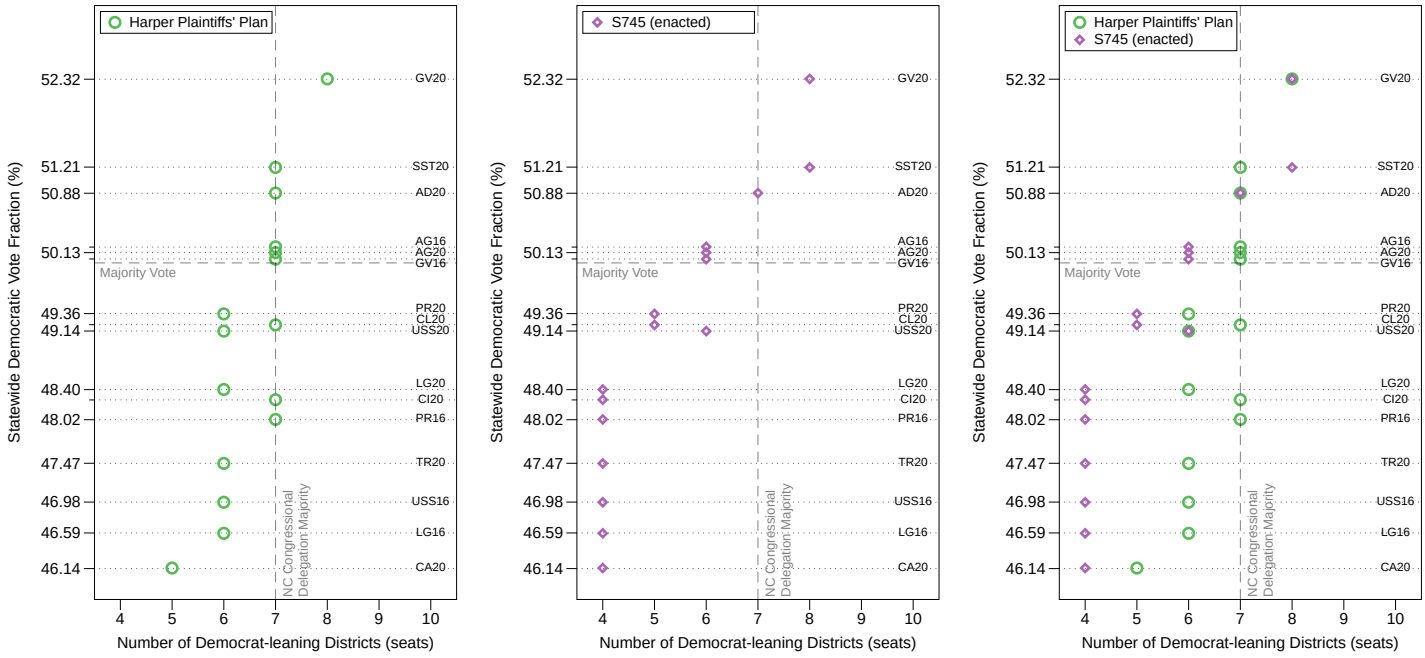

Figure 1: We show the number of seats (horizontal axis) compared with the statewide vote (vertical axis) in our 16 historic elections under the Harper Plaintiffs' map (left), and the enacted map (S745; middle). We also directly compare the two maps (right)

[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.

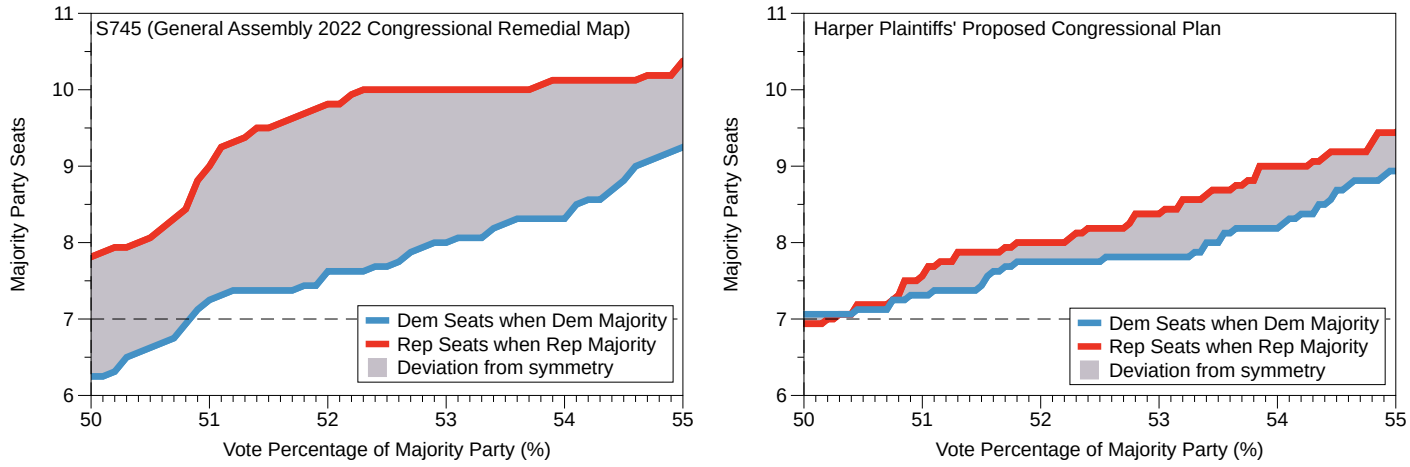

Figure 2: We show the statewide vote percentage won by the party in the majority of the vote (horizontal axis) compared with the statewide seats won by the majority party (vertical axis) in our 16 historic elections under the enacted map (S745; left), and the Harper Plaintiffs' plan (right). In a perfectly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

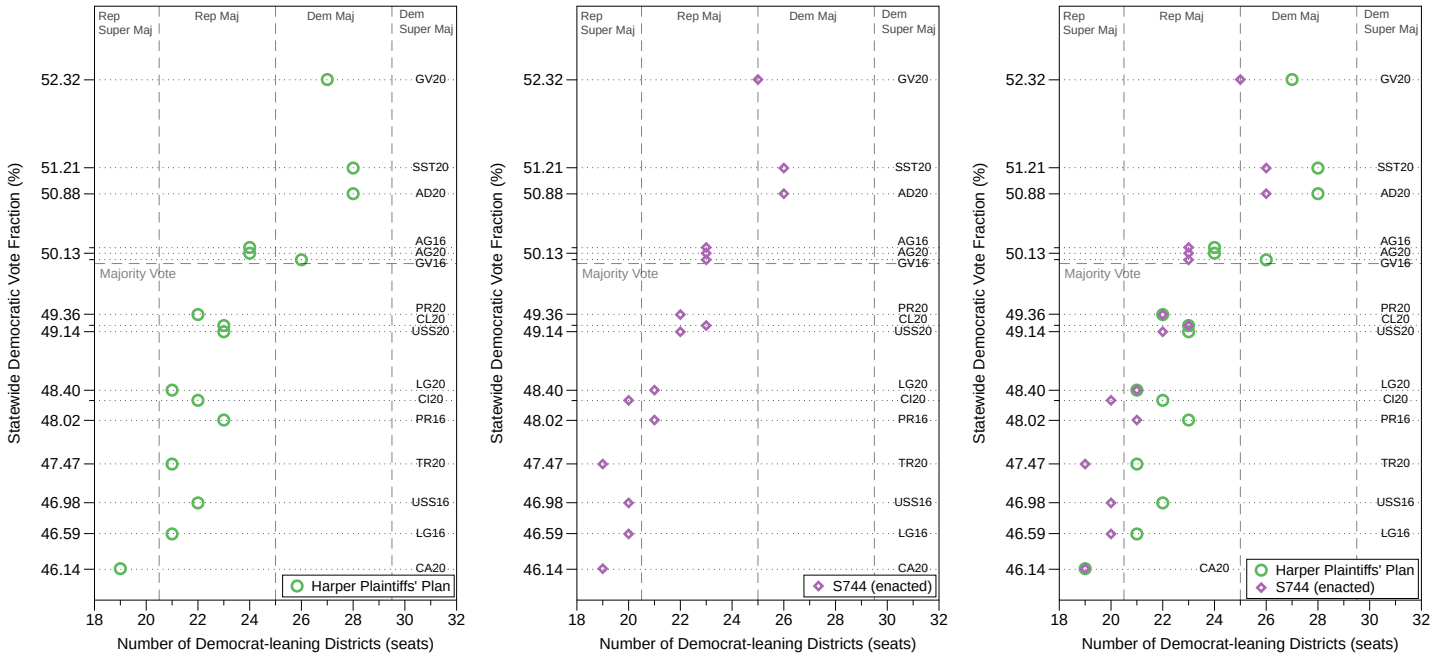

Figure 3: We show the number of seats (horizontal axis) compared with the statewide vote (vertical axis) in our 16 historic elections under the Harper Plaintiffs' map (left), and the NC Legislature's enacted map (S744; middle). We also directly compare the two maps (right).

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.

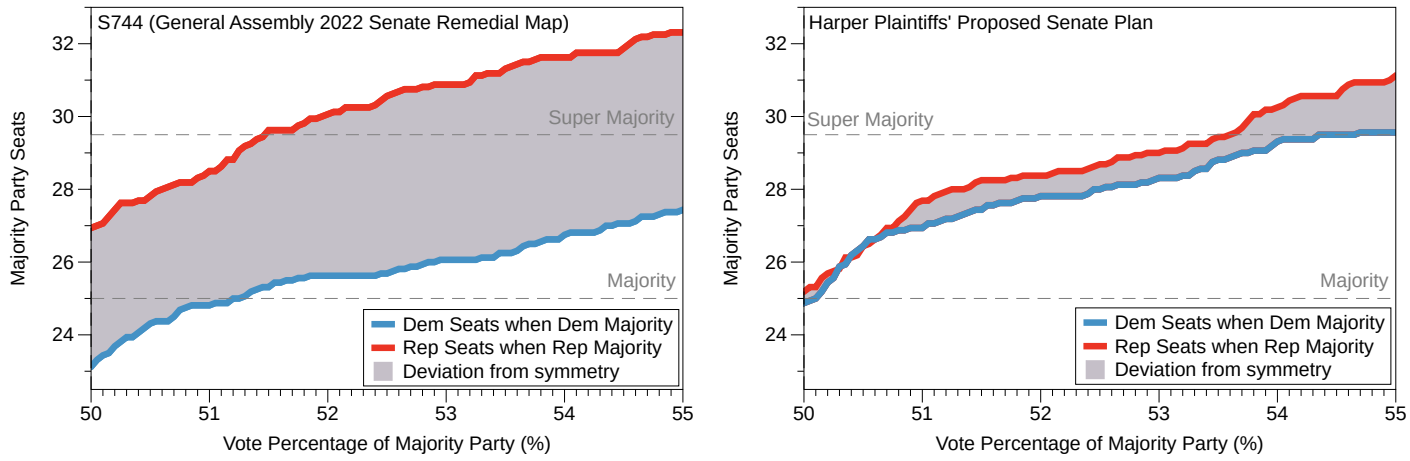

Figure 4: We show the statewide vote percentage won by the party with the majority of the vote (horizontal axis) compared with the statewide won seats by the majority party (vertical axis) in our 16 historic elections under the enacted map (S744; left), and the Harper Plaintiffs' plan (right). In a perfectly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

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NSF Post-Doctoral Fellow, Stanford University. 1999 - 2002
Szego Assistant Professor of Mathematics, Stanford University. 1998 – 2002
Post-Doctoral Member, MSRI, UC Berkeley. 1998 - 1998
Contractor, AT&T Shannon Labs. 1999 – 1999 Summer Intern, Bell Labs, Lucent. 1996 - 1996

OTHER ACADEMIC POSITIONS

Member , Institute for Advance Study, Princeton, 2021
Simons Professor , MSRI, UC Berkeley. 2015 – 2015
Visiting Professor, Berlin Summer School, TU Berlin. 2009 - 2009
Visiting Member, Centro De Giorgi, SNS Pisa, Italy. 2006 - 2006
Visiting Professor, University de Marseilles. 2002 - 2002
Visiting Professor, MSRI, UC Berkeley. 2007 - 2007
Visiting Professor, University de Marseilles. 2010
Visiting Professor, University de Nice. 2012
Principle Lecturer, Saint Flour Summer school in Probability. 2007
Visiting Professor, University de Paris VI. 2008
Visiting Member, Institut Universitaire de France. 2003
Visiting Scholar, Mathematics Institute, Warwick University. 2000

PUBLICATIONS

Gao, Y., et al. “LIMITING BEHAVIORS OF HIGH DIMENSIONAL STOCHASTIC SPIN ENSEMBLES*.” Communications in Mathematical Sciences, vol. 19, no. 2, Jan. 2021, pp. 453–94. Scopus, doi:10.4310/CMS.2021.v19.n2.a7.

Li, L., et al. “Numerical Methods For Stochastic Differential Equations Based On Gaussian Mixture.” Communications in Mathematical Sciences, vol. 19, no. 6, Jan. 2021, pp. 1549–77. Scopus, doi:10.4310/CMS.2021.v19.n6.a5.

Bakhtin, Y., et al. “Singularities of invariant densities for random switching between two linear ODEs in 2D.” Siam Journal on Applied Dynamical Systems, vol. 20, no. 4, Jan. 2021, pp. 1917–58. Scopus, doi:10.1137/20M1364345.

Autry, Eric A., et al. “Metropolized Multiscale Forest Recombination for Redistricting.” Multiscale Modeling & Simulation, vol. 19, no. 4, Society for Industrial & Applied Mathematics (SIAM), Jan. 2021, pp. 1885–914. Crossref, doi:10.1137/21m1406854.

Gao, Y., et al. “Nonlocal stochastic-partial-differential-equation limits of spatially correlated noise-driven spin systems derived to sample a canonical distribution.” Physical Review E, vol. 102, no. 5, Nov. 2020. Scopus, doi:10.1103/PhysRevE.102.052112.

Gao, Yuan, et al. “Nonlocal stochastic-partial-differential-equation limits of spatially correlated noise-driven spin systems derived to sample a canonical distribution.” Physical Review. E, vol. 102, no. 5–1, Nov. 2020, p. 052112. Epmc, doi:10.1103/physreve.102.052112. PMID: 33327182.

Herschlag, G., et al. “Quantifying Gerrymandering in North Carolina.” Statistics and Public Policy, vol. 7, no. 1, Jan. 2020, pp. 30–38. Scopus, doi:10.1080/2330443X.2020.1796400.

AGAZZI, A., and J. C. MATTINGLY. “SEEMINGLY STABLE CHEMICAL KINETICS CAN BE STABLE, MARGINALLY STABLE, OR UNSTABLE.” Communications in Mathematical Sciences, vol. 18, no. 6, Jan. 2020, pp. 1605–42. Scopus, doi:10.4310/CMS.2020.v18.n6.a5.

Lu, Y., and J. C. Mattingly. “Geometric ergodicity of Langevin dynamics with Coulomb interactions.” Nonlinearity, vol. 33, no. 2, Jan. 2020, pp. 675–99. Scopus, doi:10.1088/1361-6544/ab514a.

Chikina, M., et al. “Separating Effect From Significance in Markov Chain Tests.” Statistics and Public Policy, vol. 7, no. 1, Jan. 2020, pp. 101–14. Scopus, doi:10.1080/2330443X.2020.1806763.

Carter, D., et al. “Optimal Legislative County Clustering in North Carolina.” Statistics and Public Policy, vol. 7, no. 1, Jan. 2020, pp. 19–29. Scopus, doi:10.1080/2330443X.2020.1748552.

Herzog, David P., and Jonathan C. Mattingly. “Ergodicity and Lyapunov Functions for Langevin Dynamics with Singular Potentials.” Communications on Pure and Applied Mathematics, vol. 72, no. 10, WILEY, Oct. 2019, pp. 2231–55. Wos, doi:10.1002/cpa.21862.

Chin, Andrew, et al. “The Signature of Gerrymandering in Rucho v. Common Cause.” South Carolina Law Review, vol. 70, 2019.

Herschlag, G., et al. Evaluating Partisan Gerrymandering in Wisconsin. Sept. 2017.

Bakhtin, Y., et al. Smooth invariant densities for random switching on the torus (Submitted). Aug. 2017.

Johndrow, J. E., and J. C. Mattingly. Coupling and Decoupling to bound an approximating Markov Chain (Submitted). July 2017.

Glatt-Holtz, N. E., et al. “Scaling and Saturation in Infinite-Dimensional Control Problems with Applications to Stochastic Partial Differential Equations (Accepted).” Annals of Pde, June 2017.

Hairer, M., and J. Mattingly. The strong Feller property for singular stochastic PDEs (Submitted). 2016.

Tempkin, J. O. B., et al. “Trajectory stratification of stochastic dynamics (Accepted).” Siam Review, Society for Industrial and Applied Mathematics, 2016. PMID: 34650314. PMCID: PMC8514164.

Munch, E., et al. “Probabilistic Fréchet means for time varying persistence diagrams.” Electronic Journal of Statistics, vol. 9, Jan. 2015, pp. 1173–204. Scopus, doi:10.1214/15-EJS1030.

Luo, S., and J. C. Mattingly. Scaling limits of a model for selection at two scales. 2015. PMID: 28867875. PMCID: PMC5580332.

Glatt-Holtz, N., et al. On Unique Ergodicity in Nonlinear Stochastic Partial Differential Equations (Submitted). 2015.

Herzog, David P., and Jonathan Christopher Mattingly. Noise-Induced Stabilization of Planar Flows II. Apr. 2014.

Mattingly, Jonathan C., and Etienne Pardoux. “Invariant measure selection by noise. An example.” Discrete and Continuous Dynamical Systems. Series A, vol. 34, 2014, pp. 4223–57. Manual, doi:10.3934/dcds.2014.34.4223.

Lawley, Sean D., et al. “Sensitivity to switching rates in stochastically switched ODEs.” Communications in Mathematical Sciences, vol. 12, 2014, pp. 1343–52. Manual, doi:10.4310/CMS.2014.v12.n7.a9.

Herzog, David P., and Jonathan C. Mattingly. “Noise-Induced Stabilization of Planar Flows I.” Arxiv Preprint Arxiv:1404.0957, 2014.

Bakhtin, Yuri, et al. “Regularity of invariant densities for 1D-systems with random switching.” Arxiv Preprint Arxiv:1406.5425, 2014.

Lawley, Sean D., et al. “Stochastic switching in infinite dimensions with applications to random parabolic PDEs.” Arxiv Preprint Arxiv:1407.2264, 2014.

Herzog, David P., and Jonathan C. Mattingly. “A practical criterion for positivity of transition densities.” Arxiv Preprint Arxiv:1407.3858, 2014.

Huckemann, Stephan, et al. “Sticky central limit theorems at isolated hyperbolic planar singularities.” Arxiv Preprint Arxiv:1410.6879, 2014.

Mattingly, Jonathan C., and Christy Vaughn. “Redistricting and the Will of the People.” Arxiv Preprint Arxiv:1410.8796, 2014.

Hotz, Thomas, et al. “Sticky central limit theorems on open books.” The Annals of Applied Probability, vol. 23, 2013, pp. 2238–58. Manual, doi:10.1214/12-AAP899.

Mattingly, J. C., et al. “Geometric ergodicity of a bead-spring pair with stochastic Stokes forcing.” Stochastic Processes and Their Applications, vol. 122, no. 12, Dec. 2012, pp. 3953–79. Scopus, doi:10.1016/j.spa.2012.07.003.

Luo, Shishi, et al. “The impact of host immune status on the within-host and population dynamics of antigenic immune escape.” J R Soc Interface, vol. 9, no. 75, Oct. 2012, pp. 2603–13. Pubmed, doi:10.1098/rsif.2012.0180. PMID: 22572027. PMCID: PMC3427510.

Athreyaz, A., et al. “Propagating lyapunov functions to prove noise-induced stabilization.” Electronic Journal of Probability, vol. 17, 2012. Scival, doi:10.1214/EJP.v17-2410.

Porporato, A., et al. “Local kinetic interpretation of entropy production through reversed diffusion.” Phys Rev E Stat Nonlin Soft Matter Phys, vol. 84, no. 4 Pt 1, Oct. 2011, p. 041142. Pubmed, doi:10.1103/PhysRevE.84.041142. PMID: 22181122.

Hairer, Martin, and Jonathan C. Mattingly. Yet another look at Harris’ ergodic theorem for Markov chains. Vol. 63, Birkhäuser/Springer Basel AG, Basel, 2011, pp. 109–17. Manual, doi:10.1007/978-3-0348-0021-1_7.

Hairer, M., et al. “Asymptotic coupling and a general form of Harris' theorem with applications to stochastic delay equations.” Probability Theory and Related Fields, vol. 149, no. 1, 2011, pp. 223–59. Scival, doi:10.1007/s00440-009-0250-6.

Anderson, D. F., and J. C. Mattingly. “A weak trapezoidal method for a class of stochastic differential equations.” Communications in Mathematical Sciences, vol. 9, no. 1, 2011, pp. 301–18.

Hairer, M., and J. C. Mattingly. “A theory of hypoellipticity and unique ergodicity for semilinear stochastic PDEs.” Electronic Journal of Probability, vol. 16, 2011, pp. 658–738.

Koelle, K., et al. “A dimensionless number for understanding the evolutionary dynamics of antigenically variable RNA viruses.” Proceedings of the Royal Society B: Biological Sciences, vol. 278, no. 1725, 2011, pp. 3723–30. Scival, doi:10.1098/rspb.2011.0435. PMID: 21543353. PMCID: PMC3203497.

Cooke, Ben, et al. “Geometric Ergodicity of Two–dimensional Hamiltonian systems with a Lennard–Jones–like Repulsive Potential.” Arxiv Preprint Arxiv:1104.3842, 2011.

Mattingly, J. C., et al. “Convergence of numerical time-averaging and stationary measures via Poisson equations.” Siam Journal on Numerical Analysis, vol. 48, no. 2, 2010, pp. 552–77. Scival, doi:10.1137/090770527.

Hairer, M., and J. C. Mattingly. “Slow energy dissipation in anharmonic oscillator chains.” Communications on Pure and Applied Mathematics, vol. 62, no. 8, 2009, pp. 999–1032. Scival, doi:10.1002/cpa.20280.

Martin Hairer, Jonathan C. “Spectral gaps in Wasserstein distances and the 2D stochastic Navier-Stokes equations.” Annals of Probability, no. 6, 2008, pp. 993–1032.

Iyer, Gautam, and Jonathan Mattingly. “A stochastic-Lagrangian particle system for the Navier-Stokes equations.” Nonlinearity, vol. 21, 2008, pp. 2537–53. Manual, doi:10.1088/0951-7715/21/11/004.

Mattingly, J. C., et al. “Simple systems with anomalous dissipation and energy cascade.” Communications in Mathematical Physics, vol. 276, no. 1, Nov. 2007, pp. 189–220. Scopus, doi:10.1007/s00220-007-0333-0.

Anderson, D. F., and J. C. Mattingly. “Propagation of fluctuations in biochemical systems, II: Nonlinear chains.” Iet Systems Biology, vol. 1, no. 6, Nov. 2007, pp. 313–25. Epmc, doi:10.1049/iet-syb:20060063. PMID: 18203578.

Bakhtin, Y., and J. C. Mattingly. “Malliavin calculus for infinite-dimensional systems with additive noise.” Journal of Functional Analysis, vol. 249, no. 2, Aug. 2007, pp. 307–53. Scopus, doi:10.1016/j.jfa.2007.02.011.

Anderson, David F., et al. “Propagation of fluctuations in biochemical systems, I: linear SSC networks.” Bulletin of Mathematical Biology, vol. 69, no. 6, Aug. 2007, pp. 1791–813. Epmc, doi:10.1007/s11538-007-9192-2. PMID: 17457656.

Lamba, H., et al. “An adaptive Euler-Maruyama scheme for SDEs: Convergence and stability.” Ima Journal of Numerical Analysis, vol. 27, no. 3, Jan. 2007, pp. 479–506. Scopus, doi:10.1093/imanum/drl032.

Mattingly, J. C., et al. “Anomalous dissipation in a stochastically forced infinite-dimensional system of coupled oscillators.” Journal of Statistical Physics, vol. 128, no. 5, 2007, pp. 1145–52. Scival, doi:10.1007/s10955-007-9351-8.

Nijhout, H. Frederik, et al. “Erratum to H. Frederik Nijhout, et al. Epigenetics Volume 1, Issue 2; pp. 81-87.” Epigenetics, vol. 1, no. 3, Informa UK Limited, July 2006, pp. 115–115. Crossref, doi:10.4161/epi.1.3.3281.

Hairer, M., and J. C. Mattingly. “Ergodicity of the 2D Navier-Stokes equations with degenerate stochastic forcing.” Annals of Mathematics, vol. 164, no. 3, 2006, pp. 993–1032.

Mattingly, J. C., and É. Pardoux. “Malliavin calculus for the stochastic 2D Navier-Stokes equation.” Communications on Pure and Applied Mathematics, vol. 59, no. 12, 2006, pp. 1742–90. Scival, doi:10.1002/cpa.20136.

Bakhtin, Y., and J. C. Mattingly. “Stationary solutions of stochastic differential equations with memory and stochastic partial differential equations.” Communications in Contemporary Mathematics, vol. 7, no. 5, Oct. 2005, pp. 553–82. Scopus, doi:10.1142/S0219199705001878.

Mattingly, J. C., and T. M. Suidan. “The small scales of the stochastic Navier-Stokes equations under rough forcing.” Journal of Statistical Physics, vol. 118, no. 1–2, Jan. 2005, pp. 343–64. Scopus, doi:10.1007/s10955-004-8787-3.

Hairer, Martin, et al. “Malliavin calculus and ergodic properties of highly degenerate 2D stochastic Navier–Stokes equation.” Arxiv Preprint Math/0409057, 2004.

Hairer, Martin, et al. “Malliavin calculus for highly degenerate 2D stochastic Navier-Stokes equations.” Comptes Rendus Mathématique. Académie Des Sciences. Paris, vol. 339, 2004, pp. 793–96. Manual, doi:10.1016/j.crma.2004.09.002.

Hairer, Martin, and Jonathan C. Mattingly. “Ergodic properties of highly degenerate 2D stochastic Navier-Stokes equations.” Comptes Rendus Mathématique. Académie Des Sciences. Paris, vol. 339, 2004, pp. 879–82. Manual, doi:10.1016/j.crma.2004.09.035.

Mattingly, Jonathan C. On recent progress for the stochastic Navier Stokes equations. Univ. Nantes, Nantes, 2003, p. Exp.No.XI-52.

Mattingly, Jonathan C. “The dissipative scale of the stochastics Navier-Stokes equation: regularization and analyticity.” Journal of Statistical Physics, vol. 108, 2002, pp. 1157–79. Manual, doi:10.1023/A:1019799700126.

Mattingly, J. C., et al. “Ergodicity for SDEs and approximations: locally Lipschitz vector fields and degenerate noise.” Stochastic Processes and Their Applications, vol. 101, 2002, pp. 185–232. Manual, doi:10.1016/S0304-4149(02)00150-3.

Mattingly, J. C. “Contractivity and ergodicity of the random map $x\mapsto\vert x-θ\vert $.” Rossi\U\I Skaya Akademiya Nauk. Teoriya Veroyatnoste\U\I I Ee Primeneniya, vol. 47, 2002, pp. 388–97. Manual, doi:10.1137/S0040585X97979767.

Mattingly, Jonathan C. “Exponential convergence for the stochastically forced Navier-Stokes equations and other partially dissipative dynamics.” Communications in Mathematical Physics, vol. 230, 2002, pp. 421–62. Manual, doi:10.1007/s00220-002-0688-1.

Mattingly, J. C., and A. M. Stuart. “Geometric ergodicity of some hypo-elliptic diffusions for particle motions.” Markov Processes and Related Fields, vol. 8, 2002, pp. 199–214.

Mattingly, Jonathan Christopher. “Contractivity and ergodicity of the random map $x\mapsto|x-\theta|$.” Teoriya Veroyatnostei I Ee Primeneniya, vol. 47, no. 2, Steklov Mathematical Institute, 2002, pp. 388–97. Crossref, doi:10.4213/tvp3671.

E, Weinan, et al. “Gibbsian dynamics and ergodicity for the stochastically forced Navier-Stokes equation.” Communications in Mathematical Physics, vol. 224, 2001, pp. 83–106. Manual, doi:10.1007/s002201224083.

E, Weinan, and Jonathan C. Mattingly. “Ergodicity for the Navier-Stokes equation with degenerate random forcing: finite-dimensional approximation.” Communications on Pure and Applied Mathematics, vol. 54, 2001, pp. 1386–402. Manual, doi:10.1002/cpa.10007.

Mattingly, Jonathan C. “Ergodicity of 2D Navier-Stokes equations with random forcing and large viscosity.” Communications in Mathematical Physics, vol. 206, 1999, pp. 273–88. Manual, doi:10.1007/s002200050706.

Mattingly, J. C., and Ya G. Sinai. “An elementary proof of the existence and uniqueness theorem for the Navier-Stokes equations.” Communications in Contemporary Mathematics, vol. 1, 1999, pp. 497–516. Manual, doi:10.1142/S0219199799000183.

Holmes, Philip J., et al. “Low-dimensional models of coherent structures in turbulence.” Physics Reports. a Review Section of Physics Letters, vol. 287, 1997, pp. 337–84. Manual, doi:10.1016/S0370-1573(97)00017-3.

Johndrow, James E., et al. Optimal approximating Markov chains for Bayesian inference.

Bangia, Sachet, et al. Redistricting: Drawing the Line.

Johndrow, James E., and Jonathan C. Mattingly. Error bounds for Approximations of Markov chains used in Bayesian Sampling.

Wang, Chuang, et al. Scaling Limit: Exact and Tractable Analysis of Online Learning Algorithms with Applications to Regularized Regression and PCA.

Carter, Daniel, et al. A Merge-Split Proposal for Reversible Monte Carlo Markov Chain Sampling of Redistricting Plans.

Herschlag, Gregory, et al. Non-reversible Markov chain Monte Carlo for sampling of districting maps.

Autry, Eric A., et al. Multi-Scale Merge-Split Markov Chain Monte Carlo for Redistricting.

Leimbach, Matti, et al. Noise-induced strong stabilization.

Mattingly, Jonathan C., et al. The Gaussian Structure of the Singular Stochastic Burgers Equation.

Herzog, David P., et al. Gibbsian dynamics and the generalized Langevin equation.

Earle, Gabriel, and Jonathan Mattingly. Convergence of Stratified MCMC Sampling of Non-Reversible Dynamics.

Mattingly, Jonathan C., et al. “Diffusion limits of the random walk Metropolis algorithm in high dimensions.” Annals of Applied Probability, vol. 22, no. 3, pp. 881–930. Arxiv, doi:10.1214/10-AAP754.

Heymann, Matthias, et al. Rare Transition Events in Nonequilibrium Systems with State-Dependent Noise: Application to Stochastic Current Switching in Semiconductor Superlattices.

Theses and Dissertations

Mattingly, Jonathan. The Stochastic Navier-Stokes Equation: Energy Estimates and Phase Space Contraction, under Yakov Sinai.

PROFESSIONAL AWARDS AND SPECIAL RECOGNITION

IE Block Community Lecture. SIAM. 2021

Defenders of Democracy. National Common Cause. 2018

Fellow of the American Mathematical Society . American Mathematical Society. 2015

Simons Visiting Professor . MSRI. 2015

Institute of Mathematical Statistics Fellow. Institute of Mathematical Statistics. 2012

Faculty Early Career Development (CAREER) Program. National Science Foundation. 2005

Presidential Early Career Awards for Scientists and Engineers. National Science Foundation. 2005
Sloan Research Fellowship-Mathematics. Alfred P. Sloan Foundation. 2005
School of Mathematics/ Members. Institute for Advanced Study. 2002

PRESENTATIONS AND APPEARANCES

Sampling to Understand Gerrymandering and Influence Public Policy. MIT. January 1, 2021
Panel on Qunatifying Gerrymandering. Democracy in America. October 1, 2021
Hearing the Will of the People. ISM. August 1, 2021
Non-rversible samplers for Gerrymandering. Netherlands. August 1, 2021
The Gaussian Structure of the Stochastically Forced Burgers Equation. Berlin. May 1, 2021
The Mathematics and Policy of Gerrymandering. IAS. December 1, 2021
Gaussian Structure of Burgers Equation. India (online). January 1, 2021
A new model of randomly forced Fluid equations. Princeton Fluids Seminar. November 1, 2021
A new model of randomly forced Fluid equations. ICEM. October 1, 2021
A new model of randomly forced Fluid equations. IAS. December 1, 2021

Gaussian Structure of Stochastic Burgers. February 1, 2021
New Sampling Methods of Quantifying Gerrymandering . Brown Applied Math Colloquium . October 1, 2020
Interactions between noise and instabilities.. IHP, Paris. July 1, 2018
Quantifying Gerrymandering: A Mathematician Goes to Court. July 1, 2018
Ergodicity of Singular SPDEs. Columbia. May 1, 2018
Approximate/exact controllability and ergodicity for (additive noise) SPDEs/SODEs. CIRM, Marseilles 2018
Discovering the geopolitical structure of the United States through Markov Chain Monte Carlo sampling. The Alan Turing Institute, UK. May 1, 2018
Drawing the line in redistricting (A mathematician's take). Stanford University. March 1, 2018
Ergodic and global solutions for singular SPDEs. Corvallis, Oregon. March 1, 2018
A mathematician Goes to Court. October 1, 2017
Stabilization of Stochastic Dynamics . UCLA. IPAM. January 1, 2017
Stabilization and noise. Berekey Mathematics Department. November 12, 2015
Stochastic PDEs. October 1, 2015
Ergodicity Finite and Infinite dimentional Markov Chains. McGill University. July 1, 2015

Lectures

New Sampling Methods to Quantify Gerymandering. IID. Duke Law and TRIPODS. March 1, 2020
Anatomy of an ergodic theorem. Summer School. June 1, 2018
Dynamics Days 2014. Atlanta GA. January 4, 2014
Stabilization by Noise. November 19, 2013
Uniqueness of the inviscid limit in a simple model damped/driven system.. Probability and Mathematical Physics Seminar. November 5, 2013
Stochastic stabilization of OEDs.. Applied Math Seminar, NYU. September 6, 2013
Stochastic partial differential equations. SPA2013. August 1, 2013
Stabilization by noise. University of Maryland. May 1, 2013
Stablization by Noise. Conférence en l'honneur d'Etienne Pardoux, CIRM, Marseillais France.. February 14, 2013
Perspectives on Ergodicity. Conference on SPDEs, IMA, Minnesota. January 14, 2013

A Numerical Method for the SDEs from Chemical Equations. Probability and Biology section, 2012 Canadian Mathematical society (winter meeting). December 1, 2012

Minerva Lectures: Erodicity of Markov Processes: From Chains to SDEs to SPDEs. Mathematics Department, Columbia University. November 1, 2012

Stochastic Stabilization. Inria - Sophia Antipolis. July 1, 2012

A Menagerie of Stabilization. Joint Probability and Analysis Seminar, Nice, France. July 1, 2012

Building Lyapunov Functions (4 lectures). EPSRC Symposium Workshop – Easter Probability Meeting. March 1, 2012

Noise Induced Stability. MBI. February 1, 2012

A Menagerie of Stochastic Stabilization. CAMP/Probability Seminar, University of Chicago. October 18, 2011

A menagerie of stochastic stabilization. Equadiff 2011, Loughborough University. August 1, 2011

Coarse–graining of many–body systems: analysis, computations and applications. July 1, 2011

Ergodicity of systems with singular interaction terms. Stochastic Dynamics Transition Workshop, SAMSI. November 18, 2010

Oberwolfach Seminar: The Ergodic Theory of Markov Processes. Oberwolfach, Germany. October 1, 2010

Malliavin Calculus to prove ergodic theorems for SPDEs. ICM Satellite Conference on Probability and Stochastic Processes Indian Statistical Institute, Bangalore. August 13, 2010

SPDE scaling limits of an Markov chain Montecarlo algorithm. Stochastic Partial Differential Equations: Approximation, Asymptotics and Computation, Newton Institute. June 28, 2010

The spread of randomness. German-American Frontiers of Science, Potsdam Germany. June 1, 2010

How to prove an ergodic theorem. oberwolfach. May 1, 2010

Coupling at infinity. Seminar on Stochastic Processes. March 30, 2010

Long time stochastic simiulation. Imperial College. March 15, 2010

Spectral Gaps in Wasserstien Distance. Ergodic Theory Seminary, Princeton Mathematics. March 4, 2010

Trouble with a chain of stochastic oscillators. PACM, Princeton University. March 2, 2010

Hypo-ellipticity for SPDEs. SPDE program , Newton Institute. March 1, 2010

Numerics of SDEs. Warwick University, UK. February 24, 2010

Long Time Behavior of Stochastically Forced PDEs.. AMS Joint Meeting, San Francisco. January 14, 2010

Ellipticity and Hypo-ellipticity for SPDEs *or* What is ellipticity in infinite dimensions anyway?. Stochastic Partial Differential Equations, Newton Institute. January 8, 2010

SPDE Limits of the Random Walk Metropolis Algorithm in High Dimensions. SIAM PDE Meeting. December 7, 2009

Stochastic fluctuations in bio chemical networks. MBI: Mathematical Developments Arising from Biology. November 9, 2009

What makes infinite dimensional Markov processes different ?. Stochastic Process and Applications, Berlin. July 1, 2009

Introduction to Ergodicity in Infinite Dimentions. TU Berlin. July 1, 2009

Stochastically forced fluid equations: Transfer between scales and ergodicity.. AMS Sectional Meeting (invited talk). April 4, 2009

Trouble with a chain of stochastic oscillators. Princeton University. PACM. April 3, 2009

What makes the ergodic theory if Markov Chains in infinite dimensions different (and dificult) ?. Princeton Ergodic theory seminar. March 3, 2009

Ergodicity, Energy Transfer, and Stochastic Partial Differential Equations. Columbia University. Columbia University. December 15, 2008

The Spread of Randomness: Ergodicity in Infinite Dimensions. Mathematisches Forschungsinstitut Oberwolfach. December 15, 2008

The spread of randomness through dimensions. IPAM. November 1, 2008

The spread of randomness through dimensions. IPAM- Mathematical Frontiers in Network Multi-Resolution Analysis. November 1, 2008

Troubles with oscillators. Stanford: JBK85, Workshop on Applied Mathematics IN HONOR OF JOSEPH B. KELLER. October 1, 2008

What is different about the ergodic theory of stochastic PDEs (vs ODEs). UC Irvine, PDE and Probabilty Seminar. October 1, 2008

Trouble with a chain of stochastic oscillators. Stochastic Seminar, GaTech. September 1, 2008

Troubles with oscillators. East Midlands Stochastic Analysis Seminars. August 1, 2008

Troubles with chains of anharmonic oscillators. Statisical Mechaniques working group. June 1, 2008

The spread of randomness in infinite dimensions and ergodicity for SPDEs. Stochastic Analysis, Random Fields and Applications, Asscona IT. June 1, 2008

Ergodicity of Degenerately forced SPDEs. Séminaire de Probabilités, Laboratoire de Probabilités et Modèles Aléatoires des Universités Pierre et Marie Curie et Denis Diderot. May 27, 2008

Ergodicity of Degenerately forced SPDEs. ETH, Zurich. May 1, 2008

Named Lectures

Barton Lectures in Computational Mathematics. UNCG. November 1, 2021

IE Block Community Lecture . SIAM Annual Meeting. SIAM. July 1, 2021

Quantifying and Understanding Gerrymandering - How a quest to understand his state's political geography led a mathematician to court. ICERM . October 1, 2020

AMS Regional Meeting Plenary Speaker. Gainesville . AMS. January 1, 2019

Long Time Numerical Simulation of SDEs. Insbruk. SciCADE2019 . January 1, 2019

Quantifying Gerrymandering: A mathematician goes to court. UBC. May 1, 2018

Quantifying Gerrymandering: a mathematician goes to court. Stanford Mathematics Department. March 1, 2018

Stochastic PDEs. July 1, 2016

Event/Org Administration

Co-Organizer . Quantifying Gerrymandering. SAMSI. October 2018

Co-Organizer . Regional Gerrymandering Conference. November 2017

Co-Organizer . Interacting particle systems WITH APPLICATIONS IN BIOLOGY, ECOLOGY, AND STATISTICAL PHYSICS. SEPC 2017. May 2017

Organiser Special Term. MSRI, Berkeley CA. August 2015 - December 2015

Organized invited session at SPA2013. August 2013

Co Organizer (with Amarjit Budhiraja) : Seminar on Stochastic Processes 2013. March 2013

Local Orgnaizer (with Rick Durrett) : Woman in Probability III. October 2012

SAMSI Stochastic Dynamics tradition workshop. November 2010

MFO week long school on ergodic theory. October 2010

SAMSI Opening Workshop for Stochastic Dynamics. August 2009

local liaison/Organizer SAMSI year on stochastic dynamics. 2009 - 2010

Organiser Special Term. MSRI, Berkeley CA. August 2007 - December 2007

CURRICULUM VITAE

Gregory Joseph Herschlag, Ph.D.
Assistant Research Professor
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CURRENT APPOINTMENTS AND AFFILIATIONS

Assistant Research Professor of Mathematics

EDUCATION, TRAINING AND CERTIFICATIONS

Ph.D., Department of Mathematics, University of North Carolina - Chapel Hill, 2013
- Thesis supervisor: Prof. Sorin Mitran.
- Thesis: Multiple Scale Algorithm Design for Advancing Fronts

BS with Honors, University of Chicago, 2007

DUKE APPOINTMENT HISTORY

Phillip Griffiths Assistant Research Professor 2018-2019

Visiting Assistant Professor of Mathematics, Mathematics 2013 - 2018

PUBLICATIONS

Academic Articles

Autry, Eric A., Daniel Carter, Gregory J. Herschlag, Zach Hunter, and Jonathan C. Mattingly. "Metropolized Multiscale Forest Recombination for Redistricting." Multiscale Modeling & Simulation 19, no. 4 (January 2021): 1885–1914. https://doi.org/10.1137/21m1406854.

G. Herschlag, S. Lee, J. Vetter and A. Randles, "Analysis of GPU Data Access Patterns on Complex Geometries for the D3Q19 Lattice Boltzmann Algorithm," in IEEE Transactions on Parallel and Distributed Systems, 2021, doi: 10.1109/TPDS.2021.3061895.

Herschlag, G., Kang, H. S., Luo, J., Graves, C. V., Bangia, S., Ravier, R., & Mattingly, J. C. (2020). Quantifying gerrymandering in north carolina. Statistics and Public Policy, 7(1), 30-38. doi:10.1080/2330443X.2020.1796400.

Carter, D., Hunter, Z., Teague, D., Herschlag, G., & Mattingly, J. (2020). Optimal Legislative County Clustering in North Carolina. Statistics and Public Policy, 7(1), 19-29. doi:10.1080/2330443X.2020.1748552.

Herschlag, G., J. Gounley, S. Roychowdhury, E. Draeger, and A. Randles. "Multi-physics simulations of particle tracking in arterial geometries with a scalable moving window algorithm." Proceedings Ieee International Conference on Cluster Computing, Iccc, vol. 2019-September, 2019. Scopus, doi:10.1109/CLUSTER.2019.8891041.

Chin, A., Herschlag, G., & Mattingly, J. (2018). The Signature of Gerrymandering in Rucho v. Common Cause. SCL Rev., 70, 1241.

Herschlag, G., Lee, S., Vetter, J. S., & Randles, A. (2018, May). GPU data access on complex geometries for D3Q19 lattice Boltzmann method. In 2018 IEEE International Parallel and Distributed Processing Symposium (IPDPS) (pp. 825-834). IEEE, doi:10.1109/IPDPS.2018.00092.

Cao, Y., Feng, Y., Ryser, M. D., Zhu, K., Herschlag, G., Cao, C., ... & You, L. (2017). Programmable assembly of pressure sensors using pattern-forming bacteria. Nature biotechnology, 35(11), 1087-1093. PMID: 28991268. PMCID: 28991268.

Herschlag, G., Liu, J. G., & Layton, A. T. (2016). Fluid extraction across pumping and permeable walls in the viscous limit. Physics of Fluids, 28(4), 041902, doi:10.1063/1.4946005.

Herschlag, G. J., Mitran, S., & Lin, G. (2015). A consistent hierarchy of generalized kinetic equation approximations to the master equation applied to surface catalysis. The Journal of chemical physics, 142(23), 234703. doi:10.1063/1.4922515. PMID: 26093569. PMCID: 26093569.

Herschlag, G., Liu, J. G., & Layton, A. T. (2015). An exact solution for stokes flow in a channel with arbitrarily large wall permeability. SIAM Journal on Applied Mathematics, 75(5), 2246-2267, doi:10.1137/140995854.

G. Herschlag, T. C. Elston, M. G. Forest, G. Garcia, B. Reinhardt, B. Button, R. Tarran and B. Lindley. A mechanochemical model for auto-regulation of lung airway surface layer volume. Journal of Theoretical Biology. 325 (2013) 4251

G. Herschlag and L. A. Miller. Reynolds number limits for jet propulsion: A numerical study of simplified jellyfish. Journal of Theoretical Biology 285 (2011) 84-95

Pre-prints

Herschlag, G., Mattingly, J. C., Sachs, M., & Wyse, E. (2020). Non-reversible Markov chain Monte Carlo for sampling of districting maps. arXiv preprint arXiv:2008.07843.

Carter, D., Herschlag, G., Hunter, Z., & Mattingly, J. (2019). A merge-split proposal for reversible monte carlo markov chain sampling of redistricting plans. arXiv preprint arXiv:1911.01503.

Herschlag, G., Ravier, R., & Mattingly, J. C. (2017). Evaluating partisan gerrymandering in Wisconsin. arXiv preprint arXiv:1709.01596.

Other work

Contributer and maintainer of the Duke Quantifying Gerrymandering Blog at https://sites.duke.edu/quantifyinggerrymandering/ (2018-present)

Aided in preparing the affidavit of Jonathan Mattingly in Harper v. Lewis https://sites.duke.edu/quantifyinggerrymandering/files/2019/12/Mattingly-Nov.-26-Declaration.pdf (2019)

Aided in preparing the expert report and rebuttal of Jonathan Mattingly in Common Cause v. Lewis. https://sites.duke.edu/quantifyinggerrymandering/files/2019/09/Report.pdf (2019)

Guy-Uriel Charles, Andrew Chin, Gregory Herschlag and Jonathan C. Mattingly. Op-Ed: "The fight against partisan gerrymandering continues." Harold Sun https://www.heraldsun.com/opinion/article217639645.html August 31, 2018 10:25 AM

Herschlag. Affidavit on Evidence of Racial Gerrymandering in Covington V. North Carolina (2017)

Aided in preparing the expert report of Jonathan Mattingly in Rucho v. Common Cause. https://s10294.pcdn.co/wp-content/uploads/2016/05/Expert-Report-of-Jonathan-Mattingly.pdf (2017)

Code Repositories

Multi-scale merge-split; a hierarchical sampling algorithm on multi-level graph partitions:
https://git.math.duke.edu/gitlab/gjh/multiscalemergesplit_codebase

Merge-split; a sampling algorithm on graph partitions:
https://git.math.duke.edu/gitlab/gjh/mergesplitcodebase

An optimal county clustering algorithm based on legal redistricting criteria:
https://git.math.duke.edu/gitlab/gjh/countycluster.git

Courses Taught

- MATH 493: Research Independent Study on Bayesian Methods to Evaluate School Report Cards (with Atsushi Hu; Fall 2020, Fall 2021)
- MATH 494: Research Independent Study on Bayesian Methods to Evaluate School Report Cards (with Atsushi Hu; Fall 2020, Fall 2021)
- MATH 490/790-95: Sampling: Theory and Practice (Spring 2021)
- IDS 798: Capstone Project (Spring 2020, Fall 2020, Spring 2021)
- MATH 202D: Multivariable Calculus for Economics (Fall 2020)
- MATH 230/730; STA 230: Probability (Fall 2019)
- MATH 390: Special Topics in Mathematics (Bass Connections on Gerrymandering) (Fall 2018, Spring 2019)
- MATH 393: Research Independent Study on Election Data Analysis (with Yashas Manjunatha; Spring 2019)
- MATH 353: Ordinary and Partial Differential Equations (Fall 2013, Fall 2014, Fall 2016(two sections), Fall 2017 (two sections))
- MATH 361S: Numerical Analysis (Spring 2016)
- MATH 431: Advanced calculus (Spring 2015)
- MATH 212: Multivariable calculus (Fall 2015)

Mentoring Activities

- Post-doc in Mathematics Eric Autrey on graph partition algorithms (Summer 2019 - present)
- Organized, facilitated and ran the Master's in Interdisciplinary Data Science Capstone projects: 18 projects and 39 students in the Spring of 2020, and 52 students and 17 projects in the 2020-21 accademic year. This includes actively engaging, guiding, and mentoring project teams throughout the program.
- Organized, facilitated and ran the Data+ program in the summer of 2020 and 2021. This includes actively engaging, guiding, and mentoring project teams throughout the program.
- Three Master's students in MIDS, Jaryl Ngan, Anshupriya Srivastava, and Ishan Gupta, on understanding the history of segregation in Durham Public Schools and effects of redistricting (2020-2021)
- Master's student Evan Wyse on non-reversible sampling methods in the context of sampling graph partitions (Fall 2019 - present)
- Undergraduate math major Atsushi Hu on a project examining Simpson's Paradox and Bayesian Inference within reporting School Quality; PRUV mentor and advisor for senior thesis (Summer 2020-Spring 2021)
- Doctoral student in Biomedical Engineering Daniel Puleri on lattice Boltzmann Methods (2018 - present)
- Post-doc in Mathematics Matthias Sachs on non-reversible skew detailed balance algorithms (2018 - 2020)

- Master's student in Biomedical Engineering Ismael Perez on lattice Boltzmann Methods (2018 - 2019)
- Mentored Onuoha Odim on a Public Policy undergraduate capstone project. The project was on racially polarized voting in Dallas, Texas, and lead to an undergraduate publication "Segregation and Integration in Dallas County" in DUJPPE Fall 2020 (Spring through Fall of 2019).
- Undergraduate computer science majors Luke Farrell and Jacob Schulman on undergraduate honors thesis around stratified sampling graph partitions related to quantifying gerrymandering; Supervisor (2018-2019).
- Undergraduate math major Claire Weibe on honor thesis concerning voting patterns and representation; committee member and mentor (2018-2019)
- Lead a Bass Connections course on understanding gerrymandering spanning the 2018-2019 accademic school year; involved 18 students and 4 research projects. (2018-2019)
- Master's student in Computer Science Elizabeth Margolin, a student of Ashwin Machanavajjhala, assisted with data analysis and algorithms for evaluating the effects of differential privacy on redistricting (2018-2019)
- High School students (at NCSSM) Daniel Carter, Zach Hunter on advance sampling algorithms (Summer 2019)
- High School students (at NCSSM) Daniel Carter, Zach Hunter, Olivia Fujikawa, and Sam Ferguson on optimal clustering algorithms, modelling how spatial patterns effect district representation, and advance sampling algorithms (2018-2019)
- Master's student in Statistics Lisa Libovich on analyzing redistricting in Maryland (2017-Summer 2018)

Presentations and Invited Talks

- Monte Carlo Methods for Revealing Gerrymandering. NYU Center for Data Science; Math & Democracy Seminar, December 2022.
- Quanityfing Gerrymandering. BU Mathematics and Statistics Colloquium, Fall 2022.
- Uncovering Gerrymandering. CSU San Bernardino Mathematics Colloquium, March 2021.
- Voting: The Struggle for Voice in American Politics. Virtual. Kavli Frontiers in Science NSF. July 3, 2020
- County Preservation. TRIPODS Redistricting Conference, Durham, NC. Duke University. March 4, 2020
- Duke Law School Lunch. Duke Law School. October 2, 2019
- Supreme Court Lunch. UNC Law School. July 1, 2019
- Quantifying Gerrymandering. Florida State University Department of Mathematics. Florida State University. February 5, 2019
- Quantifying Gerrymandering: Separating Natural Bias from Political Bias. Political Science Department. University of Delaware. October 4, 2018

- Quantifying Gerrymandering: Sampling the Space of Redistricting Plans. Mathematics Department. University of Delaware. October 3, 2018
- GPU Data Access on Complex Geometries for D3Q19 Lattice Boltzmann Method. Vancouver, BC. IEEE. May 1, 2018
- GPU Data Layouts for D3Q19 Lattice Boltzmann Methods. University of North Carolina At Chapel Hill. March 4, 2018
- Using GIS tools to understand the space of political redistricting plans. Duke Computer Science Department. November 3, 2017
- Computational methods for sampling the space of redistricting plans. Duke University. November 3, 2017
- Quantifying Gerrymandering. Gross Hall. Information Initiative at Duke. October 1, 2017
- Introduction to Computing with GPUs. Physics Building. Mathematics Department at Duke University. April 6, 2017
- Continuum-atomistic computations for dendritic solidification. University of North Carolina Chapel Hill. August 1, 2013
- Continuum approximation of the chemical master equation. SIAM CSE, Boston. March 5, 2013
- Simulation of Solidification by Coupling of Phase Field and Microscopic Computations. ICIAM Vancouver. December 6, 2011
- Memory access patterns for Lattice Boltzmann methods on GPUs. Poster session at the Duke Research Computing Symposium. Duke University. January 2017

Public Appearances and Outreach

- Lecture on Gerrymandering in Ellen Veomett's undergraduate seminar. January 2021
- Claiming the Power of the Vote. Virtual. STEMEMPOWER; middle and high school students. July 3, 2020
- Quantifying Gerrymandering. Raleigh Charter High School. November 5, 2019
- Gerrymandering on trial: The case for fair maps. May 3, 2019
- Panelist at Measures of Gerrymandering. Tucson, AZ. University of Arizona. October 5, 2018
- Quantifying Gerrymandering Public Lecture. San Francisco, CA. University of San Francisco. March 4, 2018

Service to Profession

Event/Org Administration

Organizer. TRIPODS Redistricting Conference 2020. Duke University. March 2020

Organizer. TRIPODS Quantifying Gerrymandering 2019. Duke University. November 2019

Organizer. Minisymposium at SIAM-SEAS. University of North Carolina at Chapel Hill. March 2018

Organizer. Triangle Research Group Meetings (meets roughly once per month since 2018)

Member. Industrial Affiliates Coordinator between Pratt and iID Practicum.

Participant. DCI Math Cicles; meet weekly over Spring 2021 with a group of 5th grade students.

Academic and Administrative Activities of the University

Organizer of Data+ (2020 to present)

Masters in Interdisciplinary Data Science Capstone director (2020 to present)

Journals in which provided peer review since 2019

Applied Math Modeling
Physics of Fluids
Computer Physics Communications
Election Law Journal
Communications in Statistics - Theory and Methods
Statistics and Public Policy

Submitted Grant Proposals

Submitted NSF grant for Computational Mathematics titled "Sampling Graph Partitions: Algorithms, Geospatial Structure, and Fairness" in November of 2020 as a co-PI

Submitted NSF grant on Harnessing the Data Revolution (HDR): Institutes for Data-Intensive Research in Science and Engineering in November of 2020 as senior personnel

STATE OF NORTH CAROLINA

COUNTY OF WAKE

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION
21 CVS 015426, 21 CVS 500085

NORTH CAROLINA LEAGUE OF CONSERVATION VOTERS, INC.; HENRY M. MICHAUX, JR., et al.,

Plaintiffs,

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.

SECOND AFFIDAVIT OF DR. MOON DUCHIN ON REMEDIES

I, Dr. Moon Duchin, having been duly sworn by an officer authorized to administer oaths, depose and state 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. All of the quantitative work described in this Affidavit was performed by myself with the support of research assistants working under my direct supervision.

Background and qualifications

3. I hold a Ph.D. and an M.S in Mathematics from the University of Chicago as well as an A.B. in Mathematics and Women's Studies from Harvard University.

4. I am a Professor of Mathematics and a Senior Fellow in the Jonathan M. Tisch College of Civic Life at Tufts University.

5. My general research areas are geometry, topology, dynamics, and applications of mathematics and computing to the study of elections and voting. My redistricting-related work has been published in venues such as the Election Law Journal, Political Analysis, Foundations of Data Science, the Notices of the American Mathematical Society, Statistics and Public Policy, the Virginia Policy Review, the Harvard Data Science Review, Foundations of Responsible Computing, and the Yale Law Journal Forum.

6. My research has had continuous grant support from the National Science Foundation since 2009, including a CAREER grant from 2013–2018. I am currently on the editorial board of the journals Advances in Mathematics and the Harvard Data Science Review. I was elected a Fellow of the American Mathematical Society in 2017 and was named a Radcliffe Fellow and a Guggenheim Fellow in 2018.

7. A current copy of my full CV is attached to this report.

8. I am compensated at the rate of $400 per hour.

Second Report on Remedial Districting Plans in North Carolina

Moon Duchin
Professor of Mathematics, Tufts University
Senior Fellow, Tisch College of Civic Life

February 20, 2022

1 Introduction

Below, I will execute the analytical framework for evaluating remedial plans outlined in my report of February 18. The newly-passed plans SL-3 (new Congressional), SL-2 (new Senate), and SL-4 (new House) will be compared to the earlier proposals by the Legislature, and to the plaintiffs' alternative maps.

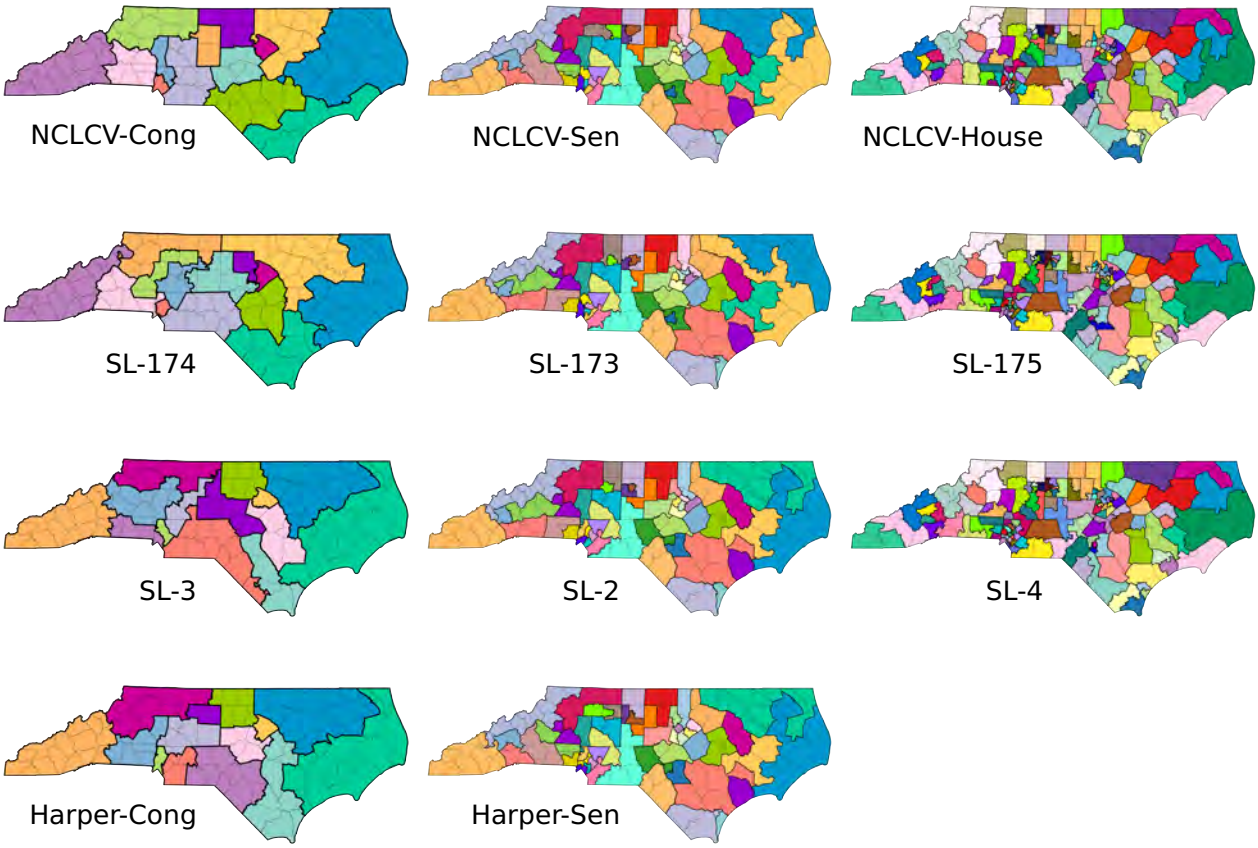

Figure 1: The eleven plans being compared in this report.

2 Close-Votes-Close-Seats

Below, the outcomes of overlaying the plans on the elections will be presented in a series of tables and figures. I use the full set of 52 general elections that occurred in North Carolina with a partisan ID in the last census cycle. This is a powerful tool to understand the performance of plans without the use of any vote index or counterfactuals.

First, Table 1 overviews the overlays with numbers, then Figures 2-4 illustrate the same data.[1]

The seats-votes scatterplots show all 52 data points for each map: one for each election, plotted as vote share for Democrats (x axis) against seat share for Democrats (y axis).

The northwest and southeast quadrants of these plots are the zones where anti-majoritarian outcomes fall. In each plot, I've marked the number of these outcomes in the associated quadrant. (I have excluded the JS120 race, which was so close to a 50-50 partisan outcome that its majoritarian properties are less meaningful.)

Out of 35 elections with a Republican vote advantage, the NCLCV-Cong plan has three instances where Democrats get more seats. Out of 16 elections with a Democratic vote advantage, the LCV plans have 0, 5, and 8 anti-majoritarian outcomes favoring Republicans.

In those 16 contests, the previous generation of plans from the legislature had 12, 12, and 14 anti-majoritarian outcomes (for Congress, Senate, and House, respectively). The new remedial proposals from the Legislature have 7, 7, and 8. And the Harper plaintiffs' Congressional and Senate plans have 1 and 2. (Note that the Harper plaintiffs did not submit a House plan.)

[1] Codes for reading Table 1: AGC = Agriculture Commissioner; ATG = Attorney General; AUD = Auditor; GOV = Governor; INC = Insurance Commissioner; LAC = Labor Commissioner; LTG = Lieutenant Governor; PRS = President; SEN = Senator; SOS = Secretary of State; SUP = Superintendent of Public Instruction; TRS = Treasurer. The prefix JA* refers to judicial elections to the Court of Appeals (so that, for instance, JA118 is the election to the Seat 1 on the Court of Appeals in 2018), JS* are elections to the state Supreme Court. All other J* prefixes refer to an election to replace a specific judge on the Court of Appeals. The two-digit suffix designates the election year. Where there was more than one judicial candidate from a given party on the ballot, they candidates from that party were combined for this analysis, so that there is a total Republican vote and a total Democratic vote in that contest.

	D Vote Share	NCLCV-Cong	SL-174	SL-3	Harper-Cong	NCLCV-Sen	SL-173	SL-2	Harper-Sen	NCLCV-House	SL-175	SL-4
GOV12	0.4418	4	4	4	6	18	16	16	15	44	41	39
AGC16	0.4444	4	4	4	6	17	17	17	16	42	40	40
LAC16	0.4475	5	4	4	5	20	18	18	17	45	42	43
JHU16	0.4563	5	4	4	6	19	18	19	17	49	42	44
AGC20	0.4615	4	3	4	5	19	17	19	19	51	40	44
JZA16	0.4619	5	4	4	6	21	19	20	18	50	43	46
JDI16	0.4653	6	4	4	6	21	19	20	19	53	44	47
LTG16	0.4665	6	4	4	6	21	19	20	21	54	44	47
LAC12	0.4674	5	4	5	6	20	20	16	15	51	44	43
AGC12	0.4678	5	4	5	6	18	18	16	16	50	43	42
SEN16	0.4705	6	**4**	**4**	6	**21**	**19**	**20**	**22**	55	**43**	**47**
TRS16	0.473	6	**4**	**4**	6	**21**	**19**	**20**	**19**	**53**	**45**	**49**
TRS20	0.4743	6	**4**	**4**	6	**20**	**17**	**19**	**21**	**51**	**45**	**49**
JA620	0.4806	7	**4**	**4**	6	**21**	**17**	**19**	**21**	55	**46**	**53**
PRS16	0.4809	7	**4**	**4**	7	**22**	**19**	**21**	23	56	**48**	**52**
JA420	0.4822	7	**4**	**4**	6	**22**	**17**	**19**	**21**	56	**47**	**54**
INC20	0.4823	7	**4**	**4**	7	23	**18**	**20**	**22**	56	**47**	**53**
LTG20	0.4836	7	**4**	**4**	6	**21**	**18**	**21**	**21**	55	**46**	**54**
JA720	0.4842	7	**4**	**4**	6	**22**	**17**	**21**	**21**	56	**48**	55
SUP20	0.4862	7	**4**	**4**	6	23	**19**	**22**	**22**	56	**49**	57
JA520	0.4874	7	**4**	**4**	6	**22**	**18**	**21**	**21**	57	**49**	57
JA218	0.4876	7	**4**	**4**	7	**22**	**18**	**20**	**22**	55	**45**	**49**
JS420	0.4879	7	**4**	**5**	7	24	**19**	**22**	23	56	**49**	57
J1320	0.4885	7	**4**	**4**	7	23	**19**	**22**	**22**	56	**49**	57
PRS12	0.4897	6	**4**	6	6	**21**	**20**	**21**	**19**	55	**46**	**48**
SEN20	0.491	7	**4**	6	6	24	**20**	**22**	23	56	**48**	56
LAC20	0.4918	8	**4**	**5**	7	25	**21**	23	23	58	**51**	56
SEN14	0.4919	6	**4**	6	6	**22**	**20**	**20**	**21**	**52**	**46**	**49**
PRS20	0.4932	8	**4**	**5**	6	25	**20**	**22**	**22**	60	**50**	59
JS220	0.4934	8	**4**	6	7	24	**21**	**22**	24	59	**51**	58
SUP16	0.4941	6	**4**	6	7	23	**22**	23	25	57	**49**	**53**
JS118	0.4955	7	**4**	**5**	7	25	**20**	**22**	23	58	**50**	**54**
INC16	0.496	6	**4**	**5**	7	**22**	**22**	**22**	25	57	**50**	**53**
JST16	0.4976	7	**4**	6	7	23	**21**	**22**	25	58	**50**	**54**
LTG12	0.4992	7	**5**	6	6	**22**	**22**	**22**	**22**	58	**50**	**53**
JS120	0.5	8	**4**	6	7	27	**22**	25	27	60	**52**	60
AUD16	0.5007	8	**5**	6	7	23	**22**	23	26	56	**51**	**51**
GOV16	0.5011	7	**4**	6	7	27	**20**	23	26	58	**50**	**54**
ATG20	0.5013	8	**4**	6	7	25	**21**	23	24	58	**51**	59
ATG16	0.5027	7	**4**	6	7	23	**20**	23	24	57	**50**	**54**
JA118	0.5078	8	**4**	7	7	26	**22**	24	25	58	**51**	59
AUD20	0.5088	8	**4**	7	7	**28**	24	26	**28**	61	**54**	62
JA318	0.5091	8	**4**	6	7	26	**21**	25	25	59	**52**	58
SOS20	0.5116	8	**5**	8	7	**28**	24	26	**28**	62	**53**	61
JGE16	0.5131	8	**5**	6	7	25	**22**	25	**28**	59	**52**	**54**
INC12	0.5186	8	**5**	6	6	**22**	**22**	**22**	25	61	55	57
SOS16	0.5226	**9**	**5**	7	7	24	24	24	27	62	57	60
GOV20	0.5229	8	**4**	8	8	27	23	25	27	63	58	64
AUD12	0.5371	9	8	7	7	28	27	27	29	65	61	64
SOS12	0.5379	9	7	8	7	26	26	25	29	63	59	62
TRS12	0.5383	9	7	10	7	24	25	25	28	65	59	63
SUP12	0.5424	9	8	9	8	28	28	28	31	66	61	64

Table 1: Do close votes translate to close seats? I have identified, for each plan, the elections with a partisan margin of closer than six points, but where the outcome falls outside of the range of 6-8 Congressional seats, 23-27 Senate seats, or 55-65 House seats.

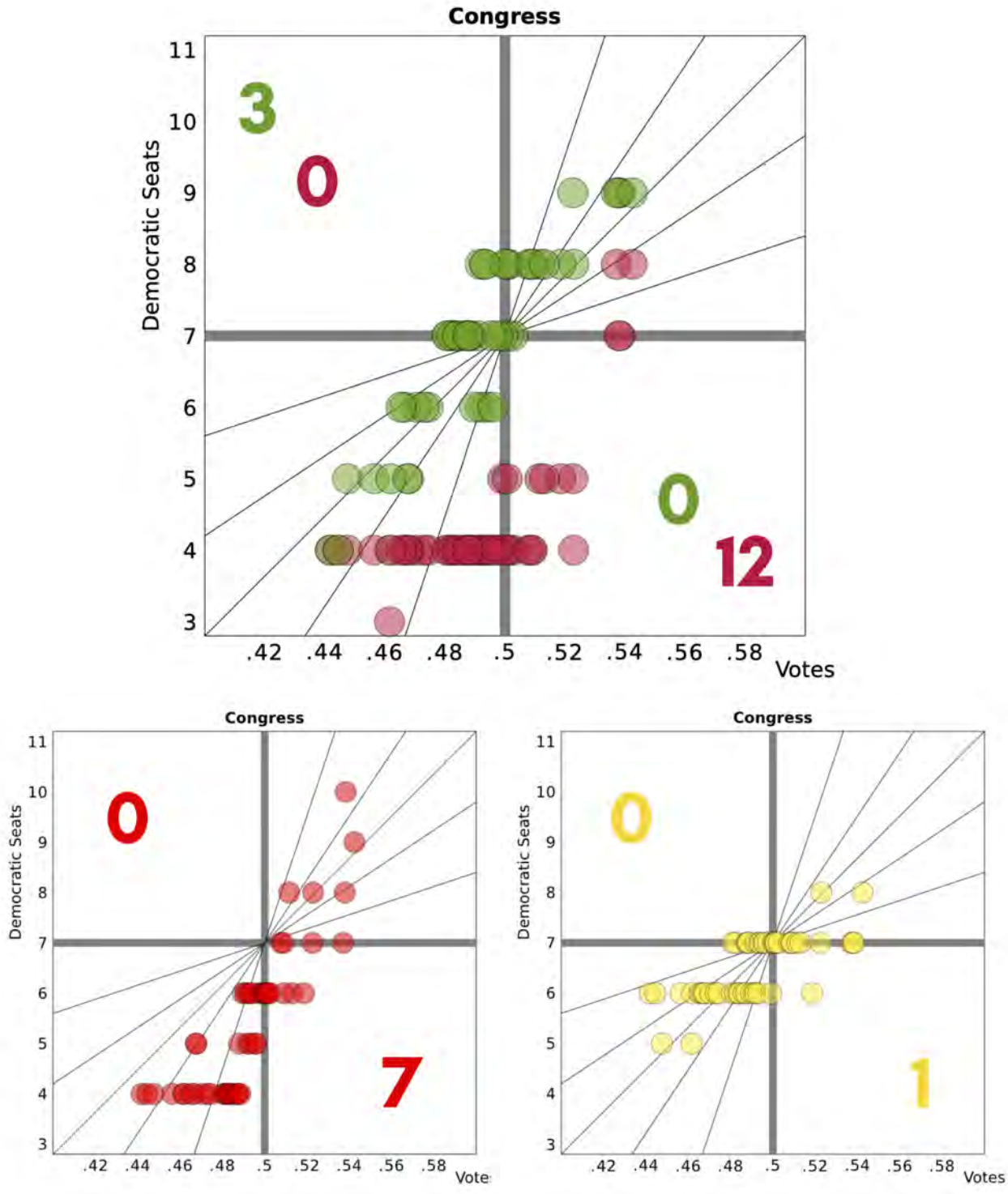

Figure 2: Congressional comparison. Top figure shows votes and seats for NCLCV-Cong (green) and the now-invalidated SL-174 (maroon); below that are SL-3 (red) and Harper-Cong (yellow). The number of anti-majoritarian outcomes for each map is noted.

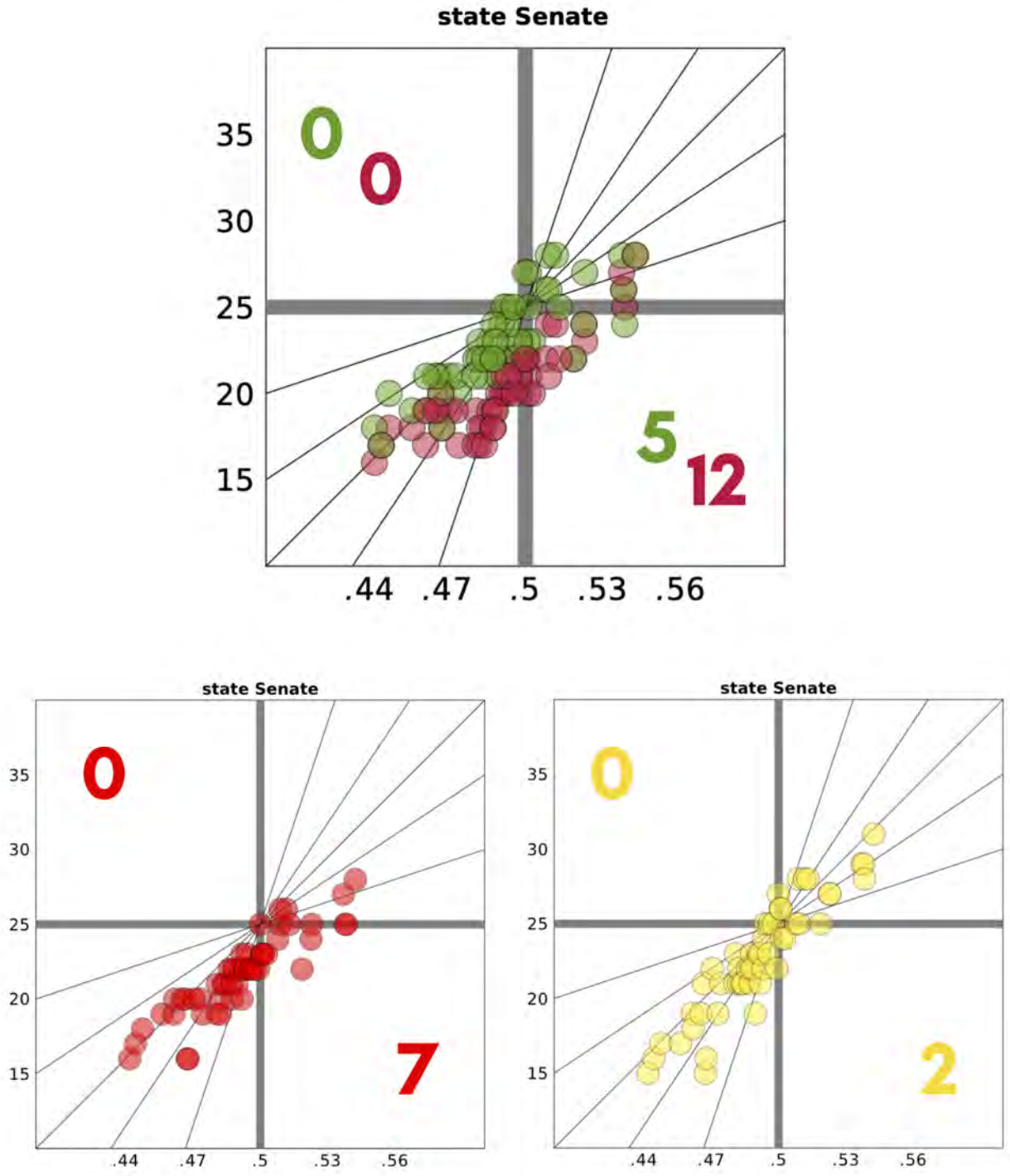

Figure 3: Senate comparison. Top figure shows votes and seats for NCLCV-Sen (green) and the now-invalidated SL-173 (maroon); below that are SL-2 (red) and Harper-Sen (yellow). The number of anti-majoritarian outcomes for each map is noted.

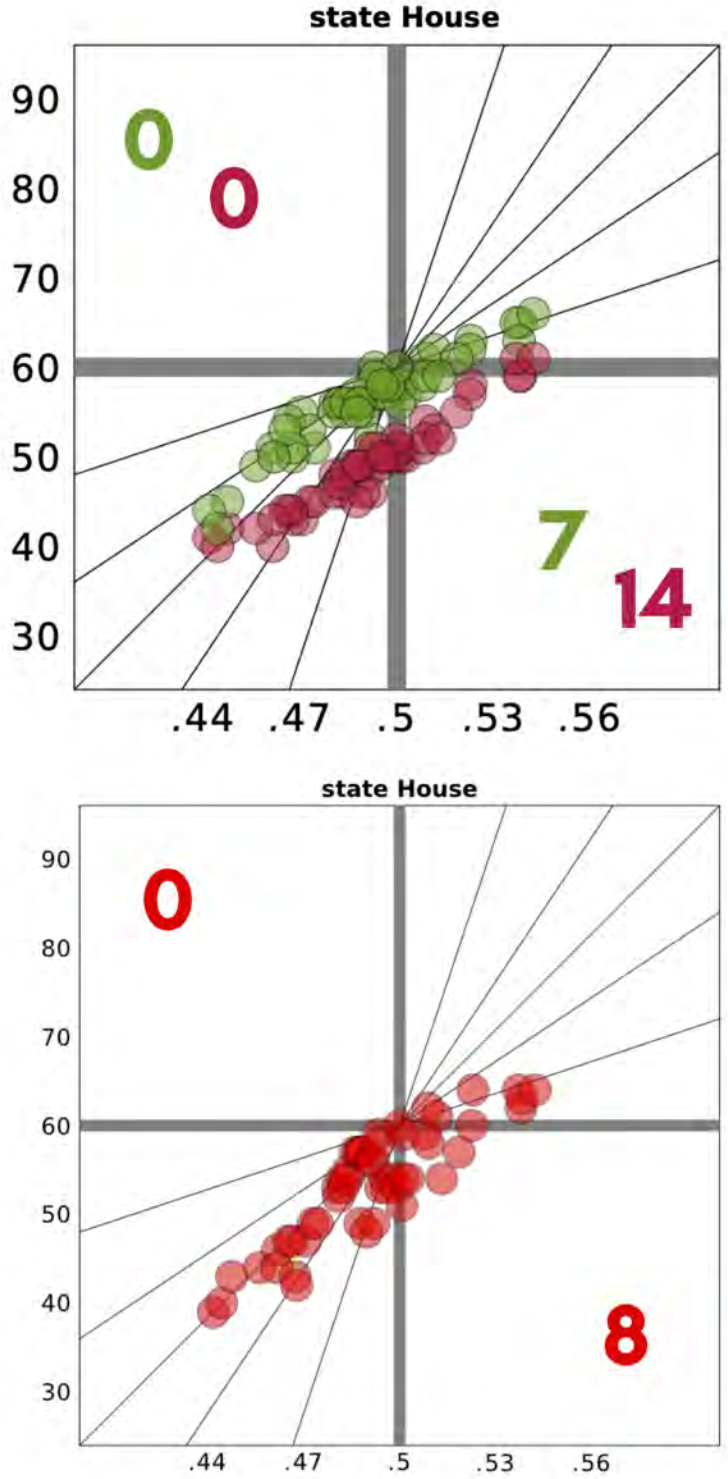

Figure 4: House comparison. Top figure shows votes and seats for NCLCV-House (green) and the now-invalidated SL-175 (maroon); below that is SL-4 (red). The number of anti-majoritarian outcomes for each map is noted.

3 Summary scores of partisan fairness

3.1 Recap of metrics

Recall the following metrics of partisan fairness, to be presented in Tables 2-4.

- *Efficiency gap* (*EG*) is the difference in "wasted" votes for the two parties, across the state, as a share of votes cast [10]. The authors of the paper that popularized efficiency gap (Stephanopoulos–McGhee) later advocated for a *simplified efficiency gap* formula $EG = 2V - S - \frac{1}{2}$, where V is the vote share in an election and S is the seat share. Original efficiency gap and simplified efficiency gap would be exactly equal if the districts had equal turnout; it's the simplified formula that was invoked, for example, in the language for the Freedom To Vote act. The authors proposed .08, later refined to .07, as the flag for a presumptive gerrymander.[2]

- *Partisan symmetry* is a family of scores based on the principle of table-turning: if the votes for the parties were reversed, would the representation also be reversed? An asymmetric plan is one in which one party fares better with its portion of support than the other party would with the same portion. Scores in this group include the *mean-median gap* (*MM*), the *partisan bias* score (*PB*), and the *partisan Gini* (*PG*). The mean-median gap literally takes the difference between the average vote share in a district and the median, or middle, district (or the average of the two middle districts when the number of districts is even). The gap is zero when the middle district looks like the state as a whole, so that half the districts are more favorable to one party and half are more favorable to the other. Partisan bias is described in the literature as measuring how much "extra" representation each party would secure in a hypothetical 50-50 election. Finally, *partisan Gini* is a summary statistic for all of the various kinds of symmetry measures in the political science literature. The "Partisan Symmetry Standard" of King and his co-authors asks that a seats-votes curve be literally symmetric about the center point, meaning that it predicts exactly the same representation for either party at any share of the vote [8]. The partisan Gini, first proposed by Bernard Grofman in 1983, takes this literally, measuring the area between the curve and its mirror image [9]. This is an unsigned metric, with zero as an ideal. (When the *PG* score is zero, all other symmetry scores, like mean-median and partisan bias, are necessarily zero as well.)

- The metric I have called *Eguia county skew* (*ECS*) is based on economist Jon Eguia's "jurisdictional partisan advantage" [7]. Eguia built a metric based on comparing the actual representation secured by a party under a vote pattern to the representation if cities and counties played the role of districts. I have applied it here only to counties, because of the fundamental importance of counties in North Carolina redistricting in particular. A simple way to explain this Eguia-style metric is as follows: in a particular election, what percentage of North Carolinians live in counties that favored Republicans? That is the benchmark for Republican representation; if their seat share is higher, the map is tilted Republican, and if lower, the map is tilted Democratic.

[2] In paragraph 167 of the North Carolina Supreme Court's recent decision in this case, it is noted that "With regard to the efficiency gap measure, courts have found "that an efficiency gap above 7% in any districting plan's first election year will continue to favor that party for the life of the plan."" (Quoting the U.S. Supreme Court, from *Whitford v. Gill*).

From these three types, I have chosen five signed scores to present in Tables 2-3: *EG*, simplified *EG*, *MM*, *PB*, and *ECS*. For all five scores, zero is ideal.

After that, I will use a second table, Table 4 to present the seat average for each party, the size of disproportionality for each election set, and the partisan Gini *PG*.

In both of these tables, I will use three sets of elections: first, the full set of 52 general elections. Next, the 35 non-judicial contests. And finally, the 14 "up-ballot" contests, which are the first five to appear on the ballot: President, U.S. Senator, Governor, Lieutenant Governor, and Attorney General. (These each occurred three times in the previous cycle, except for Attorney General, which was only contested twice.)

3.2 Comparison of metrics

We will see a phenomenon clearly visible in the following tour of the metrics (which was actually already apparent in Table 1 and Figures 2-4): when given a chance to re-draw maps, the Legislature produced maps that *split the difference* between the partisan properties of the original proposals and the properties observed in the plaintiffs' maps.

At the Congressional level, this brings the mean-median scores down substantially, but leaves all the other scores at extremely elevated levels.

	NCLCV-Cong			SL-174 (old Cong plan)		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
Efficiency Gap	0.006	0.001	−0.001	−0.167	−0.159	−0.181
Simplified *EG*	0.011	0.005	0.003	−0.17	−0.163	−0.186
Mean-median	0.007	0.006	0.007	−0.047	−0.044	−0.045
Partisan Bias	0.036	0.029	0.031	−0.192	−0.184	−0.204
Eguia County Skew	−0.006	−0.009	−0.006	−0.188	−0.176	−0.195
	SL-3 (new Cong plan)			Harper-Cong		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
Efficiency Gap	−0.093	−0.078	−0.088	−0.016	−0.021	−0.016
Simplified *EG*	−0.098	−0.083	−0.094	−0.017	−0.022	−0.017
Mean-median	−0.015	−0.017	−0.016	−0.009	−0.011	−0.009
Partisan Bias	−0.066	−0.063	−0.061	−0.014	−0.018	−0.020
Eguia County Skew	−0.115	−0.097	−0.103	−0.034	−0.035	−0.027

Table 2: Five simplified scores of partisan fairness, averaged over different sets of elections. These five metrics are all *signed*, meaning that they can take positive or negative values; positive and negative scores are intended to flag an advantage to Democrats and Republicans, respectively. *EG* and *MM* are computed as a share of votes; *PB* and the Eguia score are computed as a share of seats. Colors are intended for ease of comparisons and are consistent within each score.

For the Senate plan, the split-the-difference approach leaves significantly inferior scores on all metrics of partisan fairness than the ones, very near zero, in the plaintiffs' maps. For the House, on the other hand, the new plan is now down to a level that is markedly better in several of the metrics.

	NCLCV-Sen			SL-173 (old Senate plan)		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
Efficiency Gap	−0.020	−0.024	−0.017	−0.075	−0.068	−0.080
Simplified *EG*	−0.023	−0.028	−0.021	−0.076	−0.070	−0.081
Mean-median	−0.009	−0.012	−0.009	−0.036	−0.036	−0.037
Partisan Bias	−0.015	−0.023	−0.016	−0.072	−0.069	−0.08
Eguia County Skew	−0.040	−0.041	−0.030	−0.093	−0.083	−0.09

	SL-2 (new Senate plan)			Harper-Sen		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
Efficiency Gap	−0.045	−0.048	−0.046	−0.022	−0.023	−0.029
Simplified *EG*	−0.048	−0.051	−0.050	−0.027	−0.028	−0.034
Mean-median	−0.020	−0.022	−0.021	−0.003	−0.005	−0.003
Partisan Bias	−0.044	−0.045	−0.049	−0.013	−0.018	−0.002
Eguia County Skew	−0.065	−0.064	−0.059	−0.044	−0.041	−0.043

	NCLCV-House			SL-175 (old House plan)		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
Efficiency Gap	−0.020	−0.022	−0.017	−0.076	−0.075	−0.078
Simplified *EG*	−0.014	−0.016	−0.012	−0.074	−0.074	−0.077
Mean-median	−0.015	−0.015	−0.017	−0.039	−0.039	−0.04
Partisan Bias	−0.018	−0.019	−0.018	−0.082	−0.082	−0.086
Eguia County Skew	−0.031	−0.030	−0.021	−0.091	−0.088	−0.086

	SL-4 (new House plan)		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
Efficiency Gap	−0.039	−0.043	−0.039
Simplified *EG*	−0.037	−0.042	−0.039
Mean-median	−0.019	−0.021	−0.019
Partisan Bias	−0.042	−0.045	−0.044
Eguia County Skew	−0.054	−0.056	−0.048

Table 3: The same scores, now assessed for state Senate and state House maps. Across the board, the new maps from the Legislature split the difference between the invalidated plans and the LCV remedial proposals. Colors are intended for ease of comparisons and are consistent within each score.

When we turn to seats by party and the partisan Gini, the story is quite similar (Table 4).

	NCLCV-Cong			SL-174 (old Cong plan)		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
D Seats	6.9	6.9	6.7	4.4	4.5	4.1
R Seats	7.1	7.1	7.3	9.6	9.5	9.9
Disproportionality	0.0	0.0	−0.1	−2.5	−2.4	−2.8
Partisan Gini	0.021	0.020	0.021	0.078	0.073	0.080
	SL-3 (new Cong plan)			Harper-Cong		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
D Seats	5.4	5.6	5.4	6.5	6.5	6.4
R Seats	8.6	8.4	8.6	7.5	7.5	7.6
Disproportionality	−1.5	−1.3	−1.5	−0.4	−0.4	−0.4
Partisan Gini	0.032	0.032	0.032	0.014	0.015	0.014

	NCLCV-Sen			SL-173 (old Senate plan)		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
D Seats	23.0	22.9	22.8	20.3	20.8	19.8
R Seats	27.0	27.1	27.2	29.7	29.2	30.2
Disproportionality	−1.6	−1.7	−1.6	−4.2	−3.9	−4.6
Partisan Gini	0.026	0.026	0.026	0.051	0.049	0.054
	SL-2 (new Senate plan)			Harper-Sen		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
D Seats	21.7	21.7	21.4	22.8	22.9	22.1
R Seats	28.3	28.3	28.6	27.2	27.1	27.9
Disproportionality	−2.9	−2.9	−3.1	−1.8	−1.7	−2.3
Partisan Gini	0.036	0.035	0.038	0.027	0.027	0.028

	NCLCV-House			SL-175 (old House plan)		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
D Seats	56.2	56.3	55.8	49.0	49.3	47.9
R Seats	63.8	63.7	64.2	71.0	70.7	72.1
Disproportionality	−2.7	−2.9	−2.8	−10.0	−9.8	−10.7
Partisan Gini	0.032	0.031	0.034	0.050	0.050	0.053

	SL-4 (new House plan)		
	All (52 contests)	Non-judicial (35 contests)	Up-ballot (14 contests)
D Seats	53.4	53.2	52.5
R Seats	66.6	66.8	67.5
Disproportionality	−5.5	−5.9	−6.1
Partisan Gini	0.037	0.037	0.039

Table 4: Average seat totals and the distance from proportionality. The partisan Gini score measures how far the seats-votes curve is from perfect symmetry. Across the board, the "splits the difference" trend is apparent.

Finally, for another way of slicing the same data:

	Up-ballot generals (14)		**All generals (52)**	
	D vote share	D seat share	D vote share	D seat share
NCLCV-Cong		.4796		.4931
SL-174 (old Cong plan)	.4883	.2908	.4911	.3118
SL-3 (new Cong plan)		.3857		.3857
Harper-Cong		.4571		.4643
NCLCV-Sen		.4557		.4592
SL-173 (old Sen plan)	.4883	.3957	.4911	.4065
SL-2 (new Sen plan)		.4280		.4340
Harper-Sen		.4420		.4560
NCLCV-House		.4649		.4684
SL-175 (old House plan)	.4883	.3994	.4911	.4080
SL-4 (new House plan)		.4375		.4450

Table 5: Comparing overall fidelity of representation to the voting preferences of the electorate. As from every other point of view, the new plans from the Legislature split the difference from their original proposal to the LCV plans, which score better on all metrics of partisan fairness.

4 Comparison to Barber report

I have described the scores on a range of metrics that result from overlaying eleven plans with 52 elections, and I've also presented several more selective subsets of the elections, to make it clear the that findings are robust.

Dr. Michael Barber filed a report on February 18 in which he obtains systematically less severe bias indicators for the Legislature's new proposed maps.

For instance, consider the reported efficiency gaps.

	Barber method (12 elections)	current method (Barber elections)	current method (14 "up-ballot")
SL-174 (old)	−.195	−.195	−.181
SL-3 (new)	−.053	−.093	−.088
SL-173 (old)	−.080	−.078	−.080
SL-2 (new)	−.040	−.036	−.046
SL-175 (old)	−.072	−.079	−.078
SL-4 (new)	−.008	−.024	−.039

Table 6: Efficiency gap in each election using the wasted votes method (which is described above as the "original" *EG*).

I have made a serious attempt at replication in the very limited time available and have not been able to figure out how Dr. Barber arrives at his numbers, exactly. My conclusion is one of two things: either the discrepancy owes to the problematic way he blends elections together, which I will describe below, or he is actually using a different method from the one he describes in his report.[3]

[3]For instance, there are published methods that introduce statistical corrections into the data for fractional seats, or that randomly add noise to an election index. He has not said that he is doing either of these, but it is possible that he is employing software that does this without realizing it.

Dr. Barber describes his election index as follows: "if a district has an index value of 0.51, this would mean that 51% of the votes cast for the two major parties across these 12 elections went to Democratic candidates." This means that he is adding up the votes, rather than weighting all elections equally. I will make two observations about the problems this causes.

Weighting. The first effect is to upweight higher-turnout elections. To see the effects of the up-weighting, note that ten of 12 elections are from 2020 (see Table 7 for the list), which means that he is giving over 85% of the weight to a single election year.[4] Dr. Barber indicates that he is using the same twelve elections used by Dr. Mattingly in an earlier report—but that is a selective attribution. Mattingly uses a larger set of 15 elections for his statewide analysis. Notably dropped are ATG16 and GOV16—two elections that would counteract the dominance of 2020, and that show anti-majoritarian outcomes under the SL-3 map.

Faulty averaging: practical illustration. Consider the election-by-election efficiency gaps for Barber's 12 elections.

	PRS20	SEN20	GOV20	LTG20	ATG20	SOS20
EG	−0.1276	−0.0532	0.0225	−0.1792	−0.0742	0.0457
D seats	5	6	8	4	6	8
D votes	.4932	.4910	.5229	.4836	.5013	.5116

	TRS20	AGC20	AUD20	LAC20	PRS16	LTG16
EG	−0.1602	−0.1349	−0.0177	−0.1239	−0.1693	−0.1386
D seats	4	4	7	5	4	4
D votes	.4743	.4615	.5088	.4918	.4809	.4665

average of these *EG* values: −0.09255

Barber's reported *EG*: −.0529

Table 7: Election-by-election scores in Barber's elections for the original efficiency gap—the wasted-votes method that Barber describes in his report.

It is unreasonable on its face to take a set of actually observed elections that show such large efficiency gaps and propose a style of blending them that hides that effect.

Faulty averaging: abstract example. How is this happening? Most partisan scores are *non-linear*, meaning that if you average elections and then compute the score, this is NOT the same as reporting the average of the by-election scores.

For efficiency gap specifically, adding elections creates an unintelligible blended election from the point of view of the *meaning* of the metric. Is a vote wasted or not wasted? That depends on who wins the district. But a "wasted vote" is a property of the individual election, not of the composite.

Here is an illustrative example. Suppose that there have been ten elections in a two-district state. Nine of them had 51-49 wins for Party A in both districts. The tenth went 80-20 the other way, in favor of Party B. The nine tight elections had one wasted vote for Party A and 49 for Party B in each district, for an efficiency gap of $\frac{2(1-49)}{200}$, or −.48, indicating a huge advantage to Party A. (The largest possible magnitude of the gap is .5, so this is a truly massive gerrymander.) The last election had $EG = \frac{2(20-30)}{200} = -.1$, also indicating advantage to Party A. Let's apply Dr. Barber's method. We sum all the elections, so that now each district

[4] For instance, the total major-party cast votes in PRS20 were 5,443,067 (highest) while for LTG16 it was 4,438,769 (lowest), giving the first contest 23% more weight. Applying that factor of 1.2 to ten elections out of twelve gives them a 12/14 share of the weight, which is about 85.7%.

has 484 votes for Party A and 516 votes for Party B. Now the efficiency gap is $\frac{2(479-21)}{2000}$, or $+.458$. This looks like a single tight election, and an epic gerrymander, for Party B. That is, summing the elections gives you an uninterpretable stew. It takes a situation where one party has thin-sliced its advantage to repeatedly convert narrow preferences to a $2-0$ sweep of seats, and it obscures that pattern completely.

Let me repeat what is illustrated by this example: an application of Barber's method takes ten elections where nine had $EG = -.48$ and the last had $EG = -.1$ and, by averaging the contests into an election index, produces an overall EG of $+.458$. It is a strange method indeed if ten negative numbers can average to a positive total.

The same flaws permeate Dr. Barber's entire analysis, because each of his partisan metric calculations draws on the same problematic election index. This implicates not only his efficiency gap scores but also his mean-median scores and his partisan symmetry scores, which are likewise based on non-linear combinations of electoral data. (That is, the median of an average is not the average of the medians, and so on.) For each of his scores, he has applied an unreasonable averaging method that makes the systematic advantage for Republicans disappear.

North Carolina provides an extraordinary opportunity to base partisan determinations on a large number of actual election patterns from the last ten years, many of which were extremely close elections. We have a chance to employ methods that take advantage of this large naturalistically observed dataset rather than those that hide its systematic properties.

5 Electoral opportunity for Black voters

In my previous report, I explained how I constructed a determination of which districts are *effective* at providing Black voters with an opportunity to elect candidates of choice.

Running the same effectiveness count for the current plans, I obtain the following numbers.

Effective districts for Black voters

	NC-LCV maps	previous Leg. maps	new Leg. maps	Harper maps
Congress	4 (CD 2, 4, 9, 11)	2 (CD 2, 9)	2 (CD 1, 12)	3 (CD 1, 6, 12)
Senate	12 (SD 1, 5, 11, 14, 18, 19, 26, 27, 32, 38, 39, 40)	8 (SD 5, 11, 14, 19, 28, 38, 39, 40)	10 (SD 3, 5, 11, 14, 19, 27, 28, 38, 40, 41)	11 (SD 3, 5, 11, 13, 16, 19, 27, 28, 38, 40, 41)
House	36 (HD 2, 8, 9, 10, 23, 24, 25, 27, 31, 32, 33, 38, 39, 40, 42, 43, 44, 45, 48, 57, 58, 59, 60, 61, 63, 66, 71, 88, 92, 99, 100, 101, 102, 106, 107, 112)	24 (HD 8, 23, 24, 25, 27, 32, 38, 39, 42, 44, 48, 57, 58, 60, 66, 71, 92, 99, 100, 101, 102, 106, 107, 112)	27 (HD 8, 23, 24, 25, 27, 31, 32, 33, 38, 39, 42, 44, 45, 48, 58, 60, 61, 66, 71, 92, 99, 100, 101, 102, 106, 107, 112)	– –

Table 8: The plaintiffs' plans secure additional electoral opportunity for Black voters in North Carolina.

For comparison, Black voting age population (BVAP) levels by district can be found in Appendix A.

6 Conclusion

At a high level, the situation with the Legislature's new maps of all three types is clear throughout all of the analysis presented here: they chose maps with intermediate partisan properties between the now-invalidated original proposals and a truly even-handed map. This is quite evident in Table 4, where the number of R Congressional seats was 7.1 in the LCV maps and 9.6 in the invalidated plans; the new plans average to 8.6. For Senate, the new plans split the difference between 27.0 and 29.7 seats, giving 28.3. And in the House, they split the difference between 56.2 seats and 49.0, giving 53.4.

I find the Legislature's new Congressional and Senate plans to be particularly problematic from a Close-Votes-Close-Seats perspective, often giving four out of 14 Congressional seats (28%) or twenty out of 50 Senate seats (40%) to Democrats even when Democrats poll at better than 48% of the major-party vote. This is borne out in the partisan fairness scores, which show the new proposals splitting the difference from the now-invalidated maps to the plaintiffs' alternatives.

The plaintiffs' proposed remedial plans simply perform far better on the Close-Votes-Close-Seats norm and on the full suite of partisan fairness scores. For the scores, there are 63 opportunities to compare the plans numerically: seven metrics (*EG*, simplified *EG*, *MM*, *PB*, disproportionality, and *PG*) times three election sets (all, non-judicial, up-ballot) times three maps (Congress, Senate, House). The newly enacted plans improve on their predecessors all 63 times, but they likewise fall significantly short of the LCV maps all 63 times (and fall short of the Harper maps in 42 of 42 available comparisons). It is as consistent and robust of a finding as can be.

The LCV plans are also superlative on the traditional districting principles (recalling previous reports) and contain a large number of districts that provide effective electoral opportunity—but not a guarantee—for Black voters. In sum, they are an excellent choice of remedial plans for adoption by the Court.

References

[1] Assaf Bar-Natan, Elle Najt, and Zachary Schutzmann, *The gerrymandering jumble: Map projections permute districts' compactness scores*. Cartography and Geographic Information Science, Volume 47, Issue 4, 2020, 321–335.

[2] Richard Barnes and Justin Solomon, *Gerrymandering and Compactness: Implementation Flexibility and Abuse.* Political Analysis, Volume 29, Issue 4, October 2021, 448–466.

[3] Amariah Becker, Moon Duchin, Dara Gold, and Sam Hirsch, *Computational redistricting and the Voting Rights Act.* Election Law Journal. Volume 20, Number 4, 2021. `https://www.liebertpub.com/doi/epdf/10.1089/elj.2020.0704`

[4] Christopher Cooper, Blake Esselstyn, Gregory Herschlag, Jonathan Mattingly, and Rebecca Tippett, *NC General Assembly County Clusterings from the 2020 Census.* `https://sites.duke.edu/quantifyinggerrymandering/files/2021/08/countyClusters2020.pdf`

[5] Daryl DeFord, Natasha Dhamankar, Moon Duchin, Varun Gupta, Mackenzie McPike, Gabe Schoenbach, Ki Wan Sim, *Implementing partisan symmetry: Problems and paradoxes*. Political Analysis, to appear 2022.
Preprint available at `https://arxiv.org/pdf/2008.06930.pdf`.

[6] Moon Duchin, Taissa Gladkova, Eugene Henninger-Voss, Heather Newman, and Hannah Wheelen, *Locating the Representational Baseline: Republicans in Massachusetts.* Election Law Journal, Volume 18, Number 4, 2019, 388–401.
`https://www.liebertpub.com/doi/pdf/10.1089/elj.2018.0537`

[7] Jon X. Eguia, *A Measure of Partisan Advantage in Redistricting*. Election Law Journal, published online October 8, 2021. `https://doi.org/10.1089/elj.2020.0691`

[8] J.N. Katz, G. King, E. Rosenblatt, *Theoretical Foundations and Empirical Evaluations of Partisan Fairness in District-Based Democracies.* American Political Science Review, Volume 114, Issue 1, 2020, 164–178.

[9] Bernard Grofman, *Measures of Bias and Proportionality in Seats-Votes Relationships*. Political Methodology, Vol. 9, No. 3 (1983), 295–327.

[10] N. Stephanopoulos and E. McGhee, *Partisan gerrymandering and the efficiency gap*. The University of Chicago Law Review, pages 831–900, 2015.

A BVAP across the districts of the proposed remedial plans

NCLCV-Cong		
CD	B1VAP	APBVAP
1	0.289	0.304
2	0.332	0.347
3	0.118	0.131
4	0.319	0.344
5	0.226	0.245
6	0.227	0.242
7	0.115	0.128
8	0.123	0.132
9	0.277	0.298
10	0.232	0.25
11	0.271	0.289
12	0.121	0.132
13	0.114	0.124
14	0.032	0.039

SL-3		
CD	B1VAP	APBVAP
1	0.403	0.42
2	0.205	0.224
3	0.17	0.185
4	0.249	0.266
5	0.156	0.168
6	0.239	0.257
7	0.23	0.252
8	0.176	0.19
9	0.182	0.195
10	0.071	0.079
11	0.033	0.04
12	0.317	0.339
13	0.162	0.175
14	0.196	0.211

Harper-Cong		
CD	B1VAP	APBVAP
1	0.396	0.412
2	0.225	0.243
3	0.173	0.187
4	0.247	0.263
5	0.08	0.089
6	0.316	0.336
7	0.166	0.178
8	0.111	0.121
9	0.181	0.197
10	0.127	0.137
11	0.032	0.039
12	0.312	0.334
13	0.127	0.141
14	0.297	0.321

Table 9: Non-Hispanic Black alone (B1) and any-part-Black (APB) voting age population in the proposed remedial plans for Congress.

NCLCV-Sen		
SD	B1VAP	APBVAP
1	0.408	0.423
2	0.165	0.175
3	0.253	0.267
4	0.334	0.35
5	0.385	0.403
6	0.13	0.153
7	0.125	0.138
8	0.12	0.128
9	0.228	0.239
10	0.154	0.167
11	0.352	0.366
12	0.189	0.206
13	0.175	0.188
14	0.312	0.332
15	0.136	0.152
16	0.08	0.092
17	0.091	0.104
18	0.323	0.347
19	0.439	0.481
20	0.22	0.237
21	0.176	0.195
22	0.364	0.382
23	0.155	0.167
24	0.278	0.296
25	0.165	0.178
26	0.332	0.35
27	0.297	0.317
28	0.282	0.303
29	0.171	0.18
30	0.084	0.092
31	0.122	0.135
32	0.329	0.35
33	0.14	0.149
34	0.184	0.202
35	0.105	0.116
36	0.04	0.046
37	0.104	0.115
38	0.354	0.377
39	0.4	0.426
40	0.376	0.402
41	0.116	0.131
42	0.224	0.24
43	0.181	0.194
44	0.129	0.138
45	0.065	0.074
46	0.054	0.06
47	0.028	0.035
48	0.046	0.054
49	0.044	0.052
50	0.014	0.02

SL-2		
SD	B1VAP	APBVAP
1	0.165	0.175
2	0.253	0.267
3	0.408	0.423
4	0.334	0.35
5	0.385	0.403
6	0.13	0.153
7	0.105	0.117
8	0.139	0.148
9	0.228	0.239
10	0.154	0.167
11	0.352	0.366
12	0.189	0.206
13	0.181	0.199
14	0.406	0.43
15	0.128	0.143
16	0.094	0.107
17	0.102	0.115
18	0.215	0.23
19	0.356	0.392
20	0.256	0.273
21	0.259	0.284
22	0.326	0.344
23	0.154	0.167
24	0.278	0.296
25	0.165	0.179
26	0.207	0.221
27	0.272	0.29
28	0.43	0.456
29	0.169	0.178
30	0.084	0.092
31	0.207	0.222
32	0.234	0.252
33	0.14	0.149
34	0.184	0.201
35	0.106	0.117
36	0.039	0.045
37	0.104	0.114
38	0.411	0.437
39	0.212	0.231
40	0.361	0.387
41	0.374	0.396
42	0.11	0.125
43	0.173	0.186
44	0.123	0.131
45	0.066	0.076
46	0.042	0.049
47	0.028	0.034
48	0.048	0.055
49	0.063	0.072
50	0.014	0.02

Harper-Sen		
SD	B1VAP	APBVAP
1	0.165	0.175
2	0.253	0.267
3	0.408	0.423
4	0.334	0.35
5	0.385	0.403
6	0.13	0.153
7	0.1	0.112
8	0.142	0.152
9	0.228	0.239
10	0.154	0.167
11	0.352	0.366
12	0.189	0.206
13	0.246	0.267
14	0.115	0.131
15	0.124	0.138
16	0.382	0.405
17	0.087	0.099
18	0.169	0.181
19	0.363	0.397
20	0.39	0.41
21	0.252	0.278
22	0.195	0.211
23	0.154	0.167
24	0.278	0.296
25	0.17	0.184
26	0.283	0.3
27	0.249	0.266
28	0.376	0.399
29	0.169	0.178
30	0.084	0.092
31	0.222	0.239
32	0.224	0.24
33	0.14	0.149
34	0.184	0.201
35	0.1	0.112
36	0.04	0.046
37	0.105	0.116
38	0.422	0.448
39	0.203	0.223
40	0.341	0.365
41	0.371	0.394
42	0.127	0.143
43	0.179	0.192
44	0.129	0.138
45	0.067	0.076
46	0.056	0.063
47	0.029	0.035
48	0.044	0.051
49	0.046	0.054
50	0.014	0.02

Table 10: Non-Hispanic Black alone (B1) and any-part-Black (APB) voting age population in the proposed remedial plans for state Senate.

NCLCV-House		
HD	B1VAP	APBVAP
1	0.266	0.277
2	0.335	0.351
3	0.189	0.203
4	0.219	0.23
5	0.369	0.386
6	0.216	0.24
7	0.221	0.235
8	0.333	0.353
9	0.343	0.362
10	0.349	0.37
11	0.112	0.13
12	0.373	0.385
13	0.078	0.088
14	0.112	0.134
15	0.173	0.202
16	0.106	0.116
17	0.178	0.192
18	0.13	0.144
19	0.055	0.06
20	0.04	0.048
21	0.084	0.096
22	0.272	0.285
23	0.519	0.534
24	0.371	0.386
25	0.383	0.398
26	0.173	0.189
27	0.502	0.519
28	0.158	0.171
29	0.325	0.345
30	0.243	0.26
31	0.404	0.427
32	0.42	0.434
33	0.321	0.343
34	0.093	0.104
35	0.093	0.105
36	0.058	0.069
37	0.109	0.122
38	0.305	0.324
39	0.311	0.332
40	0.316	0.339
41	0.085	0.096
42	0.384	0.415
43	0.348	0.379
44	0.365	0.411
45	0.378	0.417
46	0.282	0.295
47	0.209	0.223
48	0.346	0.371
49	0.153	0.171
50	0.174	0.185
51	0.102	0.111
52	0.199	0.212
53	0.142	0.154
54	0.137	0.149
55	0.255	0.268
56	0.096	0.111
57	0.369	0.392
58	0.363	0.386
59	0.351	0.371
60	0.286	0.304

NCLCV-House		
HD	B1VAP	APBVAP
61	0.457	0.486
62	0.115	0.127
63	0.277	0.295
64	0.114	0.126
65	0.184	0.194
66	0.31	0.336
67	0.126	0.134
68	0.072	0.081
69	0.093	0.105
70	0.065	0.072
71	0.323	0.35
72	0.371	0.393
73	0.179	0.198
74	0.108	0.12
75	0.18	0.194
76	0.199	0.21
77	0.052	0.058
78	0.081	0.089
79	0.073	0.081
80	0.099	0.108
81	0.083	0.09
82	0.183	0.2
83	0.119	0.132
84	0.154	0.166
85	0.029	0.034
86	0.057	0.064
87	0.045	0.053
88	0.32	0.341
89	0.069	0.077
90	0.032	0.039
91	0.129	0.139
92	0.319	0.345
93	0.028	0.035
94	0.049	0.055
95	0.071	0.081
96	0.089	0.1
97	0.052	0.058
98	0.075	0.086
99	0.292	0.314
100	0.29	0.316
101	0.475	0.502
102	0.302	0.323
103	0.069	0.082
104	0.092	0.103
105	0.146	0.164
106	0.451	0.481
107	0.445	0.474
108	0.107	0.116
109	0.223	0.238
110	0.169	0.18
111	0.171	0.182
112	0.469	0.493
113	0.061	0.069
114	0.035	0.042
115	0.08	0.091
116	0.046	0.055
117	0.031	0.037
118	0.011	0.015
119	0.021	0.029
120	0.008	0.013

SL-4		
HD	B1VAP	APBVAP
1	0.172	0.182
2	0.292	0.307
3	0.188	0.202
4	0.244	0.255
5	0.369	0.386
6	0.222	0.246
7	0.221	0.235
8	0.361	0.381
9	0.313	0.332
10	0.323	0.344
11	0.121	0.136
12	0.373	0.385
13	0.079	0.088
14	0.121	0.144
15	0.164	0.191
16	0.107	0.117
17	0.099	0.107
18	0.188	0.203
19	0.047	0.054
20	0.07	0.081
21	0.085	0.096
22	0.272	0.285
23	0.519	0.534
24	0.369	0.385
25	0.385	0.4
26	0.165	0.181
27	0.502	0.518
28	0.158	0.17
29	0.29	0.31
30	0.288	0.307
31	0.434	0.456
32	0.419	0.434
33	0.32	0.34
34	0.105	0.117
35	0.17	0.187
36	0.073	0.086
37	0.111	0.124
38	0.416	0.439
39	0.314	0.336
40	0.097	0.11
41	0.07	0.083
42	0.376	0.42
43	0.342	0.369
44	0.4	0.438
45	0.354	0.392
46	0.251	0.264
47	0.241	0.256
48	0.346	0.371
49	0.142	0.16
50	0.174	0.185
51	0.154	0.167
52	0.218	0.231
53	0.147	0.16
54	0.106	0.116
55	0.248	0.261
56	0.094	0.109
57	0.233	0.251
58	0.456	0.484
59	0.306	0.325
60	0.328	0.347

SL-4		
HD	B1VAP	APBVAP
61	0.465	0.493
62	0.152	0.166
63	0.264	0.282
64	0.128	0.141
65	0.184	0.194
66	0.309	0.335
67	0.126	0.134
68	0.082	0.093
69	0.095	0.106
70	0.066	0.074
71	0.322	0.348
72	0.383	0.404
73	0.217	0.239
74	0.118	0.13
75	0.189	0.205
76	0.199	0.21
77	0.052	0.058
78	0.052	0.058
79	0.165	0.174
80	0.09	0.098
81	0.092	0.1
82	0.191	0.209
83	0.079	0.088
84	0.155	0.167
85	0.03	0.034
86	0.057	0.064
87	0.045	0.052
88	0.228	0.247
89	0.063	0.07
90	0.032	0.038
91	0.104	0.112
92	0.318	0.344
93	0.028	0.035
94	0.049	0.055
95	0.071	0.081
96	0.092	0.105
97	0.052	0.058
98	0.074	0.085
99	0.459	0.488
100	0.334	0.36
101	0.506	0.534
102	0.309	0.33
103	0.087	0.1
104	0.086	0.098
105	0.126	0.141
106	0.351	0.376
107	0.562	0.592
108	0.137	0.147
109	0.178	0.191
110	0.187	0.198
111	0.157	0.167
112	0.308	0.331
113	0.065	0.073
114	0.077	0.086
115	0.051	0.06
116	0.033	0.04
117	0.03	0.036
118	0.011	0.015
119	0.021	0.029
120	0.008	0.013

Table 11: Non-Hispanic Black alone (B1) and any-part-Black (APB) voting age population in the proposed remedial plans for the state House.

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

Executed: Feb 20, 2022

Prof. Moon Duchin

Sworn and subscribed before me

this the 20 of February, 2022.

Notary Public

Name: Simarjit Manhas

My Commission Expires: 02/02/2024

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California, County of Alameda

Subscribed and sworn to (or affirmed) before me on this 20 day of February, 2022, by Moon Duchin, proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

Signature:

NRO1 SIMARJIT MANHAS COMM. #2317737 Notary Public - California Contra Costa County My Comm. Expires Feb. 2, 2024 NRO1

STATE OF NORTH CAROLINA

COUNTY OF WAKE

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION
FILE NO. 21 CVS 015426

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

COMMON CAUSE,
Plaintiff-Intervenor,

v.

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

FILED
2022 FEB 23 AM 11:01
WAKE CO., C.S.C.
BY

STATE OF NORTH CAROLINA

COUNTY OF WAKE

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION
FILE NO. 21 CVS 500085

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.

ORDER DENYING LEGISLATIVE DEFENDANT'S MOTION TO DISQUALIFY

THIS MATTER comes before the undersigned three-judge panel upon Legislative Defendant's Motion to Disqualify Dr. Samuel Wang and Dr. Tyler Jarvis as Assistants to the Special Masters, filed February 21, 2022.

Legislative Defendants, through the present Motion, request this Court to disqualify Dr. Wang and Dr. Jarvis as assistants or advisors to the Special Masters, requiring any work

product completed by them to be immediately destroyed, prohibiting the Special Masters from considering any information or materials obtained from Dr. Wang or Dr. Jarvis, and requiring the Special Masters and their assistants to produce any communications had with third parties related to North Carolina redistricting.

In the Report of the Special Masters, filed contemporaneously with this Order as part of this Court's Remedial Order, the Special Masters set forth multiple reasons why Drs. Wang and Jarvis should not be disqualified from serving as their advisors. This Court agrees and, for the reasons expressed in the Special Masters' Report, will deny Legislative Defendant's Motion to Disqualify.

BASED UPON THE FOREGOING and in the exercise of the Court's discretion, the Court ORDERS that Legislative Defendant's Motion is DENIED.

SO ORDERED, this the 23 day of February 2022.

A. Graham Shirley, Superior Court Judge

/s/ Nathaniel J. Poovey

Nathaniel J. Poovey, Superior Court Judge

/s/ Dawn M. Layton

Dawn M. Layton, Superior Court Judge

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing document was served on the persons indicated below via electronic transmission by e-mail addressed as follows:

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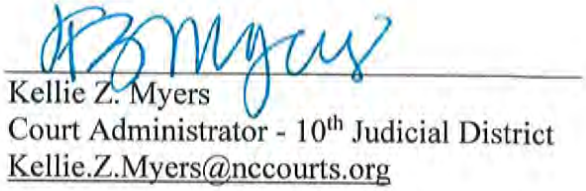
Service is made upon local counsel for all attorneys who have been granted pro hac vice admission, with the same effect as if personally made on a foreign attorney within this state.

This the 23rd day of February 2022.



Kellie Z. Myers
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STATE OF NORTH CAROLINA

COUNTY OF WAKE

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION
FILE NO. 21 CVS 015426

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

COMMON CAUSE,
Plaintiff-Intervenor,

v.

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

FILED
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BY

STATE OF NORTH CAROLINA

COUNTY OF WAKE

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION
FILE NO. 21 CVS 500085

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.

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THIS MATTER comes before the undersigned three-judge panel pursuant to the February 4, 2022, Order of the Supreme Court of North Carolina ("Supreme Court Remedial Order) for review of Remedial Redistricting Plans to apportion the state legislative and congressional districts within North Carolina (hereinafter collectively referred to as the "Remedial Plans") enacted by the North Carolina General Assembly on February 17, 2022. 2022 N.C. Sess. Laws. 2 (also known as Senate Bill 744 and hereafter referred to as "Remedial Senate Plan"); 2022 N.C. Sess. Laws. 4 (also known as House Bill 980 and hereafter referred to as "Remedial House Plan"); 2022 N.C. Sess. Laws. 3 (also known as Senate Bill 745 and hereafter referred to as "Remedial Congressional Plan").

The Remedial Plans were enacted following entry of the Supreme Court Remedial Order. This Court entered a Judgment on January 11, 2022, wherein the Court upheld the constitutionality of the 2021 Enacted State Legislative and Congressional redistricting plans (hereinafter "Enacted Plans"). Thereafter, Harper Plaintiffs, North Carolina League of Conservation Voters Plaintiffs, and Plaintiff-Intervenor Common Cause (hereinafter collectively referred to as "Plaintiffs") appealed this Court's Judgment directly to the Supreme Court of North Carolina. On February 4, 2022, the Supreme Court of North Carolina entered its Remedial Order, with opinion to follow, adopting in full this Court's findings of fact in the January 11, 2022, Judgment; however, the Supreme Court concluded that the Enacted Plans are unconstitutional under N.C. Const., art. I, §§ 10, 12, 14, and 19 and remanded the action to this Court for remedial proceedings. On February 14, 2022, the Supreme

Court filed its full opinion in this action. *Harper v. Hall*, 2022-NCSC-17 (Feb. 14, 2022).

Pursuant to the Supreme Court Remedial Order and full opinion, and after reviewing all remedial and alternative plans submitted to this Court, as well as additional documents, materials, and information pertaining to the submitted plans, including the report of this Court's appointed Special Masters and comments received from the parties, this Court sets out the following:

FINDINGS OF FACT

I. Summary of Requirements for Remedial Process

1. The Supreme Court's Order required the submission to this Court of remedial state legislative and congressional redistricting plans that "satisfy all provisions of the North Carolina Constitution"; both the General Assembly, and any parties to this action who chose to submit proposed remedial plans for this Court's consideration, were required to submit such plans, and additional information, on or before February 18, 2022, at 5:00 p.m.

2. The Supreme Court's Order also provided for a comment period in which parties to these consolidated cases were permitted to file and submit to this Court comments on any plans submitted for this Court's consideration by February 21, 2022 at 5:00 p.m.

3. The Supreme Court's Order also mandated that this Court must approve or adopt constitutionally compliant remedial plans by noon on February 23, 2022.

4. This Court subsequently entered an order on February 8, 2022, providing initial guidance on the remedial phase of the litigation before this Court,

requiring written submissions containing the information the Supreme Court set forth in its Order pertaining to redistricting plans in general and the ordered Remedial Plans specifically. The written submissions were required to provide an explanation of the data and other considerations the mapmaker relied upon to create any submitted proposed remedial plan and to determine that the proposed remedial plan was constitutional—*i.e.*, compliant with the Supreme Court Remedial Order. The full opinion of the Supreme Court, *Harper v. Hall*, 2022-NCSC-17, thereafter provided further guidance for the Remedial Plans.

5. On February 16, 2022, this Court entered an Order appointing three former jurists of our State appellate and trial courts—Robert F. Orr, Robert H. Edmunds, Jr., and Thomas W. Ross—to serve as Special Masters for the purposes of: 1) assisting this Court in reviewing any Proposed Remedial Plans enacted and submitted by the General Assembly or otherwise submitted to the Court by a party in these consolidated cases; and, 2) assisting this Court in fulfilling the Supreme Court's directive to this Court to develop remedial plans based upon the findings in this Court's January 11, 2022, Judgment should the General Assembly fail to enact and submit Proposed Remedial Plans compliant with the Supreme Court's Order within the time allowed. This Appointment Order also required the submission of additional information, data, and materials for review by the Court, the parties, and the Special Masters.

6. The Appointment Order further provided that the Special Masters were authorized to hire assistants and advisors reasonably necessary to complete their

work. Pursuant to this authorization, the Special Masters hired the following advisors to assist in evaluating the Remedial Plans:

a. Bernard Grofman: PhD in political science from the University of Chicago, and currently the Jack W. Peltason Endowed Chair and Distinguished Professor at the University of California, Irvine, School of Social Sciences;

b. Tyler Jarvis: PhD in mathematics from Princeton University, and currently a Professor at Brigham Young University's College of Physical and Mathematical Sciences;

c. Eric McGhee: PhD in political science from the University of California, Berkeley, and currently a Senior Fellow at Public Policy Institute of California, a non-partisan, non-profit think tank; and,

d. Samuel Wang: PhD in Neurosciences from Stanford University, and currently a Professor of neuroscience at Princeton University and Director of the Electoral Innovation Lab.

7. The Court finds that these advisors were reasonably necessary to facilitate the work of the Special Masters to provide this Court with an analysis of the Remedial Plans.[1]

II. The General Assembly's Remedial Plans as a Whole

8. Pursuant to the Supreme Court's directive, the General Assembly enacted Remedial Plans and, through the Legislative Defendants, timely submitted the Remedial Plans to this Court on February 18, 2022.

[1] On February 20, 2022, counsel for Harper Plaintiffs submitted a notice of communications wherein the Court was informed that Dr. Wang and Dr. Jarvis had contacted some of Harper Plaintiffs' retained experts by email regarding their algorithms and analysis models. Legislative Defendants subsequently filed a motion to disqualify Dr. Wang and Dr. Jarvis from assisting the Special Masters. The Special Masters have provided additional review of the issues presented in this motion, as noted in the Report attached to this Order, and the Court will address the Motion in a separate order that will be filed contemporaneously herewith.

A. Participants in the General Assembly's Drawing of Remedial Plans

9. The House participants involved in the drawing of the Remedial Plans consisted of twenty-one Republican members and one Democratic member, with five Republican staff members and two Democratic staff members.

10. The Senate participants involved in the drawing of the Remedial Plans consisted of four Republican members and five Democratic members, with four Republican staff members and one Democratic staff member.

11. The General Assembly members were also supported by fifteen Legislative Analysis and Bill Drafting Division staff members, as well as four Information Systems Division staff members.

12. Legislative Defendants, through counsel, also relied for limited purposes on their experts and non-testifying experts in this case, including Clark Bensen and Sean Trende for statistical analysis, Dr. Jeffrey Lewis to conduct a Racially Polarized Voting Analysis for both the 2021 and the 2022 districts, and Dr. Michael Barber for statistical analyses of the Remedial Plans and other BVAP-related information.

B. The General Assembly's Remedial Criteria for Drawing the Remedial Plans

13. The General Assembly's Remedial Criteria governing the remedial map drawing process were those neutral and traditional redistricting criteria adopted by the Joint Redistricting Committees on August 12, 2021, (received into evidence at trial as exhibit LDTX15) unless the criteria conflicted with the Supreme Court Remedial Order and full opinion.

14. Although expressly forbidden by the previously-used August 2021 Criteria, the General Assembly as part of its Remedial Criteria intentionally used partisan election data as directed by the Supreme Court's Remedial Order. The General Assembly did so by loading such data into Maptitude, the map drawing software utilized by the General Assembly in creating districting plans. The elections used by the General Assembly to evaluate the projected partisan effects of district lines were as follows: Lt. Gov 2016, President 2016, Commissioner of Agriculture 2020, Treasurer 2020, Lt. Gov. 2020, US Senate 2020, Commissioner of Labor 2020, President 2020, Attorney General 2020, Auditor 2020, Secretary of State 2020, and Governor 2020.

15. The Court finds that the General Assembly's use of partisan data in this manner comported with the Supreme Court Remedial Order.

C. The General Assembly's Racially Polarized Voting Analysis

16. Paragraph 8 of the Supreme Court Remedial Order required the General Assembly to "assess whether, using current election and population data, racially polarized voting is legally sufficient in any area of the state such that Section 2 of the Voting Rights Act requires the drawing of a district to avoid diluting the voting strength of African-American voters."

17. The General Assembly conducted an abbreviated racially polarized voting ("RPV") analysis to determine whether racially polarized voting is legally sufficient in any area of the state such that Section 2 of the Voting Rights Act *requires* the drawing of a district to avoid diluting the voting strength of African American voters during the remedial process. Legislative Defendants' expert Dr. Jeffery B.

Lewis ran an analysis and concluded that all three Remedial Plans provide African Americans with proportional opportunity to elect their candidates of choice.

18. The Court finds that the General Assembly satisfied the directive in the Supreme Court Remedial Order to determine whether the drawing of a district in an area of the state is required to comply with Section 2 of the Voting Rights Act.

D. Plaintiffs' Objections and Comments to the Plans

19. Pursuant to the Supreme Court's directive, Plaintiffs timely submitted comments on and objections to the Remedial Plans on February 21, 2022.

20. NCLCV Plaintiffs object to the Remedial Senate and Congressional Plans. NCLCV Plaintiffs do not specifically object to the Remedial House Plan but instead request the Court conduct its own analysis of the Remedial House Plan.

21. Harper Plaintiffs object to the Remedial Congressional Plan and Remedial Senate Plan. Harper Plaintiffs do not object to the Remedial House Plan.

22. Plaintiff Common Cause objects to all three Remedial Plans in general and specifically contends the Remedial Senate and House Plans must be redrawn for Senate District 4 and House District 10.

E. Report of Special Masters

23. Pursuant to this Court's Appointment Order, the Special Masters prepared a Report containing their analysis and submitted that Report to this Court for its consideration. The Report is attached to this Order as an exhibit and has been filed with the Court.

24. The Special Masters, and their advisors, conducted an analysis of the Remedial Plans using a variety of metrics to determine whether the submitted maps

meet the requirements of the North Carolina Constitution as set out by the Supreme Court of North Carolina in its Remedial Order and full opinion.

25. The Special Masters' findings demonstrate that the Remedial House and Senate Plans meet the requirements of the Supreme Court's Remedial Order and full opinion.

26. The Special Masters' findings demonstrate that the Remedial Congressional Plan does not meet the requirements of the Supreme Court's Remedial Order and full opinion.

27. This Court adopts in full the findings of the Special Masters and sets out additional specific findings on the Remedial Plans' compliance with the Supreme Court Remedial Order below.

III. Remedial Congressional Plan

A. The General Assembly's Starting Point and Subsequently Proposed Amendments

28. In determining the base map for the Congressional Districts in the Remedial Congressional Plan that was eventually enacted, the Senate started from scratch.

29. There was a House Draft of a remedial congressional plan that was never voted on and therefore never considered by a committee or the full General Assembly.

30. Senator Clark offered one amendment to the Remedial Congressional Plan, a statewide plan, that was tabled.

31. The Remedial Congressional Plans passed the Senate by a vote of 25-19. The "aye" votes in the Senate were solely by members of the Republican party, while the "no" votes in the Senate were solely by members of the Democratic Party. The Remedial Congressional Plan passed the House by voice vote along party lines.

B. Analysis of Partisanship Reflected in the Remedial Congressional Plan

32. The Remedial Congressional Plan reflects key differences from the 2021 Enacted Congressional Plan in the projected partisan makeup of certain districts.

a. Four congressional districts are some of the most politically competitive in the country (*i.e.*, presidential election differences of less than 5%): District 6, District 7, District 13, and District 14.

b. Wake and Mecklenburg Counties are only split across two districts unlike in the 2021 Enacted Congressional Plan when each county was split across three districts.

33. The Supreme Court Remedial Order stated that a combination of different methods could be used to evaluate the partisan fairness of a districting plan; of those methods, the General Assembly used the "mean-median" test and the "efficiency gap" test to analyze the partisan fairness of the Remedial Plans.

34. The Court finds, based upon the analysis performed by the Special Masters and their advisors, that the Remedial Congressional Plan is not satisfactorily within the statistical ranges set forth in the Supreme Court's full opinion. *See Harper v. Hall*, 2022-NCSC-17, ¶166 (mean-median difference of 1% or less) and ¶167 (efficiency gap less than 7%).

35. The Court finds that the partisan skew in the Remedial Congressional Plan is not explained by the political geography of North Carolina.

IV. Remedial Senate Plan

A. The General Assembly's Starting Point and Subsequently Proposed Amendments

36. In determining the base map for the State Senate Districts, the Senate also started from scratch. The Senate altered two county groupings and adopted groupings for Senate Districts 1 and 2 that were preferred by Common Cause Plaintiffs. The remaining county groupings remained the same. As a result, the 13 wholly-contained single district county groupings in the Remedial Plan were kept from the Enacted Plan.

37. Alternative county groupings were proposed but not adopted.

a. The Senate considered the Democratic members' preferred alternate grouping for Forsyth County, which pairs it with Yadkin instead of Stokes County, but it was determined that the resulting districts in Alexander, Wilkes, Surry, and Stokes Counties would have been less compact. Additionally, Yadkin County is more Republican than Stokes County.

b. Alternative county groupings around Buncombe County were considered as well, but the Senate determined that any change from the chosen grouping would have resulted in districts that would have been significantly less compact.

38. The Remedial Senate Plan passed the Senate by a vote of 26-19. The "aye" votes in the Senate were solely by members of the Republican party, while the "no" votes in the Senate were solely by members of the Democratic Party. The Remedial Senate Plan passed the House by voice vote along party lines.

B. Analysis of Partisanship Reflected in the Remedial Senate Plan

39. The process for the development of the Remedial Senate Plan began with separate maps being drawn by the Senate Democratic Caucus and the Republican Redistricting and Election Committee members, respectively. The plans were then exchanged and discussed; however, after the two groups could not come to a resolution, the plan proposed by the Republican Redistricting and Election Committee members was then put to a vote by the Senate Committee and advanced to the full chamber.

40. The Remedial Senate Plan includes ten districts that were within ten points in the 2020 presidential race.

41. The Remedial Senate Plan reflects key differences from the 2021 Enacted Senate Plan in the projected partisan makeup of districts in certain county groupings.

a. In the Cumberland-Moore County grouping, Senate District 21 is now more competitive.

b. In the Iredell-Mecklenburg County grouping, one district is more competitive.

c. In New Hanover County, the districts were made more competitive, resulting in a Senate District 7 that leans Democratic.

d. In Wake County, Senate Districts 17 and 18 are more Democratic leaning.

42. The Court finds, based upon the analysis performed by the Special Masters and their advisors, that the Remedial Senate Plan is satisfactorily within the statistical ranges set forth in the Supreme Court's full opinion. *See Harper v. Hall*, 2022-NCSC-17, ¶166 (mean-median difference of 1% or less) and ¶167 (efficiency gap less than 7%).

43. The Court finds that to the extent there remains a partisan skew in the Remedial Senate Plan, that partisan skew is explained by the political geography of North Carolina.

C. The General Assembly's Consideration of Incumbency Protection and Traditional Neutral Districting Criteria

44. For the Remedial Senate Plan, current members of either chamber who announced retirement or their intention to seek another office were not considered as "incumbents."

45. In the Senate, incumbency was considered evenly. No Senators are double bunked unless as a result of the mandatory county groupings, and no Democratic members are double bunked with other incumbents.

46. The Court finds that the measures taken by the General Assembly for the purposes of incumbency protection in the Remedial Senate Plan were applied evenhandedly.

47. The current membership of the General Assembly was elected under a districting plan that was approved by the trial court in *Common Cause v. Lewis* and, as stated above, the General Assembly began anew the process of drawing district lines after choosing county groupings for the remedial state legislative districts in this case.

48. The Court finds that the measures taken by the General Assembly for the purposes of incumbency protection in the Remedial Senate Plan do not perpetuate a prior unconstitutional redistricting plan.

49. The Court finds that the measures taken by the General Assembly for the purposes of incumbency protection in the Remedial Senate Plan are consistent with the equal voting power requirements of the North Carolina Constitution.

50. The Court finds that the General Assembly did not subordinate traditional neutral districting criteria to partisan criteria or considerations in the Remedial Senate Plan.

V. Remedial House Plan

A. The General Assembly's Starting Point and Subsequently Proposed Amendments

51. In determining the base map for the State House Districts, the House started from scratch after keeping only the 14 districts that were the product of single district county groupings.

52. The Remedial House Plan was ultimately amended by six amendments offered by Democratic Representatives.

a. Three amendments, drawn by Representative Reives, redrew certain districts in Wake, Mecklenburg, and Buncombe, which were already Democratic leaning, to be more Democratic leaning.

b. An additional amendment, also drawn by Representative Reives, added an additional district in Cabarrus County that is more Democratic leaning.

c. An amendment offered by Representative Meyer swapped two precincts in Orange County in order to keep Carrboro whole.

d. An amendment offered by Representative Hawkins adjusted district lines in Durham County in order to better follow educational district lines.

53. The Remedial House Plan passed the House by a vote of 115-5 and was passed by the Senate by a vote of 41-3. The "aye" votes in the House and Senate were by members of both political parties. The "no" votes in the House and Senate were solely by members of the Democratic Party.

B. Analysis of Partisanship Reflected in the Remedial House Plan

54. The Remedial House Plan reflects key differences from the 2021 Enacted House Plan in the projected partisan makeup of districts in certain county groupings.

a. Buncombe County, which consisted of 1 Republican and 2 Democratic districts in the Enacted Plan, consists of 3 Democratic districts in the Remedial House Plan.

b. Pitt County, which consisted of 1 Republican and 1 Democratic district in the Enacted Plan, consists of 2 Democratic districts in the Remedial House Plan.

c. Guilford County now consists of 6 Democratic leaning districts.

d. Cumberland County now consists of 3 Democratic districts and 1 competitive district.

e. Mecklenburg and Wake Counties now consist of 13 Democratic leaning districts each.

f. New Hanover, Cabarrus, and Robeson Counties now contain an additional competitive district each.

55. The Court finds, based upon and confirmed by the analysis of the Special Masters and their advisors, that the Remedial House Plans are satisfactorily within the statistical ranges set forth in the Supreme Court's full opinion. *See Harper v. Hall*, 2022-NCSC-17, ¶166 (mean-median difference of 1% or less) and ¶167 (efficiency gap less than 7%).

56. The Court finds that to the extent there remains a partisan skew in the Remedial House Plan, that partisan skew is explained by the political geography of North Carolina.

C. The General Assembly's Consideration of Incumbency Protection and Traditional Neutral Districting Criteria

57. For the Remedial House Plan, current members of either chamber who announced retirement or their intention to seek another office were not considered as "incumbents."

58. In the House, incumbency was considered evenly. The only discretionary double bunking in the Remedial House Plan pairs two Republican members. There was no discretionary double bunking of Democratic members. The few double bunked members are double bunked solely as a result of the mandatory county groupings.

59. The Court finds that the measures taken by the General Assembly for the purposes of incumbency protection in the Remedial House Plan were applied evenhandedly.

60. The current membership of the General Assembly was elected under a districting plan that was approved by the trial court in *Common Cause v. Lewis* and, as stated above, the General Assembly began anew the process of drawing district lines after choosing county groupings for the remedial state legislative districts in this case.

61. The Court finds that the measures taken by the General Assembly for the purposes of incumbency protection in the Remedial House Plan do not perpetuate a prior unconstitutional redistricting plan.

62. The Court finds that the measures taken by the General Assembly for the purposes of incumbency protection in the Remedial House Plan are consistent with the equal voting power requirements of the North Carolina Constitution.

63. The Court finds that the General Assembly did not subordinate traditional neutral districting criteria to partisan criteria or considerations in the Remedial House Plan.

VI. Plaintiffs' Alternative Remedial Plans

64. The following alternative remedial plans for the Court's consideration were submitted by NCLCV Plaintiffs, Harper Plaintiffs, and Plaintiff-Intervenor Common Cause on February 18, 2022 (hereinafter referred to as "NCLCV Alternative Plans"; "Harper Alternative Plans"; "Common Cause Alternative Plans"; or collectively, "Alternative Plans").

65. Although Plaintiffs submitted Alternative Plans, because the Court is satisfied with the Remedial House and Senate Plans, the Court did not need to consider an alternative plan for adoption.

66. Furthermore, the Court, in following N.C.G.S. § 120-2.4(a1), has chosen to order the use of an interim districting plan for the 2022 North Carolina Congressional election that differs from the Remedial Congressional Plan to the extent necessary to remedy the defects identified by the Court.

VII. Special Masters' Interim Congressional Plan

67. As part of their Report, the Special Masters have developed a recommended congressional plan ("Interim Congressional Plan") for this Court to consider due to their findings, which the Court has adopted, that the Remedial Congressional Plan does not satisfy the requirements of the Supreme Court Remedial Order and full opinion.

68. The Court finds that the Interim Congressional Plan recommended by the Special Masters was developed in an appropriate fashion[2], is consistent with N.C.G.S. § 120-2.4(a1), and is consistent with the North Carolina Constitution and the Supreme Court's full opinion.

Based upon the foregoing findings of fact, the Court makes the following:

CONCLUSIONS OF LAW

1. In *Harper v. Hall*, 2022-NCSC-17, the Supreme Court stated:

> We do not believe it prudent or necessary to, at this time, identify an exhaustive set of metrics or precise mathematical thresholds which conclusively demonstrate or disprove the existence of an unconstitutional partisan gerrymander. *Cf. Reynolds v. Sims*, 377 U.S. 533, 578 (1964) ("What is marginally permissible in one [case] may be unsatisfactory in another, depending on the particular circumstances of the case. Developing a body of doctrine on a case-by-case basis appears to us to provide the most satisfactory means of arriving at detailed constitutional requirements in the area of . . . apportionment."). As in *Reynolds*, "[l]ower courts can and assuredly will work out more concrete and specific standards for evaluating state legislative apportionment schemes in the context of actual litigation." *Id.* However, as the trial court's findings of fact indicate, there are multiple reliable ways of demonstrating the existence of an unconstitutional partisan gerrymander. In particular, mean-median difference analysis; efficiency gap analysis; close-votes, close-seats analysis; and partisan symmetry analysis may be useful in assessing whether the mapmaker adhered to traditional neutral districting criteria and whether a meaningful partisan skew necessarily results from North Carolina's unique political geography. If some combination of these metrics demonstrates there is 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, then the plan is presumptively constitutional.

Id. at ¶163.

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[2] The data files (e.g., block equivalency, shape files, population deviation results) are included in the court file with this order in native format. The equivalent of the "stat pack" has been requested from the Special Masters' advisor and will be placed in the court file and provided to the parties as soon as available.

2. Plaintiffs have urged upon this court that we must adopt plans that "treat voters of both political parties fairly." They argue that the "LD Congressional and Senate Plans are not fair." Further, they argue that the Supreme Court ordered "fair maps" and that "[b]ecause the LD Congressional and Senate Plans are not fair maps, . . . the Court should adopt one of the fairer maps before it – such as the NCLCV Maps." We see Plaintiffs' arguments as tantamount to urging this Court to adopt a proportional representation standard, which the Supreme Court, in its order, specifically disavowed. *Id.* at ¶169.

3. The Court concludes that the Remedial Senate Plan satisfies the Supreme Court's standards.

4. The Court concludes that the Remedial House Plan satisfies the Supreme Court's standards.

5. Because the Court concludes that the enacted Remedial Senate and House Plans meet the Supreme Court's standards and requirements in the Supreme Court Remedial Order and full opinion, the Remedial Senate and House Plans are presumptively constitutional.

6. Furthermore, no evidence presented to the Court is sufficient to overcome this presumption for the Remedial Senate and House Plans, and those plans are therefore constitutional and will be approved.

7. The Court concludes that the Remedial Congressional Plan does not satisfy the Supreme Court's standards.

8. Plaintiffs suggest that if we conclude that a Remedial Plan passed by the General Assembly does not satisfy the Supreme Court's standards, we should simply jettison that plan and adopt one of their plans. We do not believe that our conclusion on the Remedial Congressional Plan—that it fails to satisfy the Supreme Court's standards—automatically results in the adoption of an alternate plan proposed by Plaintiffs. Given that the ultimate authority and directive is given to the Legislature to draw redistricting maps, we conclude that the appropriate remedy is to modify the Legislative Remedial Congressional Plan to bring it into compliance with the Supreme Court's order. *See* N.C.G.S. § 120-2.4(a1).

9. Because the Court concludes that the enacted Remedial Congressional Plan does not meet the Supreme Court's standards and requirements in the Supreme Court Remedial Order and full opinion, the Remedial Congressional Plan is not presumptively constitutional and is therefore subject to strict scrutiny.

10. The General Assembly has failed to demonstrate that their proposed Congressional map is narrowly tailored to a compelling governmental interest, and we therefore must conclude that the Remedial Congressional Map is unconstitutional.

11. The Interim Congressional Plan as proposed by the Special Masters satisfies the Supreme Court's standards and should be adopted by this Court for the 2022 North Carolina Congressional elections.

DECREE

BASED UPON THE FOREGOING findings and conclusions, the Court here by ORDERS the following:

1. The Remedial Senate Plan and Remedial House Plan, enacted into law by the General Assembly on February 17, 2022, are hereby APPROVED by the Court.

2. The Remedial Congressional Plan, enacted into law by the General Assembly on February 17, 2022, is hereby NOT APPROVED by the Court.

3. The Interim Congressional Plan as recommended by the Special Masters is hereby ADOPTED by the Court and approved for the 2022 North Carolina Congressional elections.

4. As the Special Masters and their retained experts may be called upon to assist this Court in this matter should the need arise in the future, the prohibition in this Court's prior order appointing the Special Masters against contacting the Special Masters or their experts remains in full force and effect.

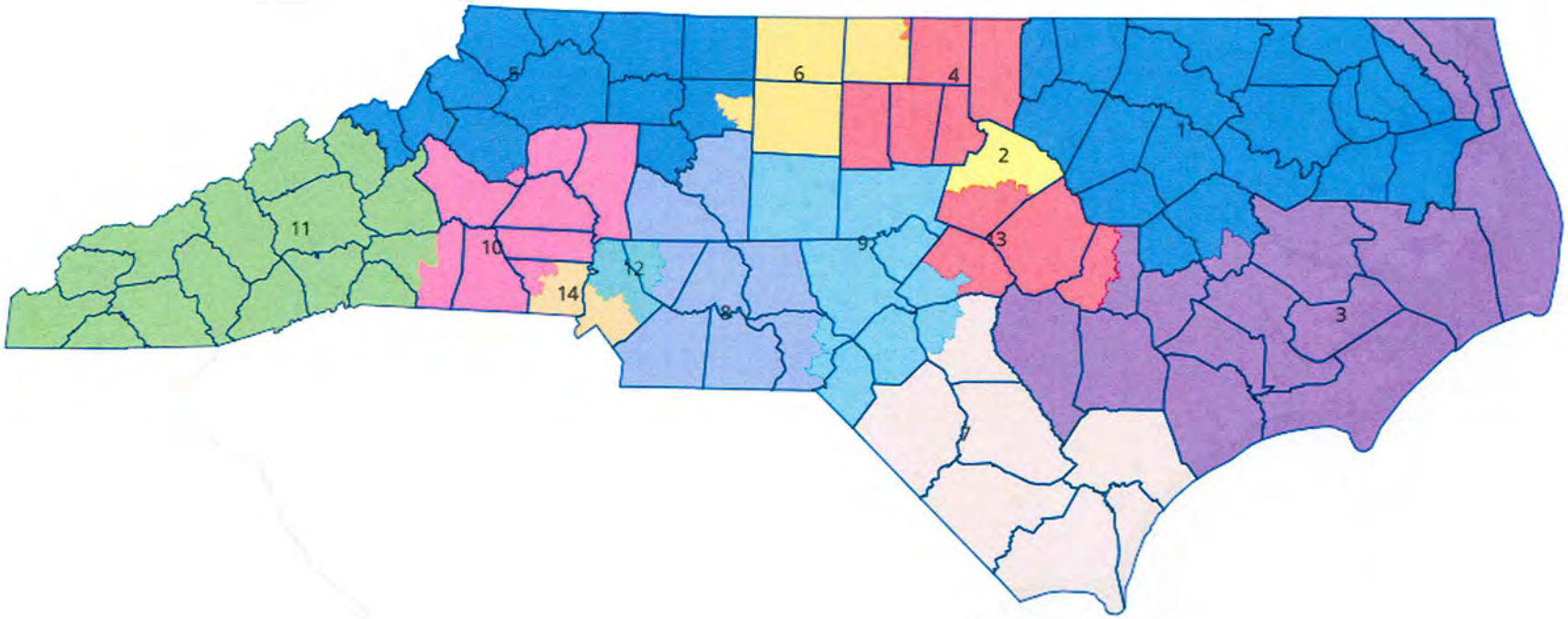
SO ORDERED, this the 23rd day of February, 2022.

A. Graham Shirley, Superior Court Judge

Nathaniel J. Poovey, Superior Court Judge

Dawn M. Layton, Superior Court Judge

Interim Congressional Plan



TO: Judges Shirley, Poovey, and Layton

FROM: Special Masters

DATE: February 23, 2022

SUBJECT: Special Masters' Report – Analysis and Recommendations

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Introduction

Pursuant to the trial court's "Order Appointing Special Masters" on February 16, 2022, ¶ 6, the undersigned now file the following report with the three-judge panel in this case.

Motion for Disqualification

In its Order Appointing the three Special Masters, the Court authorized the undersigned Special Masters (hereinafter "Special Masters") to "hire research and technical assistants and advisors reasonably necessary to facilitate [our] work." We subsequently retained Dr. Bernard Grofman, Dr. Tyler Jarvis, Dr. Eric McGhee, and Dr. Samuel Wang to assist us in satisfying our duties as Special Masters. The Curriculum Vitae for each of these individuals (hereinafter referred to as "advisors") is attached to this report. In this same Order, this Court also ordered the "parties and non-parties may not engage in any *ex parte* communication with the Special Masters about the subject matter of this litigation." *Id.*

We have been informed that Legislative Defendants have filed a motion in this case requesting that this Court disqualify Dr. Wang and Dr. Jarvis as advisors to the Special Masters and take further steps to destroy any work product completed by them and otherwise prohibit the undersigned from considering any information or materials obtained from them. We have investigated this matter and below is a detailed review of our findings.

On February 18, 2022, at 1:01 pm, Dr. Wang emailed Dr. Mattingly requesting the underlying data utilized in his analysis of the 2021 redistricting plans. On this same date at 1:57 p.m., Dr. Mattingly responded, and correspondence between Dr. Wang and Dr. Mattingly continued through February 20, 2022 at 10:23 a.m.

On February 18, 2022, at 1:21 p.m., Dr. Wang emailed Dr. Pedgen, expert for Harper Plaintiffs, seeking the underlying data Dr. Pedgen utilized in his analysis of the 2021 redistricting plans. On this same date at 2:31 p.m., Dr. Pedgen responded to Dr. Wang's inquiry, directing him to use the method utilized by Dr. Mattingly, expert for Harper Plaintiffs and Plaintiff Common Cause. On February 19, 2022, at 6:59 a.m., Dr. Wang responded to Dr. Mattingly's correspondence.

On February 19, 2022, at 4:46 p.m., Dr. Jarvis contacted Dr. Mattingly to request clarification on Dr. Mattingly's analysis and underlying data. Later that day, at 8:13 p.m., Dr. Jarvis contacted Dr. Herschlag, Dr. Mattingly's colleague at Duke University, regarding Dr. Herschlag's analysis and underlying data supporting his analysis of the 2021 redistricting plans to which Dr. Herschlag responded on that same date. All email correspondence between Dr. Wang and Dr. Jarvis and the plaintiff experts Mattingly and Pegden is attached to this report and the email correspondence attached is all of the communication that occurred between the advisors and any of the experts of the parties.

The undersigned acknowledge the technical breach of this Court's mandate that no *ex parte* communication occur between parties and non-parties with the Special Masters. The undersigned, however, respectfully recommend that the Court deny the motion for the following reasons:

- First, these communications between the advisors and Drs. Mattingly and Herschlag do not appear to have been made in bad faith and constitute the only communications between them, written or otherwise. The advisors immediately ceased contact with Drs. Mattingly and Herschlag, and have provided copies of the communications. Therefore, all parties are privy to the extent of the communications.
- Second, their communications directed at experts for Harper Plaintiffs were solely for the purpose of proceeding as quickly as possible within the abbreviated time frame allotted for the remedial process.
- Third, the Special Masters emphasize that, while the communications were in the context of the advisors' preliminary steps to evaluate the 2022 Remedial Plans, the communications sought background information pertaining to the earlier analysis of the 2021 Redistricting Plans performed by Drs. Pegden, Mattingly, and Herschlag in the merits stage of this case that was ultimately received and relied upon by the Court at trial. Additionally, as was later determined, the information sought by Dr. Wang and by Dr. Jarvis was publicly available on Dr. Hershlag's website at the time of the communications questioned herein by the Legislative Defendants.
- Finally, though the analysis provided by Drs. Wang and Jarvis was helpful and consistent with the analysis of our other expert advisors, it was not determinative of any recommendations made by the Special Masters to the court.

Review of Proposed Remedial Plans

Pursuant to the North Carolina Supreme Court's opinion, any plan with a mean-median difference of 1% or less (*Harper*, 2022-NCSC-17 at ¶ 166) and an efficiency gap below 7% (*Harper*, 2022-NCSC-17 at ¶ 167) should be considered presumptively constitutional. Additionally, as the Supreme Court recognized, other metrics may be instructive (*Harper*, 2022-NCSC-17 at ¶ 168). The Special Masters considered the full Order and Opinion of the North Carolina Supreme Court along with, the submissions from all of the parties as well as the reports of the advisors and reached the following conclusions:

I. Proposed Remedial House Plan

The advisors as well as the experts of the parties ("experts") all found the efficiency gap of the proposed remedial House plan to be less than 7%. The majority of the advisors and experts found the mean-median difference of the proposed remedial House plan to be less than 1%. In addition to these facts, the Special Masters considered the findings of the advisors on the partisan symmetry analysis, the declination metrics, and their opinions on partisan bias and evidence of partisan gerrymandering. Considering all of this information as well as the totality of circumstances, the Special Masters conclude under the metrics identified by the North Carolina Supreme Court that the proposed remedial House plan meets the test of presumptive constitutionality. Further the Special Masters did not find substantial evidence to overcome the presumption of constitutionality and recommend to the trial court that it give appropriate deference to the General Assembly and uphold the constitutionality of the remedial House plan.

II. Proposed Remedial Senate Plan

All of the advisors and experts found the efficiency gap of the proposed remedial Senate plan to be less than 7%. The majority of the advisors and experts found the mean-median difference of the proposed remedial Senate plan to be less than 1%. In addition to these facts, the Special Masters considered the findings of the advisors on the partisan symmetry analysis, the declination metrics, and their opinions on partisan bias and evidence of partisan gerrymandering. Considering all of this information as well as the totality of circumstances, the Special Masters conclude under the metrics identified by the North Carolina Supreme Court the remedial Senate plan meets the test of presumptive constitutionality. Further the Special Masters did not find substantial evidence to overcome the presumption of constitutionality and recommend to the trial court that it give appropriate deference to the General Assembly and uphold the constitutionality of the remedial Senate plan.

III. Proposed Remedial Congressional Plan

Unlike the proposed remedial House and Senate plans, there is substantial evidence from the findings of the advisors that the proposed congressional plan has an efficiency gap above 7% and a mean-median difference of greater than 1%. The Special Masters considered this evidence along with the advisors' findings on the partisan symmetry analysis and the declination metrics. There is disagreement among the parties as to whether the proposed remedial congressional plan meets the presumptively constitutional thresholds suggested by the Supreme Court. The Special Masters, considering the reports of their advisors and the experts of the parties while giving appropriate deference to the General Assembly, are of the opinion that the proposed remedial congressional plan fails to meet the threshold of constitutionality and recommend that the Trial Court reject the proposed remedial congressional plan as being unconstitutional.

Given the recommendation that the Trial Court reject the proposed remedial congressional plan, and consistent with the instructions from the three-judge panel and the Order of the Supreme Court of North Carolina, the Special Masters have submitted a modified version of the proposed remedial congressional plan submitted by the Legislative Defendants. It is our opinion that the attached plan satisfies the requirements of the Supreme Court.

The following data files for the modified congressional plan are included with this report:

1. Block equivalency files in .CSV format for each district and the plan as a whole;
2. Environmental Systems Research Institute, Inc. (ESRI) shapefiles for each district and the plans as a whole;
3. Color maps in .PDF format of the plan as a whole;
4. Population totals and deviations for each district based on the 2020 Census P.L. 94-171 dataset; and
5. Note: due to time constraints, the functional equivalent of what the General Assembly includes in its "stat pack" is not included with this report; however, if requested we will endeavor to obtain this from Dr. Grofman.

In redrawing certain district lines, the undersigned considered all of the submitted plans and related commentary. Being mindful that the Constitution of North Carolina provides that the General Assembly has the responsibility of redistricting, we focused on the proposed remedial congressional plan submitted by the Legislative Defendants. On that basis, the Special Masters worked solely with Dr. Bernard Grofman and his assistant to amend the Legislative Defendants' plan to

enhance its consistency with the opinion of the Supreme Court of North Carolina, the Constitutions of the United States and of North Carolina, and the expressed will of the General Assembly.

Dr. Grofman prepared a preliminary exemplar map at the Special Masters' request and thereafter at the instruction of the Special Masters prepared three maps for consideration. One of these maps raised potential VRA concerns and so was discarded. A second map did not meet the 1% threshold for mean-median difference and so was likewise discarded. The Special Masters then modified the third prepared map in order to improve the efficiency gap and mean-median difference scores as well as compactness and contiguity measures.

The following parties were involved in the process of redrawing the plans:

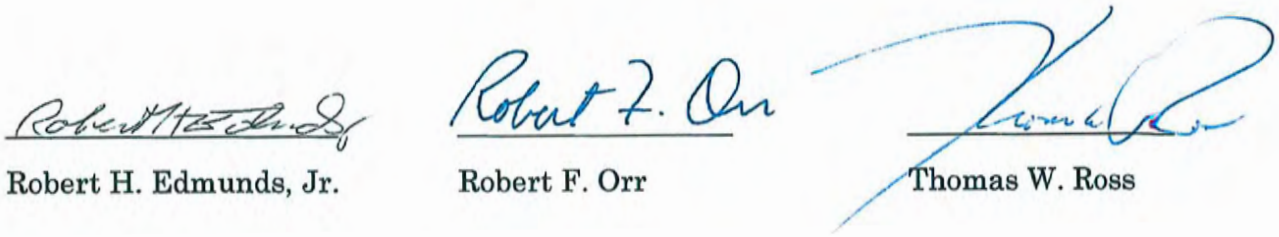
a. Robert F. Orr
b. Robert H. Edmunds, Jr.
c. Thomas W. Ross
d. Dr. Bernard N. Grofman
e. Zachary R. Griggy (Research Assistant to Dr. Grofman)
f. Adam H. Steele, Senior Judicial Fellow (for administrative purposes only)
g. Alison J. Rossi, Judicial Fellow (for administrative purposes only)
h. Danielle Smith, Judicial Fellow (for administrative purposes only)

Dave's Redistricting App was used in the redrawing of the plan.

The Special Masters believe the modified congressional plan recommended for adoption to the Trial Court achieves the partisan fairness and "substantially equal voting power" required by the Supreme Court of North Carolina without diluting votes under the Voting Rights Act while maintaining the number of county splits, retaining equal population, compactness, and contiguity, as well as respecting municipal boundaries. Dr. Grofman's analysis of the modified congressional plan recommended by the Special Masters indicates that the plan has an efficiency gap of 0.63%, a mean-median difference of 0.69%, seat bias of 0.28%, and vote bias of 0.10%. According to Dr. Grofman, "this is the most non-dilutive plan in partisan terms of any map that has been submitted to the Court."

Accordingly, the Special Masters recommend to the Trial Court that it order the State of North Carolina to utilize the modified congressional plan prepared by the Special Masters in the 2022 Congressional election.

This the 23rd day of February 2022.



Robert H. Edmunds, Jr. Robert F. Orr Thomas W. Ross

Acknowledgement

We would like to thank the advisors, Dr. Grofman, Dr. Jarvis, Dr. McGhee, and Dr. Wang for their analysis and advice in the extremely compressed timeframe. Additionally, we would like to thank the Judicial Fellows, Adam Steele, Alison Rossi, and Danielle Smith for their administrative support and assistance in preparing this report and for the long hours of work in bringing this matter to a conclusion.

CERTIFICATE OF SERVICE

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This the 23rd day of February 2022.

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ADVISORY REPORT TO SPECIAL MASTERS ON PROPOSED REMEDIAL REDISTRICTING PLANS FOR NORTH CAROLINA

Tyler J. Jarvis*

February 22, 2022

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1. Overview

I was asked to perform an ensemble analysis of eight proposed remedial plans: two (Congressional and Senate) from the Harper plaintiffs, and three each (Congressional, House, and Senate) from NCLCV and the legislative defendants.

Ensemble analysis consists first of constructing a large number of possible alternative plans (the ensemble). The plans are generated without using any partisan information, but in accordance with accepted criteria for redistricting in the state, including approximately equal population per district, contiguity of districts, relative compactness of districts, few boundary traversals, and so

forth. Historical election data is then used to compare election results under the proposed plans with elections results under the ensemble.

I was asked to include the following well-known metrics in my ensemble analysis: mean–median (MM), efficiency gap (EG), partisan bias (PB), and declination (D). All of these have the property that a more negative score is supposed to represent more benefit to Republicans and a more positive score is supposed to represent more benefit to Democrats. Scores closer to zero are generally expected to be less indicative of a partisan gerrymander.

But the range of possible scores also varies widely from state to state because of widely varying political geography from state to state, varying criteria for redistricting, and varying results from different elections. Although one might make a philosophical argument for why scores for a given metric that lie outside a given range should be considered evidence of a partisan gerrymander, this is an unreasonable standard if all or most of the possible scores lie outside that range. Indeed, in some cases it may not even be possible for the scores in a given state under a given set of redistricting rules to lie in that prescribed range.

Ensembles provide important context for interpreting these scores by helping to identify a typical range of score values as well as identifying outliers.

1.1. **Ensembles.** The best way to do an ensemble analysis is to generate an ensemble with a distribution of plans that specifically reflects the redistricting criteria for case under consideration. But doing that properly takes much more time than is available. Because of this I chose to use ensembles previously generated by Professor Jonathan Mattingly and his collaborators at Duke University [1]. These were generated using well-accepted MCMC methods.

My analysis is conditioned on the assumption that these ensembles are somewhat representative of the distribution of possible plans reflecting established law and intent of the court. In the case of the Congressional ensemble, I am more confident of this for the Congressional ensemble than in the case of the House and Senate ensembles. I discuss this in more detail in Sections 2.2, 3.1, and 4.

1.2. **Election Data.** For all three types of plans (congressional, senate, and house) I used historical results from the following 11 elections: the 2016 Attorney General (G16AG), Presidential (G16PR), Lieutenant Governor (G16LG) and Governor (G16AG), as well as the 2020 Attorney General (G20AG), Presidential (G20PR), Lieutenant Governor (G20LG), 2020 Governor (G16AG), Treasurer (G20TR), US Senate (G20USS), and Secretary of State (G20SST). To calculate the vote shares and other scores for the proposed plans, I used 2016 and 2020 precinct-level election results from the Voting and Election Science Team (VEST) and prorated the data to 2020 census blocks.

1.3. **Racial Considerations.** It is important to note that I have not considered racial factors or the VRA in this analysis. Incorporating those considerations may lead to other conclusions than those I have drawn here.

2. Congressional Plans Analysis

Using data from the 11 different historical elections mentioned above, I evaluated three congressional plans: one each from the Harper plaintiffs (Harper), NCLCV, and the legislative defendants (LD). I also analyzed the number of seats that would have been won under these various vote counts and the margins of victory in the most contested districts.

2.1. **Summary of Congressional Analysis.** My analysis below shows that, by all the measures I used, the LD plan favors Republicans more than the other two plans do, the NCLCV plan favors Democrats more than the other two plans, and the Harper plan lies somewhere between them. Both the LD and Harper plans are fairly typical in the ensemble distributions for all the measures I considered. The NCLCV plan, however, shows up as a significant outlier for the seat margins

for competitive seats (see Section 2.4) as well as for the mean–median and partisan bias scores. Taken together these give some evidence of partisan gerrymandering in the NCLCV congressional plan.

These conclusions do not take VRA racial considerations into account.

2.2. **Ensemble.** For analyzing the congressional plans I used the ensemble [2] (sometimes denoted the *Duke* congressional ensemble in this report). According to my reading of [4], this ensemble is generated using well-accepted Markov chain Monte Carlo methods (a parallel tempering framework using a proposal from the Multiscale Forest RECOM algorithm). Under this method specific parameters for the distribution to enforce certain requirements and to encourage certain properties of the plans chosen. According to [4] the resulting plans split no more than 14 counties and split no county into more than two districts. All districts are required to consist of one contiguous region. The deviation of the total population in any district is within 1% of the ideal district population. Districts traverse counties as few times as possible, and plans with a higher Polsby–Popper score (more compact) are more likely to be selected. This model was tuned to give similar Polsby–Popper score to the enacted congressional plan. Some have argued that tuning for a specific range of Polsby–Popper scores might skew the distribution somewhat, but in my own (unpublished) research I have explicitly checked for correlation between Polsby–Popper scores and metrics of partisan bias in ReCom MCMC and found none. I expect that this absence of correlation would hold in the other ReCom-based MCMC methods as well, including the method used to generate this ensemble. The ensemble has nearly 80,000 plans, and according to [4] the distribution seems well mixed has been sufficiently sampled to provide stable statistics. I cannot verify the mixing directly, but in my use of the ensemble, I saw no signs that the ensemble was not well mixed. Based on these I conclude that this ensemble is suitable to evaluate the Congressional plans.

2.3. **Distribution of Seats Across Elections.** Different plans perform differently under different elections. When a plan gives more seats to one party than most of the plans in the ensemble do, that can suggest a possible partisan gerrymander, especially when this occurs over several elections. To analyze this, I used histograms of seats won for the ensemble for each race, collected in Figure 1.

These histograms show that while the LD plan consistently favors Republicans and the the Harper plan consistently favors Democrats, in both cases the number of seats they give in most races is fairly typical of the ensemble distribution. The NCLCV plan also consistently favors Democrats, usually much more so than the Harper plan, and in one case (G20PR) more so than 99.7% of the ensemble, making it a significant outlier in that election.

An alternative view of the same data collected into one diagram, with histograms replaced by violin plots, is shown in Figure 2.

2.4. **Rank-Ordered Violin Plots.** The number of seats won by a plan in an election does not indicate how close the election would be. A plan that gives Democrats 51% of the vote share in their winning districts is very different from one that gives them 70% of the vote share in those districts. To analyze this effect for the proposed plans I used rank-ordered violin plots; see Figures 3 and 4. In a rank-ordered violin plot for a given election, all the congressional districts for each plan are ordered left-to-right by their Democratic vote share in the election. The numbers on the horizontal axis represent the position of the district in rank ordering (not the name given to the district in the plan). The vote share for the plans in the ensemble is represented by the gray violin-shaped distributions in each distribution, and the vote share for each plan is indicated by the corresponding colored bar.

Figure 3 shows a rank-ordered violin plot for the election G20LG, which reveals that although the NCLCV plan gives one more seat (District 8 in the figure) to the Democrats than the Harper plan, that extra seat comes by a very fine margin, with the NCLCV plan just over 50% and the Harper plan just under 50% in that district. None of the plans is a far outlier compared to the

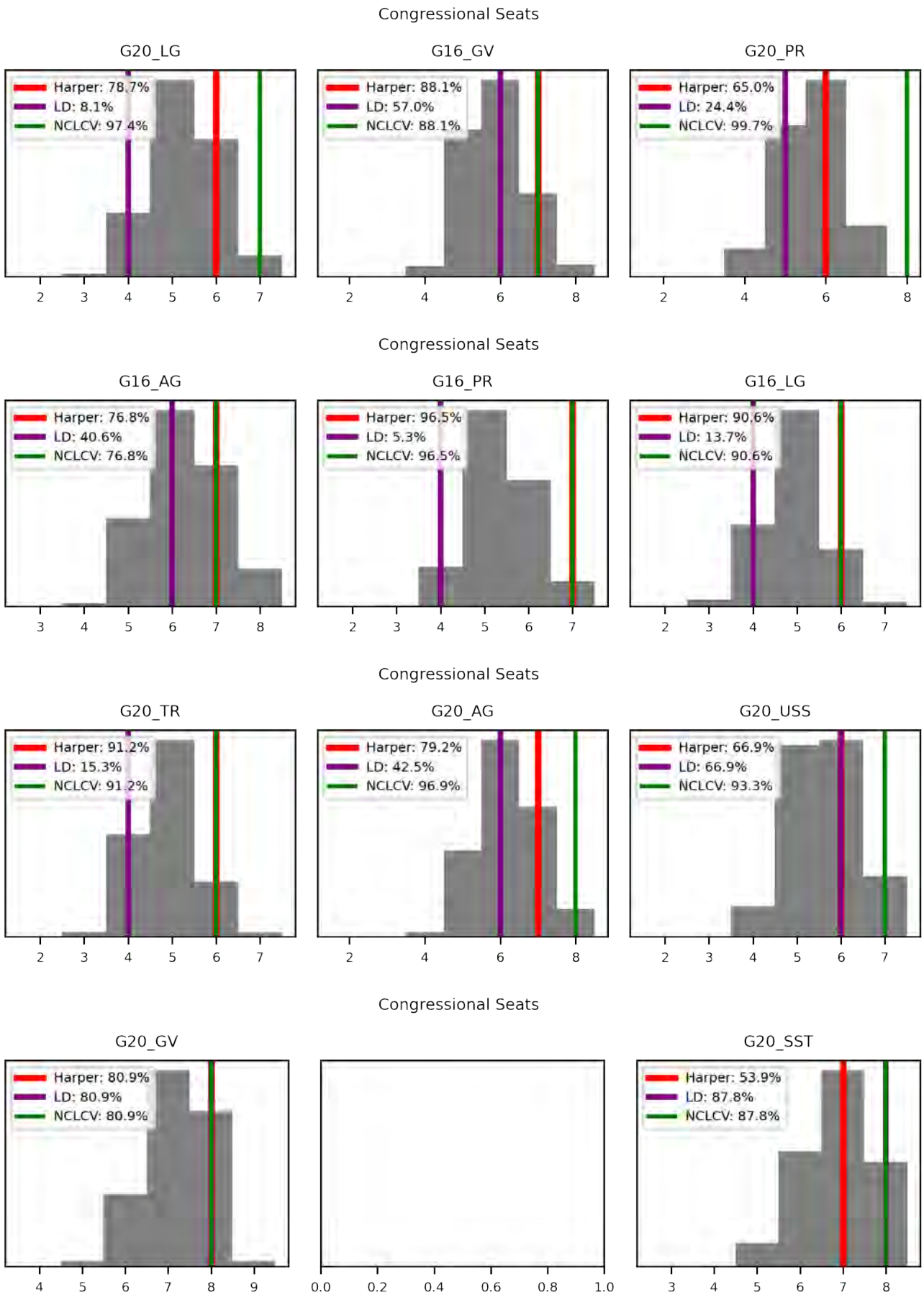

FIGURE 1. Histograms of congressional seats won in all 11 elections for the ensemble plans (gray). The proposed plans are indicated as colored vertical lines.

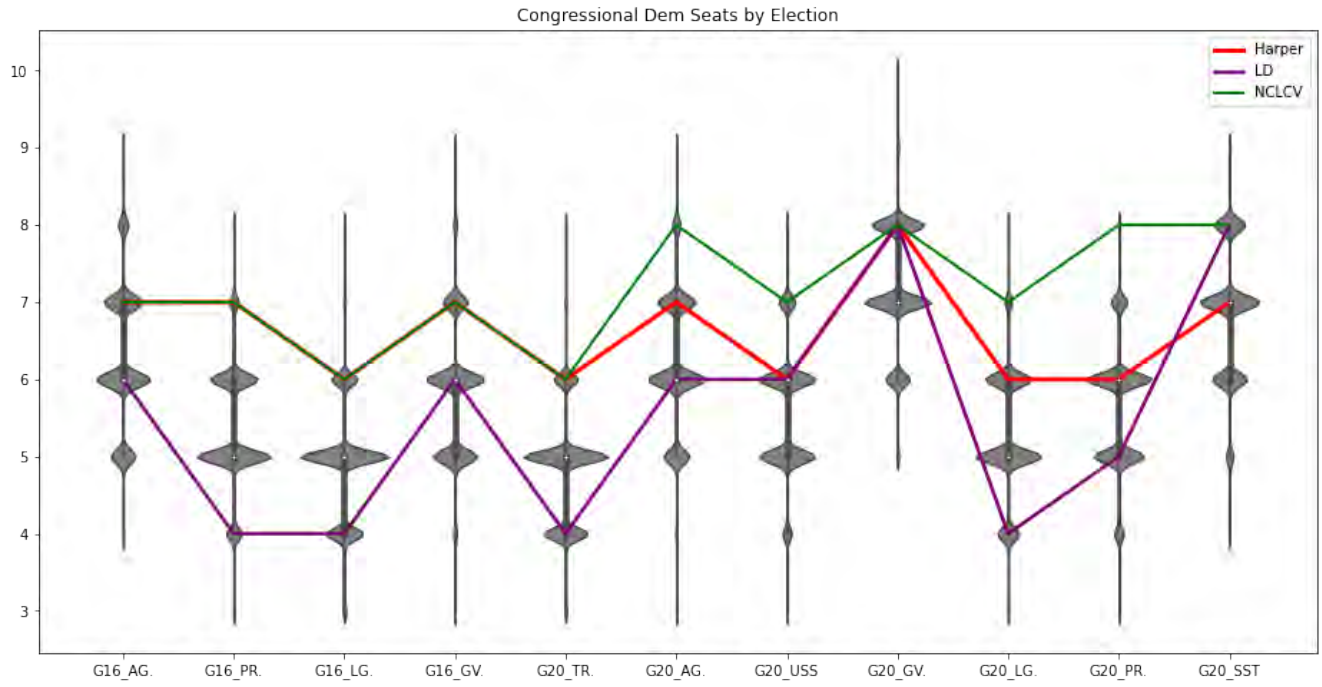

FIGURE 2. Congressional seats won across elections: shows the number of seats won (vertical axis) by Democratic candidates under each plan (colored lines) over the 11 elections (horizontal axis). The ensemble distribution of seats won for each election is indicated with the gray "violins," with wider gray regions around a point indicating more ensemble plans with the indicated number of seats won, and narrower regions indicating fewer ensemble plans with the indicated number of seats won.

ensemble in this district. This suggests that the difference in the number of seats between NCLCV and Harper in this election is not significant.

However, in this election the NCLCV plan makes District 7 much more competitive (favoring the Democrats) than either the Harper or LD plans do. Although NCLCV does not actually give the seat in District 7, NCLCV gives this district a much higher Democratic vote share than either Harper or LD and, more significantly, much higher than most of the ensemble. This makes that district very close to a win for the Democrats, without actually giving the seat to them.

Taken together, Figures 4 and 3 show that in seven of the elections (G20LG, G20GV, G20AG, G20US, G20TR, G20PR, and G16GV) the NCLCV plan places the Democratic vote share in this borderline district (7) substantially higher than most of the ensemble, which either gives the seat to the Democrats or nearly gives them the seat, by pushing the Democratic vote share close to 50%. The other plans (Harper and LD) stay in a fairly typical part of the ensemble distribution across all elections. I take this as some evidence of partisan gerrymandering in the NCLCV plan, but not in the LD and Harper plans.

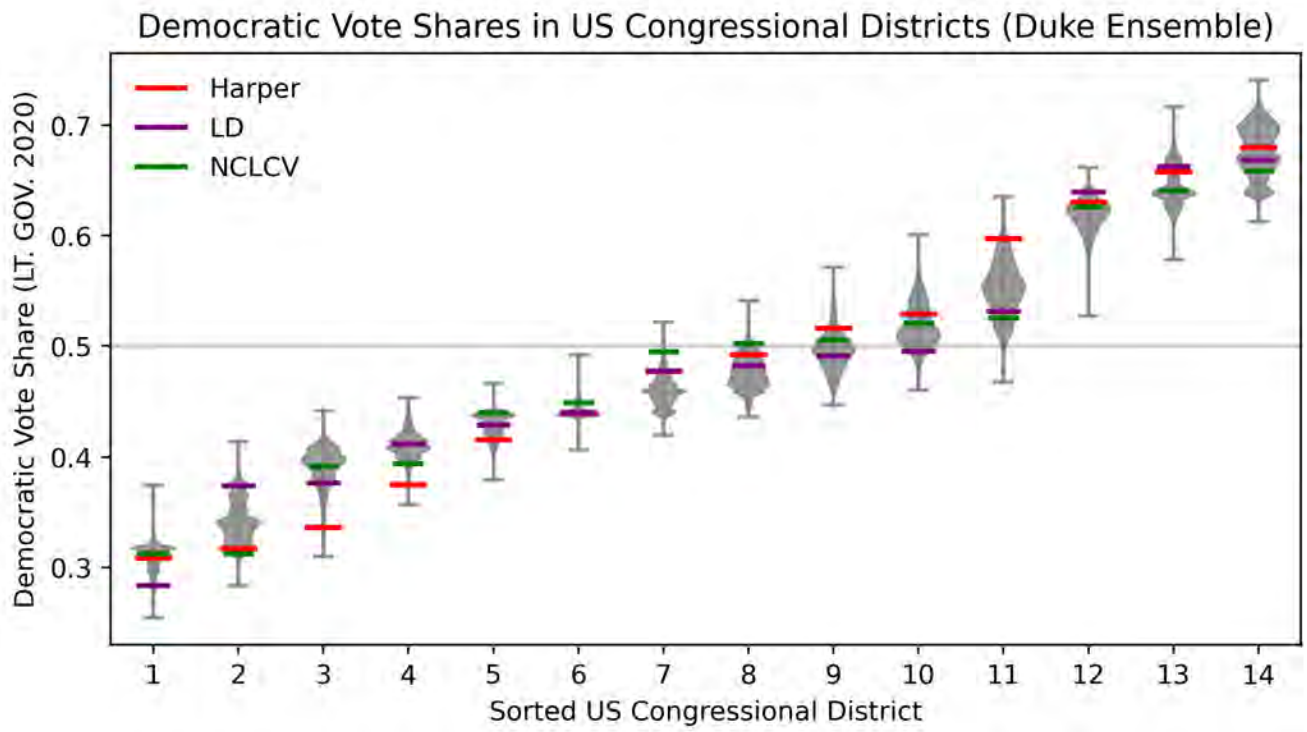

FIGURE 3. For each plan, all the congressional districts (horizontal axis) are ordered left-to-right by their Democratic vote share in the G20LG election. The numbers on the horizontal axis represent the position of the district in rank ordering (not the number given in the proposal). The vote share for the plans in the ensemble is represented by the gray violin-shaped distributions in each distribution, and the vote share for each plan is indicated by the corresponding colored bar. Points above the gray 50-percent line indicate a seat that goes to the Democrats and those below go to the Republicans.

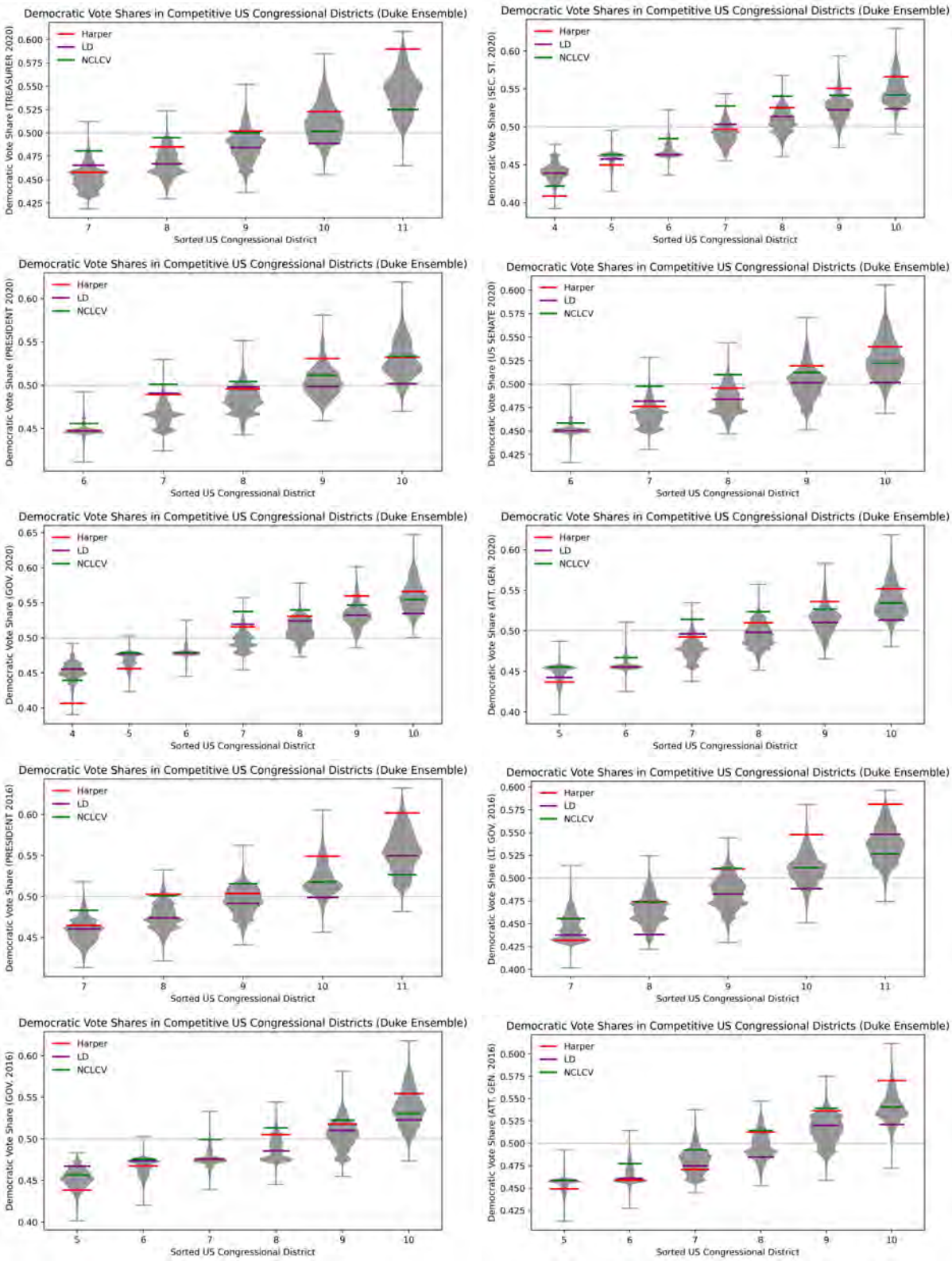

FIGURE 4. Rank-ordered congressional districts for all the elections except G20LG (shown above in Figure 3). These plots show only the most competitive districts.

2.5. **Other Metrics.** I also analyzed the plans using the mean–median score, partisan bias score, efficiency gap, and partisan declination. The first three scores are well-known and widely used. The declination is a relatively new measure proposed by Warrington. All four measures are reviewed in [5], so I will not describe them in detail here. All four of them give a single score for which a more negative score is supposed to represent more benefit to Republicans and a more positive score is supposed to represent more benefit to Democrats. Scores closer to zero are generally expected to be less indicative of a partisan gerrymander, but that depends heavily on the political geography of the state, so it is important to interpret these scores in the context of ensembles.

In the ensemble analysis below, all four scores show the LD plan favors Republicans more than the other two plans do, the NCLCV plan favors Democrats more than Harper or LD, and the Harper plan lies somewhere between them. Both the LD and Harper plans are fairly typical in the ensemble distributions for all four scores across almost all elections. The NCLCV plan, however, shows up as a significant outlier the mean–median and partisan bias scores.

2.5.1. *Mean–Median.* Table 1 shows my calculations of the mean–median scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

As shown in Figure 5 the mean–median score consistently identifies the LD plan as favoring Republicans more than the others but it is still not an outlier for the ensemble distribution. The Harper plan is is also not an outlier for the ensemble. The NCLCV plan is identified as favoring Democrats more than the others (higher scores) and is a significant outlier (greater than 99th percentile) in six of the elections.

2.5.2. *Partisan Bias.* Table 2 shows my calculations of the partisan bias scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

As shown in Figure 6, the partisan bias score also consistently identifies the LD plan as favoring Republicans more than the others but overall is more typical of the distribution than either of the other two plans. The NCLCV plan is identified as favoring Democrats more than the others and is on the very high end (over 97th percentile) of the ensemble distribution in many of the elections.

2.5.3. *Efficiency Gap.* Table 3 shows my calculations of the efficiency gap scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

As shown in Figure 7 the LD and Harper plans are mostly typical for the distribution of efficiency gap across elections. The the NCLCV plan is a significant outlier in one election (G20PR), and is somewhat high (above 90th percentile) for three other elections.

2.5.4. *Declination.* Table 4 shows my calculations of the declination scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

As shown in Figure 8 the declination only marks the NCLCV plan as a significant outlier (over 99%), but all three plans are on the outer edges (above 90% or below 10%) for some of the elections.

2.6. **Congressional Conclusion.** Both the LD and Harper plans are fairly typical in the ensemble distributions for all the measures I considered. The NCLCV plan, however, shows up as a significant outlier for the seat margins for competitive seats (see Section 2.4) as well as for the mean–median and partisan bias scores. Taken together these give evidence of partisan gerrymandering in the NCLCV congressional plan, but VRA racial considerations, which I have not considered here, might change that conclusion.

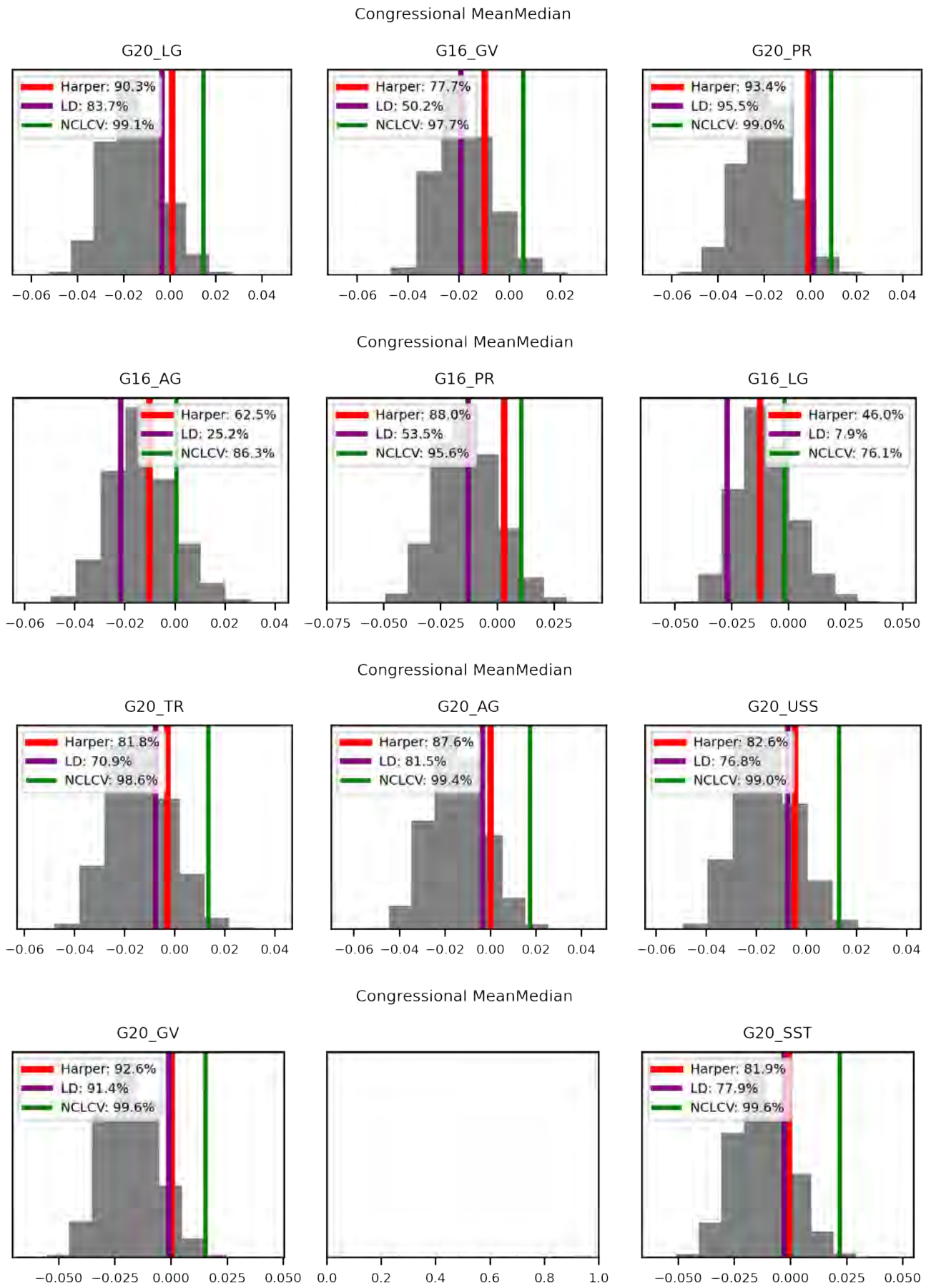

FIGURE 5. Histogram of congressional mean–median score for all 11 elections. The percentages in the legend represent percentile of the corresponding score in the ensemble.

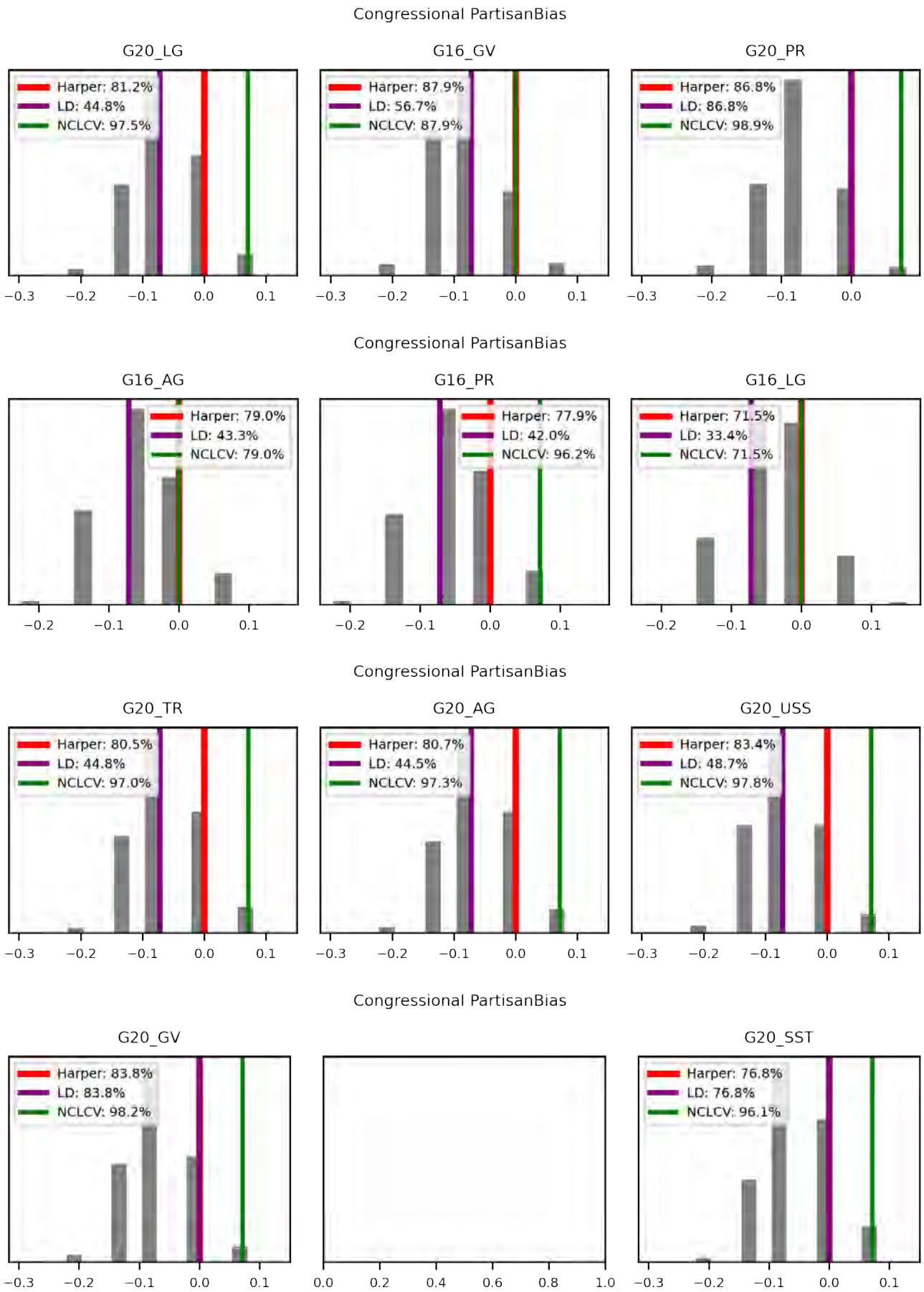

FIGURE 6. Histogram of partisan bias for all 11 elections. The numbers in the legend are the percentile in the ensemble for the corresponding plan.

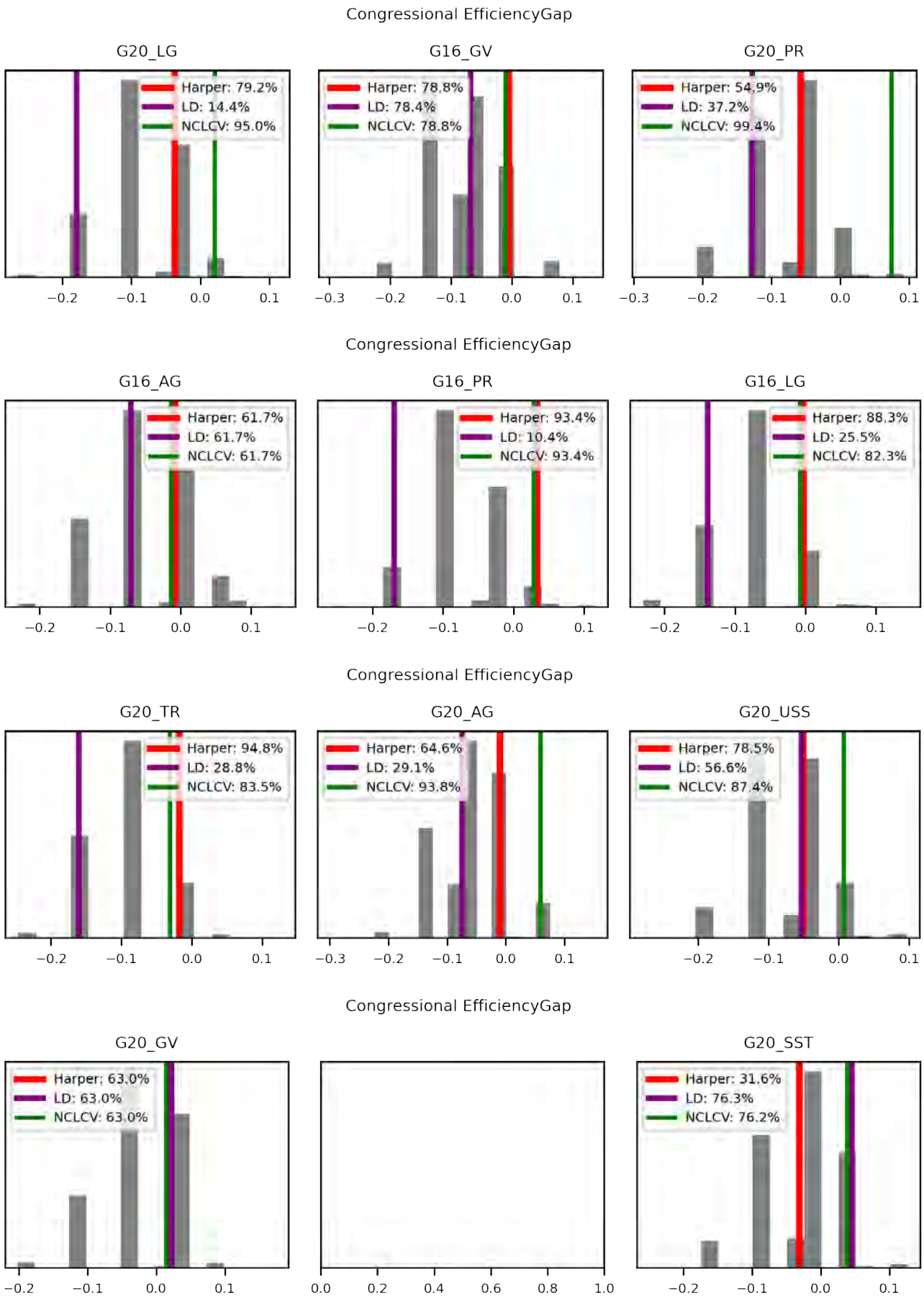

FIGURE 7. Histogram of congressional efficiency gap for all 11 elections. The percentages in the legend represent percentile of the corresponding score in the ensemble.

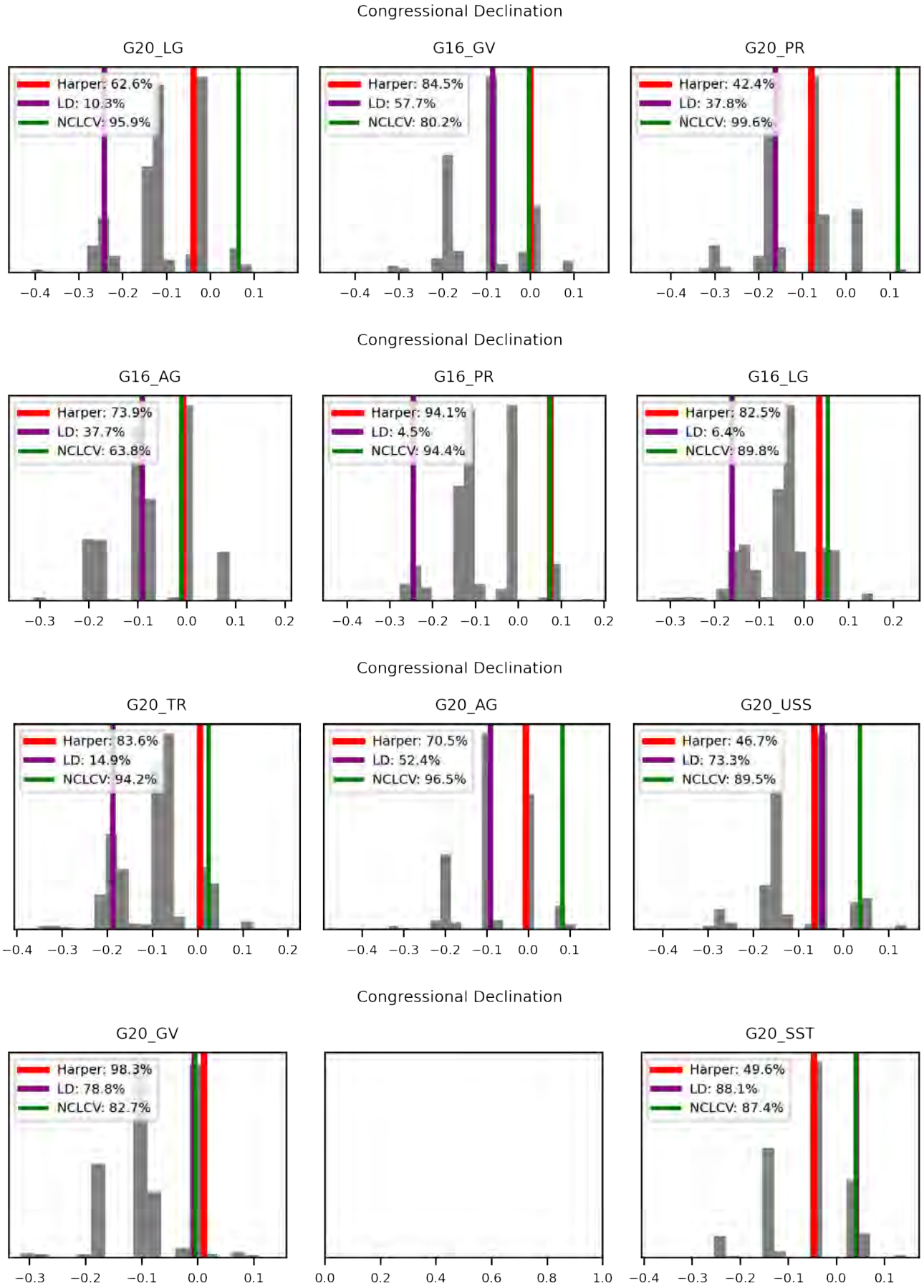

FIGURE 8. Histogram of congressional partisan declination for all 11 elections. The percentages in the legend represent percentile of the corresponding score in the ensemble.

Congressional Mean–Median

Proposed_Plan	Harper	LD	NCLCV	Enacted
G20PRE	−0.1	0.1	0.9	−6.4
G20USS	−0.5	−0.7	1.3	−5.7
G20GOV	0.0	−0.1	1.5	−5.7
G20LTG	0.1	−0.3	1.5	−6.2
G20ATG	−0.0	−0.3	1.7	−6.2
G20TRE	−0.3	−0.7	1.3	−5.5
G20SOS	−0.1	−0.3	2.2	−6.1
G16PRE	0.3	−1.3	1.1	−5.3
G16GOV	−1.0	−1.9	0.6	−4.1
G16LTG	−1.3	−2.7	−0.2	−4.4
G16ATG	−1.0	−2.2	0.1	−3.8
Average	−0.3	−0.9	1.1	−5.4

Table 1. Mean–median scores listed as percentages (times 100) for the proposed Congressional plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 5)—not as isolated numbers.

Congressional Partisan Bias

Proposed_Plan	Harper	LD	NCLCV	
G20PRE	0.0	0.0	7.1	−21.4
G20USS	0.0	−7.1	7.1	−21.4
G20GOV	0.0	0.0	7.1	−21.4
G20LTG	0.0	−7.1	7.1	−21.4
G20ATG	0.0	−7.1	7.1	−21.4
G20TRE	0.0	−7.1	7.1	−21.4
G20SOS	0.0	0.0	7.1	−21.4
G16PRE	0.0	−7.1	7.1	−21.4
G16GOV	0.0	−7.1	0.0	−21.4
G16LTG	0.0	−7.1	0.0	−21.4
G16ATG	0.0	−7.1	0.0	−21.4
Average	0.0	−5.2	5.2	−21.4

Table 2. Partisan bias scores listed as percentages (times 100) for the proposed Congressional plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 6)—not as isolated numbers.

Congressional Efficiency Gap

Proposed_Plan	Harper	LD	NCLCV	Enacted
G20PRE	−5.8	−12.8	7.5	−20.1
G20USS	−5.1	−5.3	0.7	−19.5
G20GOV	1.7	2.2	1.5	−26.0
G20LTG	−3.7	−17.9	2.1	−18.1
G20ATG	−1.1	−7.4	5.9	−21.6
G20TRE	−1.8	−16.0	−3.1	−16.2
G20SOS	−3.1	4.6	3.9	−17.4
G16PRE	3.3	−16.9	2.9	−17.2
G16GOV	−0.5	−6.8	−1.0	−21.0
G16LTG	−0.3	−13.9	−0.7	−14.1
G16ATG	−0.8	−7.1	−1.3	−21.3
Average	−1.6	−8.8	1.7	−19.3

Table 3. Efficiency gap scores listed as percentages (times 100) for the proposed Congressional plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 7)—not as isolated numbers.

Congressional Declination

Proposed_Plan	Harper	LD	NCLCV	Enacted
G20PRE	−8.0	−16.2	11.8	−32.0
G20USS	−6.4	−4.7	3.7	−29.7
G20GOV	1.1	−0.6	−0.4	−41.4
G20LTG	−3.9	−24.1	6.6	−27.7
G20ATG	−0.6	−9.1	8.3	−33.8
G20TRE	0.5	−18.7	2.4	−22.3
G20SOS	−4.7	4.2	4.1	−24.6
G16PRE	7.4	−24.5	7.5	−28.3
G16GOV	−0.0	−8.5	−0.3	−32.4
G16LTG	3.3	−16.1	5.3	−19.9
G16ATG	−0.8	−9.1	−1.1	−32.6
Average	−1.1	−11.6	4.4	−29.5

Table 4. Partisan declination scores listed as percentages (times 100) for the proposed Congressional plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 8)—not as isolated numbers.

3. Senate Plan Analysis

I received three proposed Senate plans (LD, Harper, and NCLCV) to evaluate. I used the same methods to evaluate these plans as I did for the Congressional plans, but with a different ensemble.

3.1. **Senate Ensembles.** For analyzing the senate plans I used Dr. Mattingly's ensemble [3]. It was generated with the same method as the Congressional plan. According to my reading of [4] the resulting plans comply with the county clustering rules of *Stephenson*, maintain a population balance that deviates by no more than 5%, They are also designed to produce contiguous districts that are relatively compact and to reduce the number of counties split. This ensemble does not explicitly preserve municipalities, except as a secondary consequence of other parameter settings. This is important because municipality splits are known to have a significant interaction with partisan vote shares and measures of partisan symmetry. According to [4] the distribution seems well mixed, but I cannot verify the mixing directly.

3.2. **Seats Won.** The histograms of seats won in Figure 9 show Harper and NCLCV both are mostly typical of the ensemble, while LD is often a significant outlier in favor of the Republicans.

3.3. **Rank-Ordered Violin Plots.** As with seats won the rank-ordered violin plots show Harper and NCLCV are both mostly typical of the ensemble, while LD is often deviates in favor of the Republicans; see Figure 10.

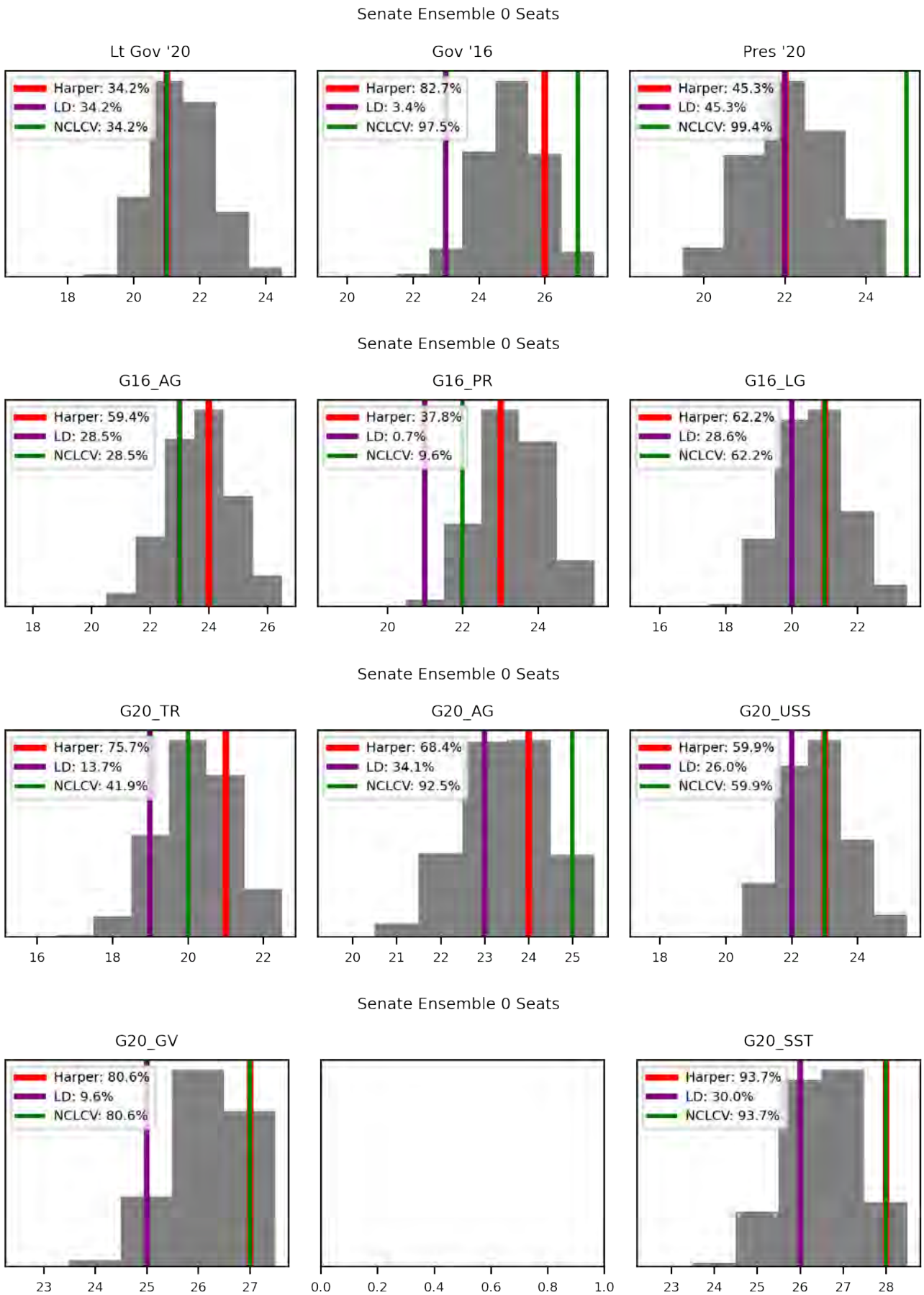

FIGURE 9. Histograms of congressional seats won in all 11 elections for the ensemble plans. The percentages in the legend represent percentile of the corresponding score in the ensemble.

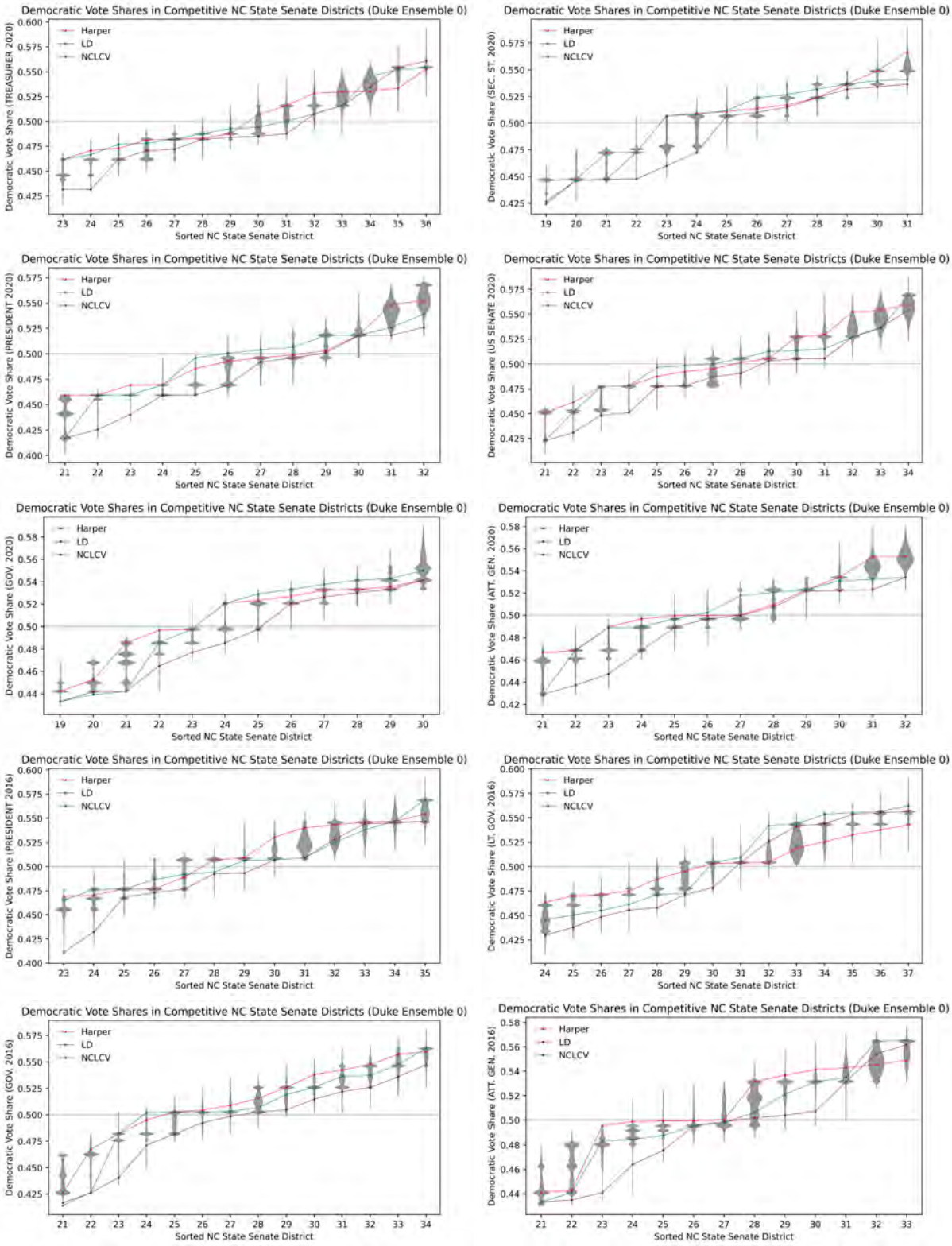

FIGURE 10. Rank-ordered senate districts for 10 of the elections (all elections but G20LG). These plots show only the most competitive districts.

3.4. **Other Metrics.**

3.4.1. *Mean–Median.* Table 5 shows my calculations of the mean–median scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

As shown in Figure 11 the mean–median score identifies the LD plan as a Republican-favoring outlier (lower than the 5th percentile) for three of the 11 elections (G20PR, G16AG, and G16LG).

The NCLCV plan is a pro-Democratic outlier (greater than 95th percentile) in four of the elections (G20PR, G20LG, G20USS, and G20GV).

The Harper plan leans toward the Democratic side of the distribution, but is not an outlier.

3.4.2. *Partisan Bias.* Table 6 shows my calculations of the partisan bias scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

As shown in Figure 12, the LD plan is a Republican-favoring outlier twice, and the Harper plan is a pro-Democratic outlier once. But the NCLCV plan stands out as a pro-Democratic outlier for partisan bias in four elections (G20PR, G20TR, G20USS, and G20GV).

3.4.3. *Efficiency Gap.* Table 7 shows my calculations of the efficiency gap scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

In Figure 13 the efficiency gap flag the NCLCV plan as a pro-Democratic outlier five times, and four of those are significant (99th percentile or greater). Harper shows up twice as Democratic outlier and LD shows up twice as a Republican outlier.

3.4.4. *Declination.* Table 8 shows my calculations of the declination scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

As shown in Figure 14 the declination marks the LD plan as a Republican outlier (below 5%) three times. The NCLCV plan shows as a Democratic outlier (over 95%) three times and Harper twice (G20GV and G20SST).

3.5. **Senate Conclusion.** The partisan symmetry scores give weak evidence of of partisan gerrymandering in the LD plan, and the seat margins in the rank-ordered violin plots give strong evidence of partisan gerrymandering in the LD plan.

The seat margins in the rank-ordered violin plots give some evidence of partisan gerrymandering in the NCLCV plan, and that is corroborated by the many outliers among the partisan symmetry scores.

These conclusions do not take VRA racial considerations into account.

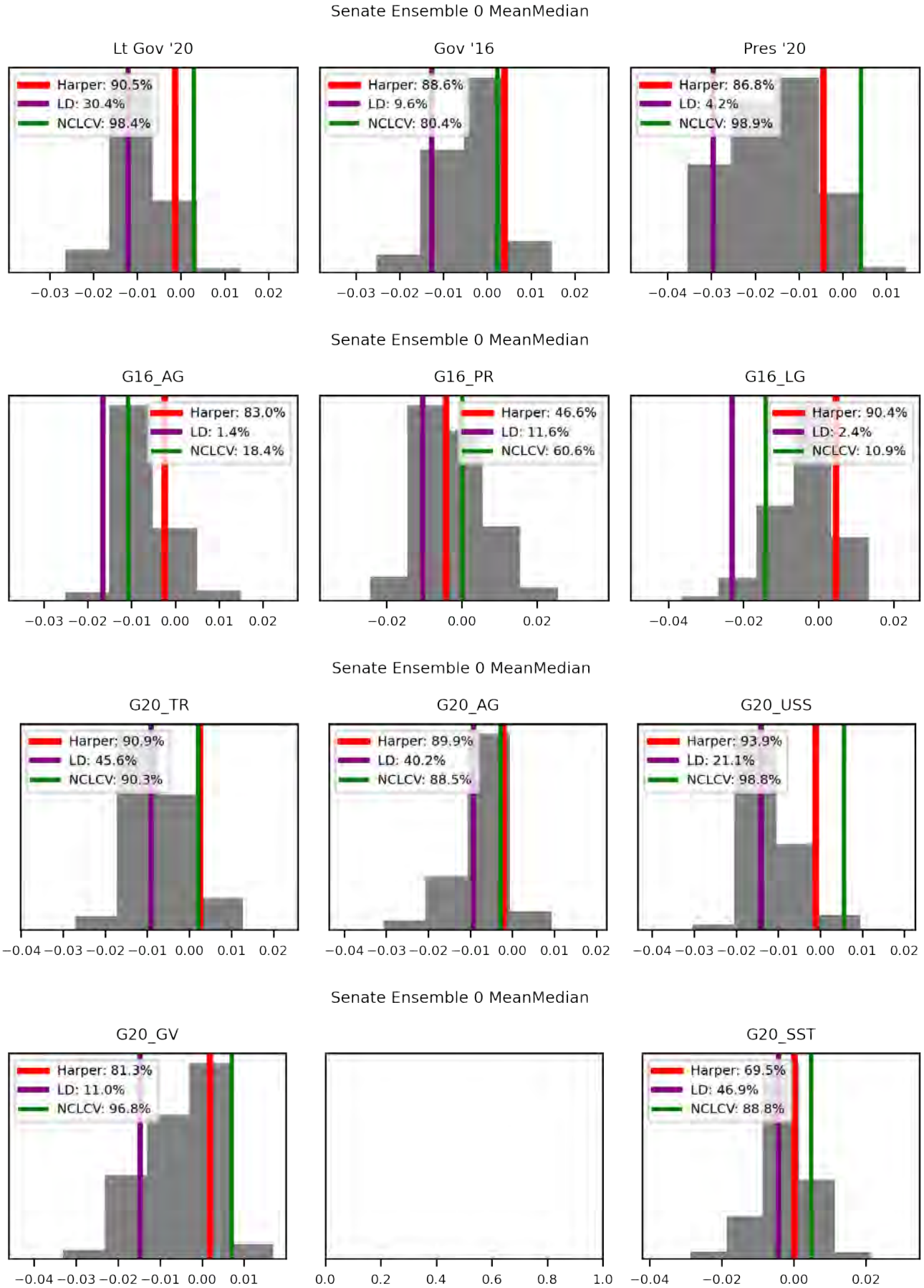

FIGURE 11. Histogram of senate ensemble mean–median score for all 11 elections.

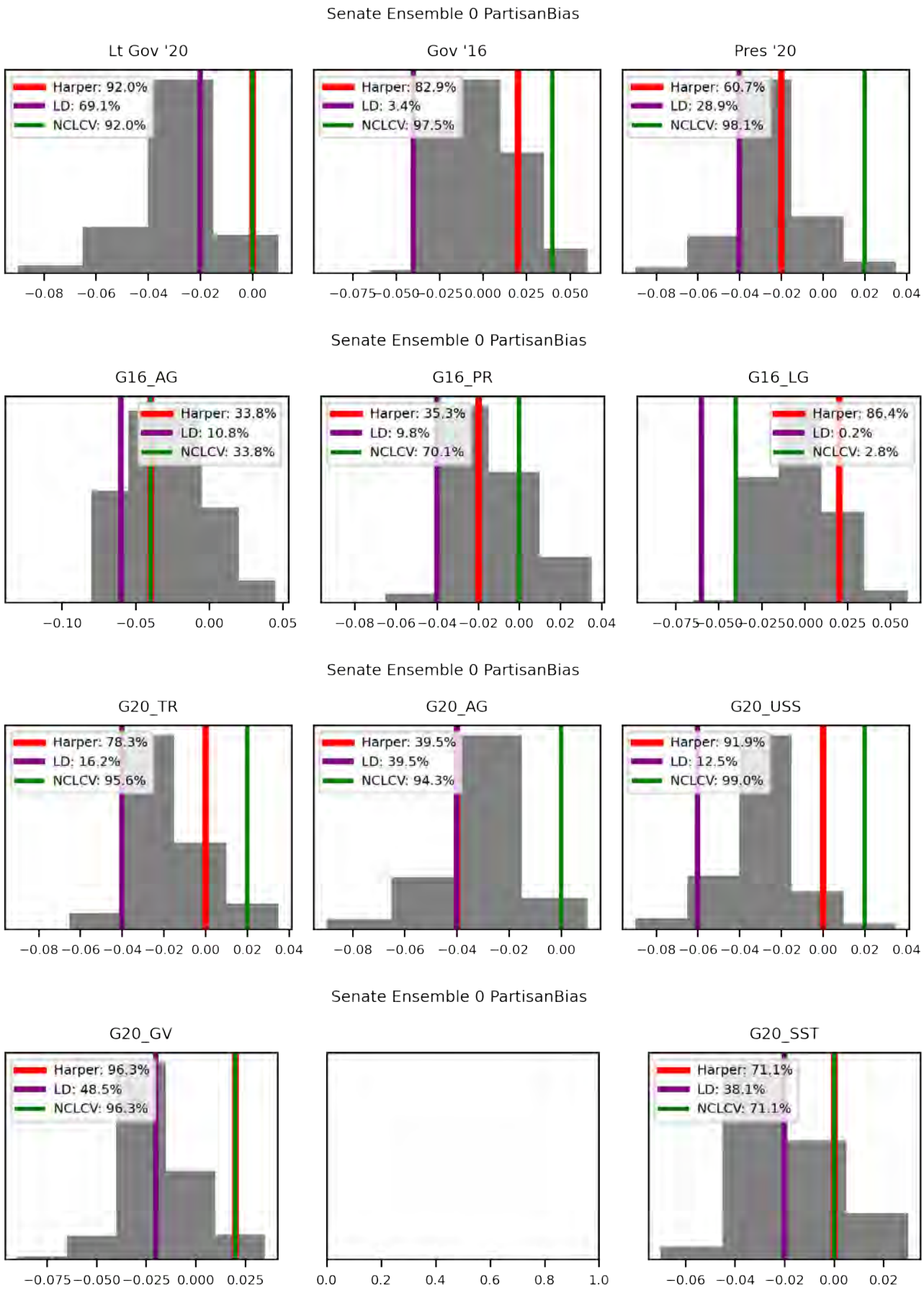

FIGURE 12. Histogram of partisan bias for all 11 elections.

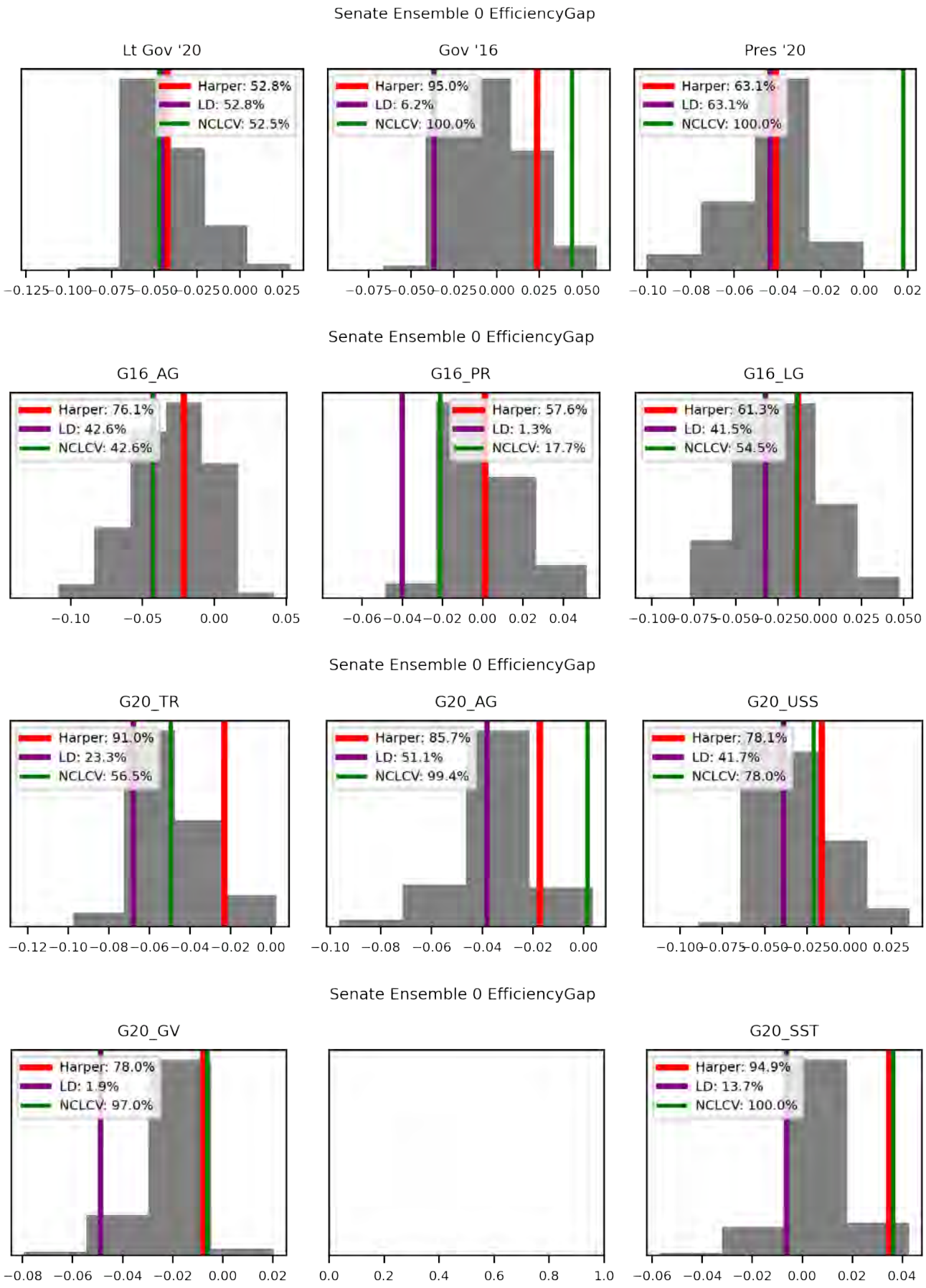

FIGURE 13. Histogram of senate ensemble efficiency gap for all 11 elections. The percentages in the legend represent percentile of the corresponding score in the ensemble.

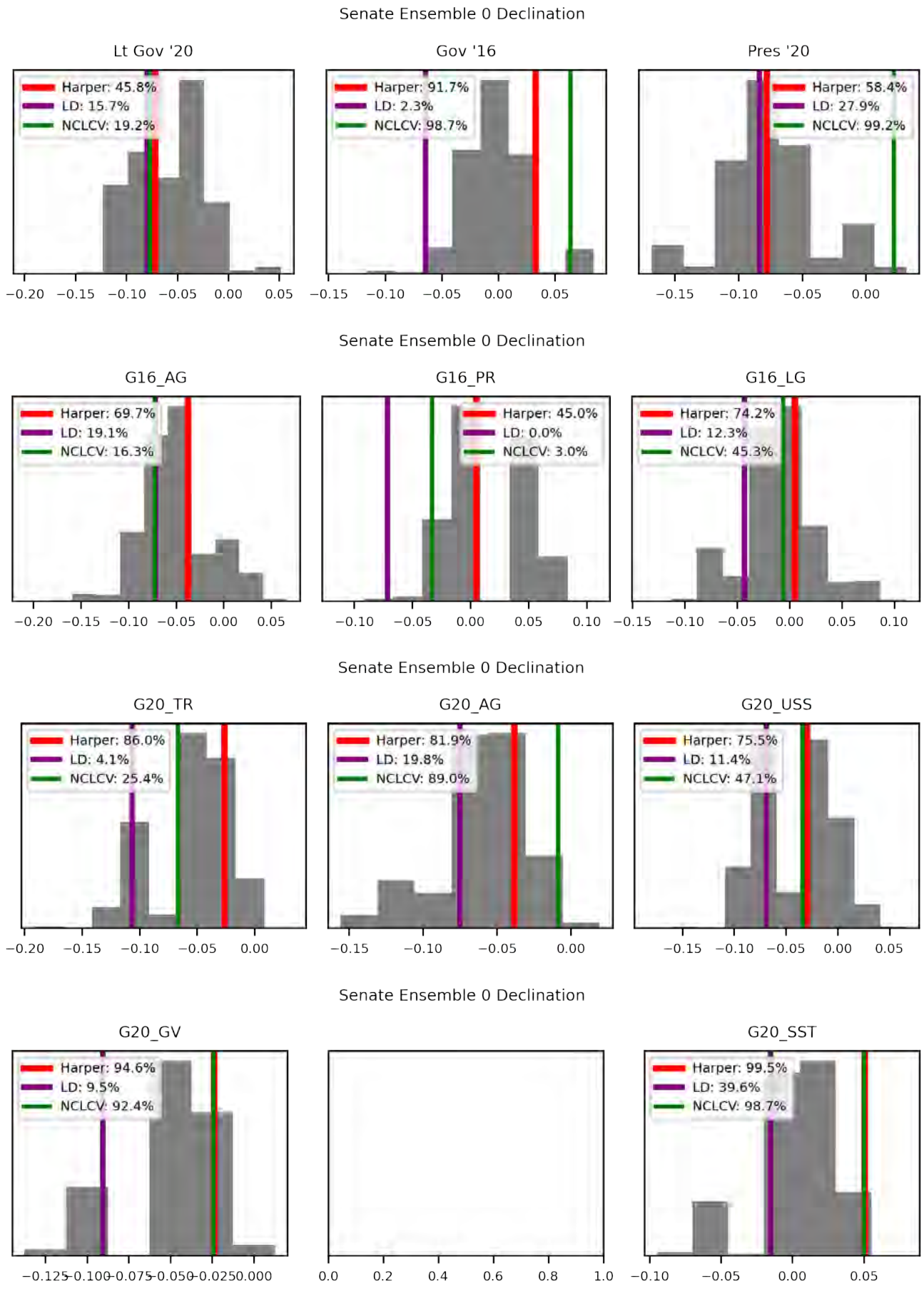

FIGURE 14. Histogram of senate ensemble partisan declination for all 11 elections. The percentages in the legend represent percentile of the corresponding score in the ensemble.

Senate Mean–Median

Proposed_Plan	Harper	LD	NCLCV	Enacted
G20PRE	−0.4	−3.0	0.4	−3.8
G20USS	−0.1	−1.4	0.6	−4.0
G20GOV	0.2	−1.5	0.7	−4.5
G20LTG	−0.1	−1.2	0.3	−3.7
G20ATG	−0.2	−0.9	−0.3	−3.9
G20TRE	0.2	−0.9	0.2	−3.3
G20SOS	0.0	−0.4	0.5	−3.7
G16PRE	−0.4	−1.0	0.0	−2.0
G16GOV	0.4	−1.3	0.2	−3.1
G16LTG	0.5	−2.3	−1.4	−4.1
G16ATG	−0.3	−1.7	−1.1	−3.2
Average	−0.0	−1.4	0.0	−3.6

Table 5. Mean–median scores listed as percentages (times 100) for the proposed Senate plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 11)—not as isolated numbers.

Senate Partisan Bias

Proposed_Plan	Harper	LD	NCLCV	Enacted
G20PRE	−2.0	−4.0	2.0	−8.0
G20USS	0.0	−6.0	2.0	−8.0
G20GOV	2.0	−2.0	2.0	−6.0
G20LTG	0.0	−2.0	0.0	−8.0
G20ATG	−4.0	−4.0	0.0	−8.0
G20TRE	0.0	−4.0	2.0	−10.0
G20SOS	0.0	−2.0	0.0	−6.0
G16PRE	−2.0	−4.0	0.0	−10.0
G16GOV	2.0	−4.0	4.0	−10.0
G16LTG	2.0	−6.0	−4.0	−8.0
G16ATG	−4.0	−6.0	−4.0	−10.0
Average	−0.5	−4.0	0.4	−8.4

Table 6. Partisan bias scores listed as percentages (times 100) for the proposed Senate plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 12)—not as isolated numbers.

Proposed_Plan	Harper	LD	NCLCV	Enacted
G20PRE	−4.1	−4.3	1.8	−8.5
G20USS	−1.6	−3.9	−2.1	−8.0
G20GOV	−0.8	−4.9	−0.6	−8.8
G20LTG	−4.2	−4.5	−4.7	−10.9
G20ATG	−1.7	−3.8	0.2	−8.0
G20TRE	−2.3	−6.8	−4.9	−11.2
G20SOS	3.5	−0.6	3.7	−4.6
G16PRE	0.1	−4.0	−2.1	−8.5
G16GOV	2.4	−3.6	4.4	−10.2
G16LTG	−1.3	−3.2	−1.3	−5.5
G16ATG	−2.1	−4.2	−4.2	−10.5
Average	−1.1	−4.0	−0.9	−8.6

Table 7. Efficiency gap scores listed as percentages (times 100) for the proposed Senate plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 13)—not as isolated numbers.

Senate Declination

Proposed_Plan	Harper	LD	NCLCV	Enacted
G20PRE	−7.8	−8.4	2.2	−16.9
G20USS	−3.0	−6.9	−3.4	−15.3
G20GOV	−2.4	−9.1	−2.4	−16.2
G20LTG	−7.2	−8.0	−7.7	−20.9
G20ATG	−3.8	−7.5	−0.9	−15.3
G20TRE	−2.7	−10.6	−6.7	−20.5
G20SOS	5.1	−1.5	5.0	−8.5
G16PRE	0.5	−7.1	−3.3	−16.2
G16GOV	3.3	−6.4	6.4	−17.9
G16LTG	0.5	−4.3	−0.6	−10.0
G16ATG	−3.8	−7.2	−7.2	−18.4
Average	−1.9	−7.0	−1.7	−16.0

Table 8. Declination scores listed as percentages (times 100) for the proposed Senate plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 14)—not as isolated numbers.

4. House Plan Analysis

I followed the same procedures for analyzing the House plans as I did for the Senate and Congressional plans, but here I had only two plans (LD and NCLCV). I used the ensemble [**?**], whose characteristics are similar to those of the Senate ensemble used above.

4.1. **Seats Won.** Considering the number of seats won in each election, as shown in Figure 15, Both the LD and NCLCV plans appear to be mostly typical in terms of the number of seats won, except in G20PR and G16LG where NCLCV is much higher (pro Democrat) than the main distribution.

4.2. **Rank-Ordered Violin Plots.** Referring to Figure 16, which focuses only on the most competitive districts, the NCLCV plan appears to deviate much more from the ensemble than the LD plan does.

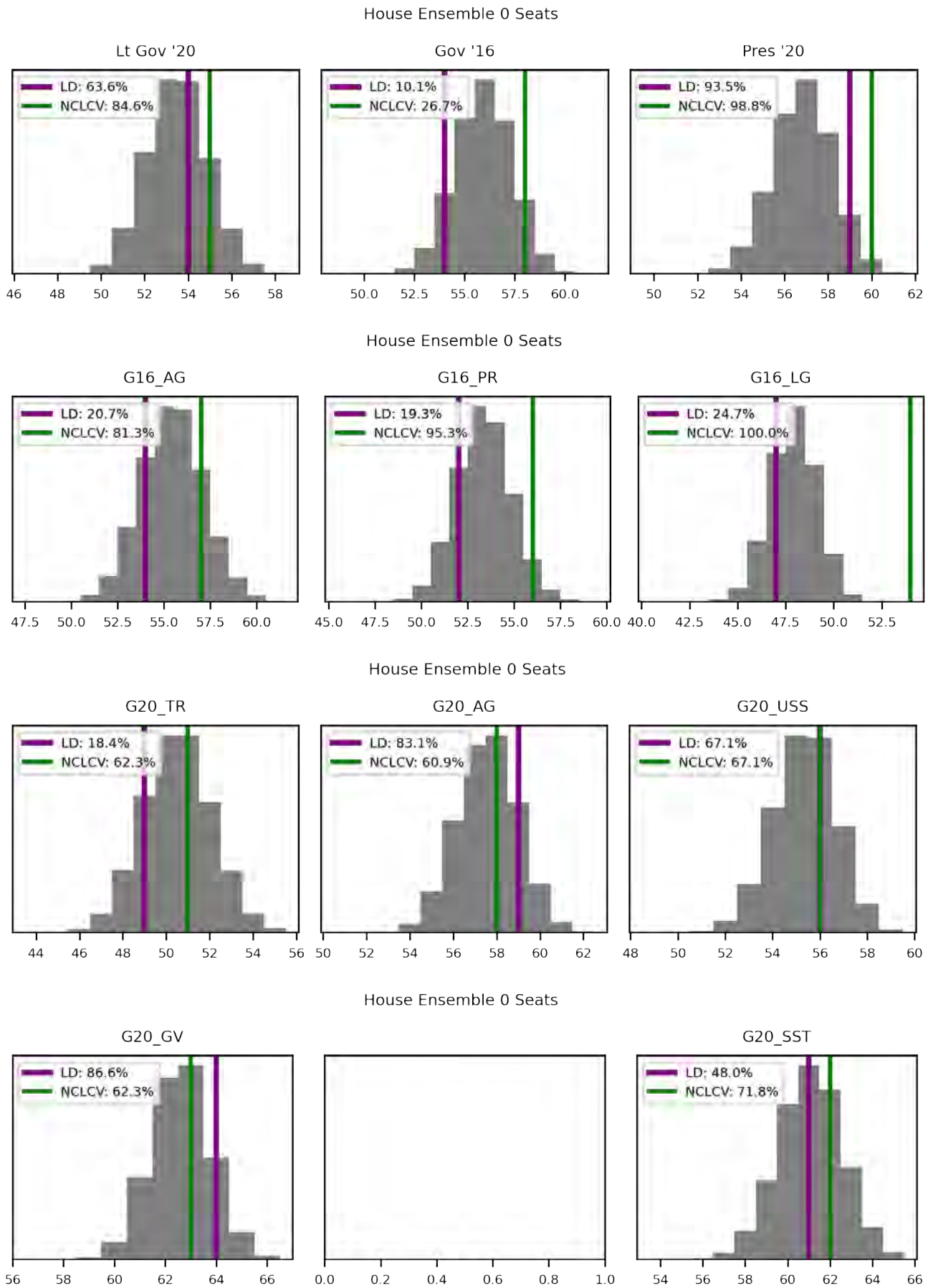

FIGURE 15. Histograms of congressional seats won in all 11 elections for Ensemble 0 plans. The percentages in the legend represent percentile of the corresponding score in the ensemble.

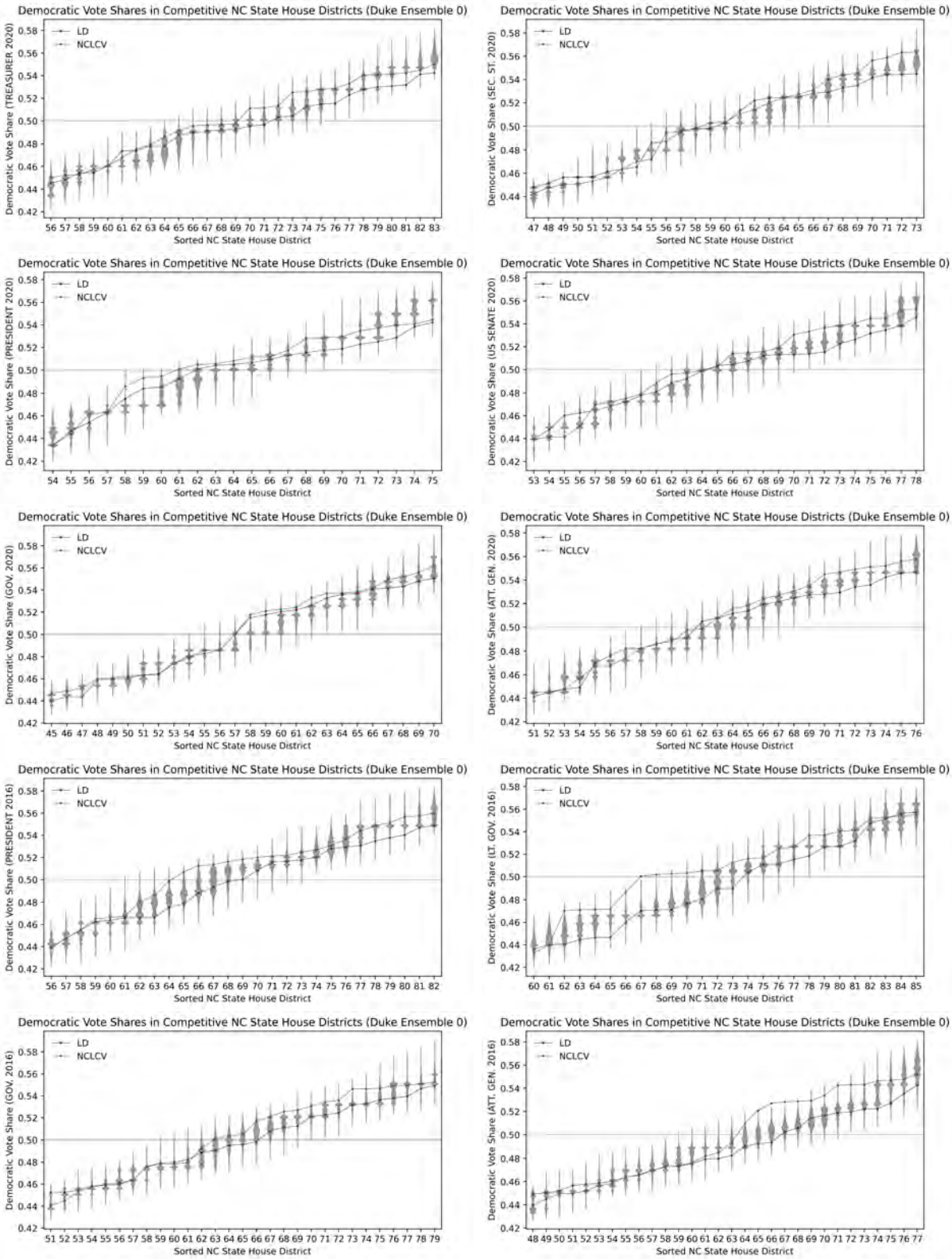

FIGURE 16. Rank-ordered house districts for 10 of the elections (all elections but G20LG) using Ensemble 0. These plots show only the most competitive districts.

4.3. **Other Metrics.**

4.3.1. *Mean–Median.* Table 9 shows my calculations of the mean–median scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 17)—not as isolated numbers.

The distribution is shifted in the negative direction, so scores very close to 0 look more like outliers than large negative scores. Specifically, the NCLCV score of 0.1% in the election G20PR is very close to zero, but it is more Democratic favoring than 98% of all plans, so this plan is an outlier for this distribution, while the LD plan's score of −0.7% is more typical of the distribution.

Although there are occasional outliers, taken as a whole, neither proposed plan looks to me like a partisan gerrymander with respect to the distribution of mean–median scores.

4.3.2. *Partisan Bias.* Table 10 shows my calculations of the partisan bias scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 18)—not as isolated numbers.

Although there are occasional outliers, taken as a whole, neither proposed plan looks to me like a partisan gerrymander with respect to the distribution of partisan bias scores.

4.3.3. *Efficiency Gap.* Table 11 shows my calculations of the efficiency gap scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 19)—not as isolated numbers.

Although there are occasional outliers, taken as a whole, neither proposed plan looks to me like a partisan gerrymander with respect to the distribution of efficiency gap scores.

4.3.4. *Declination.* Table 4 shows my calculations of the declination scores of the three plans in the different races. These scores should be interpreted in light of the full distribution of scores (histograms in Figure 20)—not as isolated numbers.

Although there are occasional outliers, taken as a whole, neither proposed plan looks to me like a partisan gerrymander with respect to the distribution of declination scores.

4.4. **House Conclusion.** The seat margins shown in the rank-ordered violin plots of Figure 16 give evidence of partisan gerrymandering in the NCLCV plan.

These conclusions do not take VRA racial considerations into account.

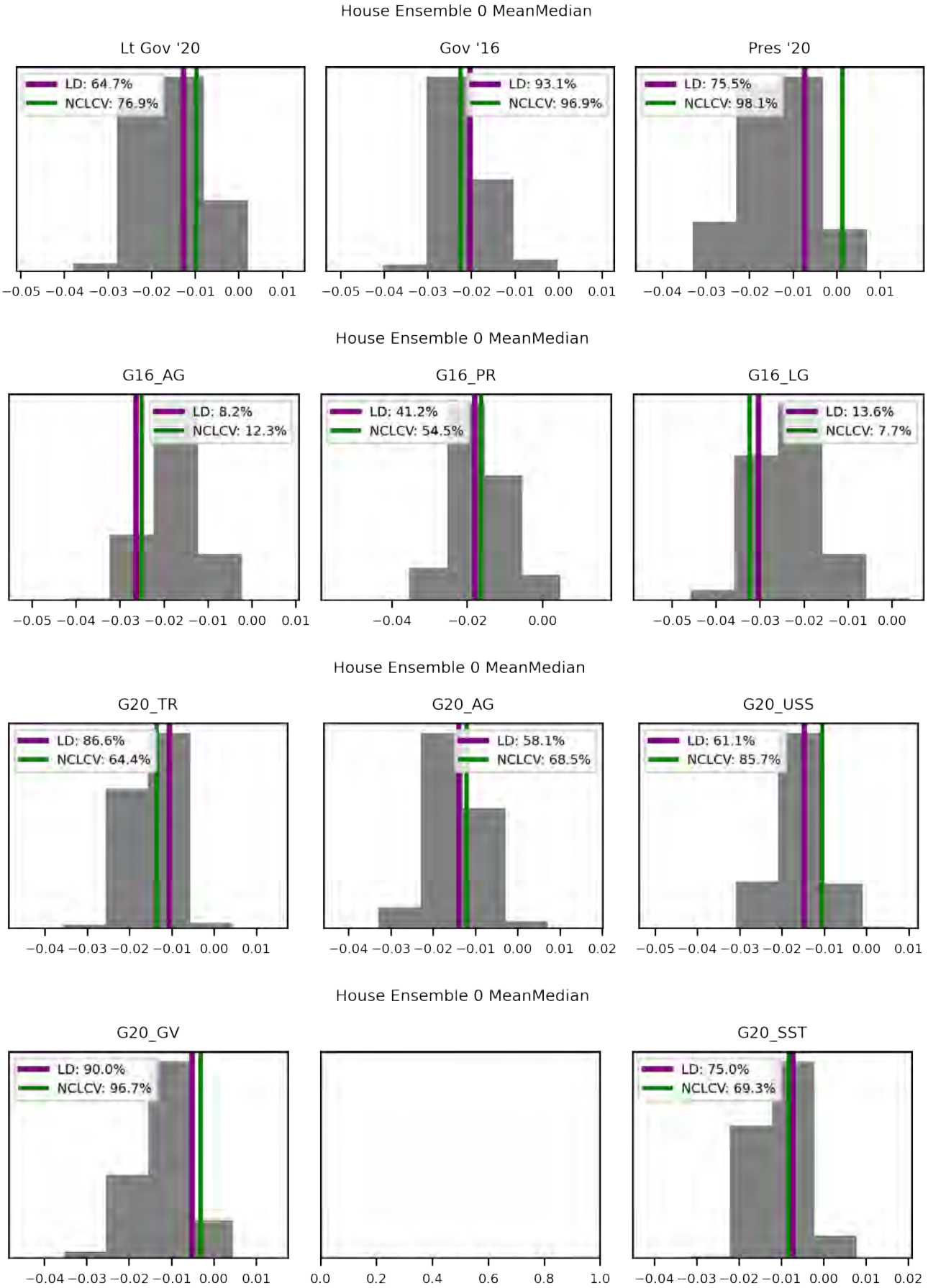

FIGURE 17. Histogram of house ensemble 0 mean–median score for all 11 elections.

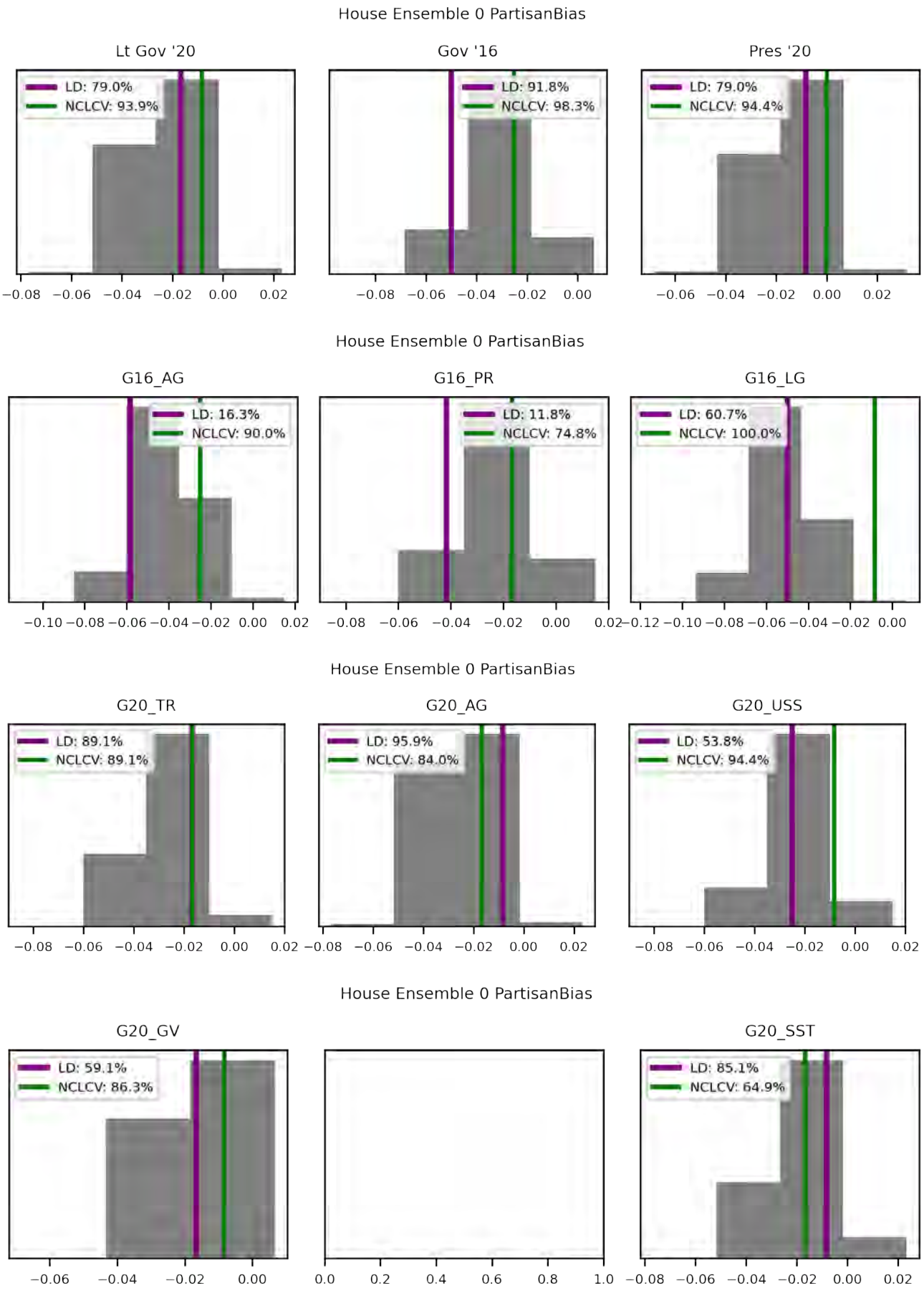

FIGURE 18. Histogram of partisan bias for all 11 elections for Ensemble 0.

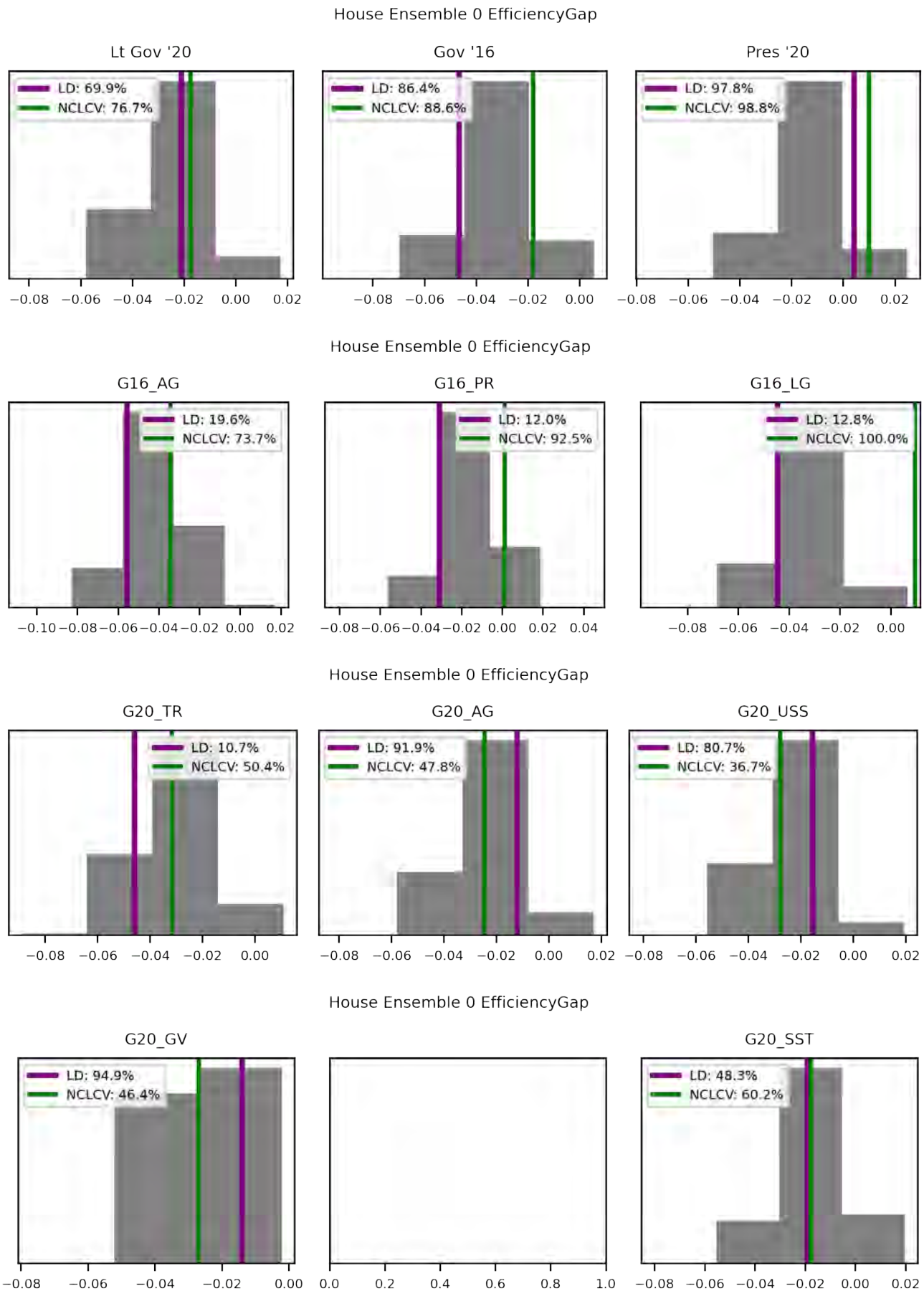

FIGURE 19. Histogram of house ensemble 0 efficiency gap for all 11 elections.

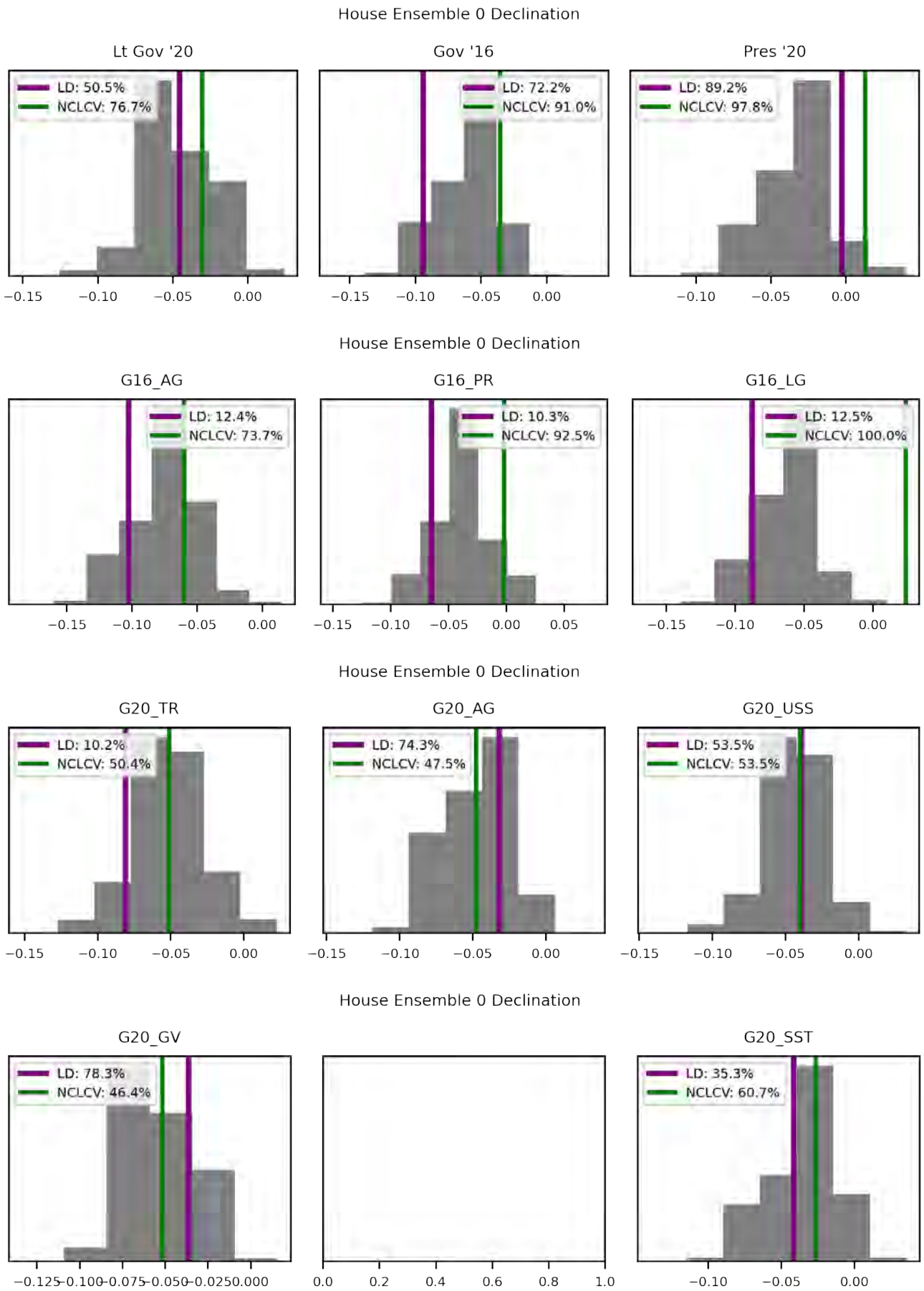

FIGURE 20. Histogram of house ensemble 0 partisan declination for all 11 elections.

House Mean–Median

Proposed_Plan	LD	NCLCV	Enacted
G20PRE	−0.7	0.1	−3.0
G20USS	−1.5	−1.0	−3.4
G20GOV	−0.5	−0.3	−3.3
G20LTG	−1.3	−1.0	−3.4
G20ATG	−1.4	−1.2	−3.1
G20TRE	−1.1	−1.4	−3.4
G20SOS	−0.7	−0.8	−3.1
G16PRE	−1.8	−1.6	−5.1
G16GOV	−2.0	−2.2	−4.1
G16LTG	−3.0	−3.2	−4.4
G16ATG	−2.6	−2.5	−4.5
Average	−1.5	−1.4	−3.7

Table 9. Mean–median scores listed as percentages (times 100) for the proposed House plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

House Partisan Bias

Proposed_Plan	LD	NCLCV	Enacted
G20PRE	−0.8	0.0	−6.7
G20USS	−2.5	−0.8	−7.5
G20GOV	−1.7	−0.8	−8.3
G20LTG	−1.7	−0.8	−7.5
G20ATG	−0.8	−1.7	−7.5
G20TRE	−1.7	−1.7	−7.5
G20SOS	−0.8	−1.7	−7.5
G16PRE	−4.2	−1.7	−9.2
G16GOV	−5.0	−2.5	−8.3
G16LTG	−5.0	−0.8	−8.3
G16ATG	−5.8	−2.5	−9.2
Average	−2.7	−1.4	−8.0

Table 10. Partisan bias scores listed as percentages (times 100) for the proposed House plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

House Efficiency Gap

Proposed_Plan	LD	NCLCV	Enacted
G20PRE	0.4	1.0	−7.5
G20USS	−1.5	−2.8	−8.7
G20GOV	−1.4	−2.7	−6.3
G20LTG	−2.1	−1.8	−8.9
G20ATG	−1.2	−2.4	−8.6
G20TRE	−4.6	−3.2	−8.0
G20SOS	−1.9	−1.8	−8.9
G16PRE	−3.1	0.1	−5.2
G16GOV	−4.7	−1.8	−8.2
G16LTG	−4.4	1.0	−7.0
G16ATG	−5.5	−3.4	−9.0
Hou EG mean	−2.7	−1.6	−7.8

Table 11. Efficiency gap scores listed as percentages (times 100) for the proposed House plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

House Declination

Proposed_Plan	LD	NCLCV	Enacted
G20PRE	−0.3	1.3	−14.9
G20USS	−3.9	−4.0	−16.8
G20GOV	−3.6	−5.1	−12.7
G20LTG	−4.5	−3.0	−18.0
G20ATG	−3.2	−4.7	−15.7
G20TRE	−8.1	−5.1	−15.2
G20SOS	−4.1	−2.6	−16.3
G16PRE	−6.5	−0.2	−11.8
G16GOV	−9.4	−3.5	−15.7
G16LTG	−8.7	2.4	−14.4
G16ATG	−10.2	−6.0	−16.4
Average	−5.7	−2.8	−15.3

Table 12. Declination scores listed as percentages (times 100) for the proposed House plans across the 11 elections. These scores should be interpreted in light of the full distribution of scores (histograms)—not as isolated numbers.

References

[1] Gregory Herschlag. Ncanalysis2020. https://git.math.duke.edu/gitlab/gjh/ncanalysis2020/-/tree/main, 2021. Last accessed 21 February 2022.

[2] Gregory Herschlag. Ncanalysis2020: Congressional election results. https://git.math.duke.edu/gitlab/gjh/ncanalysis2020/-/tree/main/outputs/observables/electionResults/congressional, 2021. Last accessed 21 February 2022.

[3] Gregory Herschlag. Ncanalysis2020: House election results, ensemble 0. https://git.math.duke.edu/gitlab/gjh/ncanalysis2020/-/tree/main/outputs/observables/electionResults/house/mcd_on_0, 2021. Last accessed 21 February 2022.

[4] Gregory Herschlag. Ncanalysis2020: Senate election results, ensemble 0. https://git.math.duke.edu/gitlab/gjh/ncanalysis2020/-/tree/main/outputs/observables/electionResults/senate/mcd_on_0, 2021. Last accessed 21 February 2022.

[5] Jonathan Mattingly. Expert report on the north carolina state legislature and congressional redistricting (corrected version). https://www.nccourts.gov/assets/inline-files/PX629%20Expert%20Report%20of%20Dr.%20Jonathan%20C.%20Mattingly.pdf?68n8gxG7t8ZPLTxl7WYUgl.BPD1BoTVd, 2021. Plaintiffs' Exhibit 629.

[6] Gregory S. Warrington. A comparison of partisan-gerrymandering measures. *Election Law Journal: Rules, Politics, and Policy*, 18(3):262–281, 2019.

Preliminary Report:

Proposed Legislative and Congressional Remedial Plans in North Carolina

Revised draft (please discared the older version)

Bernard Grofman*

March 21, 2022

* I am Jack W. Peltason Chair of Democracy Studies and Distinguished Professor of Political Science at the University of California, Irvine. My research deals primarily with issues of representation, including minority voting rights and party competition. I am a Fellow of the American Academy of Arts and Sciences. I have an honorary Ph.D. from the University of Copenhagen for my work on the cross-national study of elections and voting rules. I am the recipient of a lifetime achievement award from the American Political Science Association for my work on elections and voting rights. I am co-author of five books with major university presses (Cambridge (4), Yale (1), and co-editor of 26 other books, (including books with Oxford (3), U. Michigan (4), and Princeton) with over 300 research articles and book chapters.. Over the past six years I have served as a special master to draw remedial maps for five different federal courts, including redrawing a Virginia congressional district and redrawing eleven districts in the Virginia House of Delegates, and preparing remedial maps s in local elections in Georgia, Virginia, and Utah. In addition I served as co-special master in the 2021 redistricting, drawing the remedial maps adopted by the Virginia State Supreme Court for that state's legislative and congressional districts. Over a 40+ year career, I have served as an expert witness or consultant in redistricting cases in nearly a dozen states I have worked as an expert for both political parties, the NAACP, MALDEF, the U.S, Department of Justice, and non-partisan redistricting authorities. My work has been cited in a dozen different U.S. Supreme Court cases, perhaps most notably in *Thornburg v. Gingles* 478 U.S. 30 (1986). In mid-February 2022 I was asked to serve as an expert consultant to the three Special Masters appointed to present recommendations to the North Carolina Supreme Court in the case of *Harper v. Hall*. North Carolina maps and block equivalency files were provided by the parties in this case; North Carolina election data was provided courtesy of the Voting and Election Science Team: https://dataverse.harvard.edu/dataverse/electionscience, disseminated by Dave's Redistricting App : https://davesredistricting.org of which I made extensive use.. I am also deeply indebted to my research assistant, Zachary Griggy, for the work he provided under my direction.

I. Introduction: Thinking About Partisan Gerrymandering.

We can address the questions of partisan or racial gerrymandering either directly in terms of observed or expected political or racial consequences or, more indirectly, by examining features of maps (e.g., undue fragmentation of existing political subunits) that are often manipulated for partisan purposes. In this report my focus is on political consequences.[1]

Another useful distinction in thinking about gerrymandering is whether the focus is to be on statewide indicators of gerrymandering or on evidence of gerrymandering at the district (or additionally, in North Carolina, county cluster) level. I believe in a holistic view of gerrymandering in which we examine both statewide effects and look in detail at evidence of manipulation at the level of districts/districts within clusters. Below I discuss both approaches.[2]

(1) Using statistical metrics to directly evaluate the degree to which a map as a whole is non-dilutive in its expected partisan (or racial) consequences?

Most analyses of partisan effects of gerrymandering rely on a set of measures in the political science literature such as the *mean minus median gap*, or *partisan bias* that are applied on a jurisdiction-wide basis. These two metrics are intended to be effectively independent of the actual state-wide vote share in any given election.[3] The mean-median gap builds in the value of the statewide vote average; by comparing means and medians of the partisan distribution, it is looking at one aspect of the skewness of a distribution, which is a measure of asymmetry. The partisan bias measure is evaluated in terms of what happens when both parties get a 50% vote share, and thus checks to see if one party is advantaged when the vote share is evenly divided at

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[1] Since I have written extensively on racially polarized voting and racial vote dilution, if requested, I could extend my Report to analyze racial representation in the proposed maps. But, given the intense time pressure, I have limited myself here to issues involving partisan gerrymandering.

[2] Courts have differed in how they approached this issue. One possible synthesis is to evaluate maps at the jurisdiction wide level but to determine remedies in particular districts or particular areas of the state where the key problems seemed to lie. In the racial context, the finding of violations and the remedies for gerrymandering (or for a violation of the *Shaw v. Reno* 509 U.S. 630 (1993) test for a constitutionally unlawful racially preponderant motive) have usually been localized.

[3] However, *ceteris paribus*, both methods work best when, as in North Carolina, the state-wide two party vote share is close to fifty-fifty.

the statewide level. [4] Note also that the mean-median gap and partisan bias are NOT tests for proportionality; they are tests for unequal treatment.

The best known metric to evaluate partisan inequities is *partisan bias*, one measure of which is reported for proposed NC maps in Table 1 later in the Report.[5] The *partisan bias* metric, which focuses on what happens when the vote share is 50%, implicitly incorporates what Dr. Duchin in her first expert witness report refers to as the *majoritarian principle*, namely that a majority of votes should translate into a majority of seats. As the Supreme Court said in *Reynolds v. Sims*," to sanction minority control of state legislative bodies would appear to deny majority rights in a

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[4] Similarly, the difference between the value of the *efficiency gap* for a given plan and a value of the *efficiency gap* of zero can be taken to be an indicator of possible gerrymandering.

[5] The partisan bias test, based on symmetry, was developed by the Princeton political scientist, Edward Tufte in 1973 and the statistical methodology for calculating it was improved by the Harvard political scientist Gary King and his co-authors in the 1980s, mostly notably in joint work with the Columbia University statistician, Andrew Gelman. A relatively non-technical introduction can be found in Bernard Grofman and Gary King. "Partisan Symmetry and the Test for Gerrymandering Claims after LULAC v. Perry." 6 *Election L.J.* 2 (2007). Also see Katz Jonathan N., Gary King, and Elizabeth Rosenblatt. 2019. "Theoretical Foundations and Empirical Evaluations of Partisan Fairness in District-Based Democracies." American Political Science Review. Partisan has a simple intuition but requires a somewhat complicated method to generate results. Take a situation in which Democrats typically won approximately 53% of the statewide two-party vote. Say that with 53% of the vote Democrats would win 57% of the seats in some legislative or congressional election. Now, say that in a succeeding election, Democrats lost 6 percentage points in the popular vote so that they, not the Republicans had 47% of the popular vote. If the map were perfectly symmetric, with 53% of the vote, the Republicans also should win 57% of the seats, as the Democrats did with this same vote share. Calculating partisan symmetry requires that a researcher estimate a 50-50 election. In our example above, the researcher begins with a 53% vote share and then shifts the vote share, on average, a point at a time in both the Republican and Democratic direction while tracking the expected outcomes in seats won and lost. Then the relationship between vote share and seat share is calculated. If the parties move identically up and down what is called a votes-seats curve, the deviations should cancel out and you are left with a 0 deviation from symmetry, i.e., an estimated seat share of 50% at a vote share of 50% (i.e., vote share of 50% at a seat share of 50%). If the outcome at a 50% vote share is something other than a 50% seat share then there is partisan bias in favor of one party or the other. While this metric can be time consuming to calculate by hand, a computer can calculate this quickly. Note that a 53% vote share need not require a 53% seat share for the map to be non-dilutive. Note also that we need to a test to see if the observed level of bias is statistically significant. If a large proportion of seats are competitive, then an estimated bias may not be statistically significant, since a small change in vote share in some of the competitive seats can shift seat share substantially. This metric is the only one to attract favorable mention by some Supreme Court Justices (see Grofman and

way that far surpasses any possible denial of minority rights that might otherwise be thought to result " 377 U.S. 533 at 565 (1964).[6]

While the mean-median gap is a very useful and easy to calculate tool for getting a handle on the presence of partisan gerrymandering, it cannot stand as the sole statistical measure of partisan gerrymandering. Not only does it need to be informed by the results other measures, such as partisan bias, but it also can usefully be supplemented by measures which extend its basic approach beyond a single district.

Dr. Duchin in her first expert witness trial report (PX150, Figure 2, at p.7) shows data for the enacted congressional map and congressional ensembles. and looks at the set of most competitive districts (not just at one district, the median district). She examines whether the set of competitive districts are skewed in favor of one party. She refers to this approach as the "close votes, close seats" principle. Analogous analyses are performed by Dr. Chen in his trial testimony (see PX482, pp. 30-31). This approach can be thought of as a generalization of the mean-median gap, and is arguably to be preferred to it, since the mean-median gap only deals with results for a single district and thus can present a misleading picture of the partisan consequences of a map as a whole. Also, the mean-median gap may be easier to manipulate by mapmakers than some other measures, e.g., by assuring that in the particular district which is the median, the mean-median gap is not that big even though the map as a whole remains a clear partisan gerrymander. Nonetheless, largely because of its simplicity, the mean-median metric is an important one. I have used it myself in evaluating maps when appointed in 2021 by the Virginia Supreme Court as co-Special Master for Virginia congressional and legislative redistricting.

But, regardless of which measure of partisan vote dilution is being used, it is important to also consider how likely to be durable is the gerrymandering effect. As the Supreme Court of North Carolina observed in *Harper v. Hall*. "While partisan gerrymandering is not a new tool, modern technologies enable mapmakers to achieve extremes of imbalance that, 'with almost surgical precision,' undermine our constitutional system of government. Indeed, the programs and algorithms now available for drawing electoral districts have become so sophisticated that it is possible to implement extreme and durable partisan gerrymanders that can enable one party to effectively guarantee itself a supermajority for an entire decade, even as electoral conditions change and voter preferences shift" (slip op., p.1, footnotes omitted).

(*2) Looking at evidence of partisan manipulation <u>at the district or county cluster level</u>*

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[6] The majoritarian principle is much weaker than the proportionality principle; the latter requires that a given vote share for a party translate into the identical share of legislative seats for that party. My 1985 essay, "Criteria for Districting: A Social Science Perspective." <u>UCLA Law Review</u>, 33(1):77-184," is among the many which discuss the importance of the majoritarian principle for democratic theory and election law

To look for evidence of gerrymandering at the district or county cluster requires an intensively local appraisal of how political subunits, concentrations of voters of a given party, and demographic groups are being treated (as well as of the degree to which compactness concerns were being met). This can be accomplished in two different ways.

One way is to look for evidence about intentional manipulation of boundaries at the district or county cluster level by careful use of the eyeball (and perhaps also some simple descriptive statistics) by individuals who have detailed knowledge of the state and who then provide a description of how particular pieces of geography were manipulated. Here, we can either be looking to identify areas where gerrymandering is found and to which remedies might be directed and/or we look for "patterns and practices" that are common across subunits of a kind that are indicative of gerrymandering even if we do not formally test for statistical significance[7] This type of common-sense evidence can be compelling, both at the level of individual districts and for understanding an overall pattern of dilutive acts.

The second way is to make use statistical analyses for districts or county clusters is to do analyses based on ensembles in ways that closely resemble those used for statewide analyses.

For example, one useful approach to understanding the degree to which the two key tools of gerrymandering, *packing* and *cracking*, were used by mapmakers at the district level employs ensemble analysis and calculation of statistical outliers. Dr. Jowei Chen in his expert witness trial report. Dr. Chen (PX882, Figure 4, p. 25) ranked congressional districts from most Republican to least Republican in the enacted congressional map, and considered whether there was evidence of manipulation in that the districts Republicans did best in were, in general, being won by lower than expected vote margins (i.e., the map "efficiently" placed Republican voters to win without wasting Republican votes), while the districts in which the Democrats did best were, in general, being won by higher than expected vote margins (i.e., the map "inefficiently" placed Democratic voters to "pack" them and thus waste their votes), while districts that were somewhat competitive by and large showed a higher than expected Republican votes hare (those districts were "shored up" to make Republican loss unlikely).This creates an s-shaped pattern in the data that is clearly visible in Figure 4. [8] This type of evidence suggests, even if it cannot prove, <u>intentional</u> partisan gerrymandering,

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[7]*Descriptive statistics* simply describe data and patterns in the data; *inferential statistics* seek to assign probability of occurrence of events relative to some null hypothesis. With ensemble analysis, the null hypothesis against which statistical significance is determined is that the plan was drawn from a set of plans like those in the ensemble.

[8] Chen observes statistically significant results in 10 of 14 of the county clusters and the overall pattern is striking. Here it is important not to be misled by the fact that there were some clusters that were not statistically significant; it is the overall pattern that shows the improbability of the results. Indeed, even if there were NO clusters with statistically significant results but the directionality of manipulation was as predicted across virtually all the clusters, properly applied statistical calculations that look at multiple clusters at the same time can show the reality of statistically significant results even if no <u>single</u> cluster is a statistically significant outlier. [8]

At the county cluster level, we can also evaluate whether there were excess city splits or county cuts within that cluster from what we would expect of plans in the ensemble in that same clusters. We should also note that we can ask if expected partisan outcomes within the cluster in terms of mean expected wins were extreme statistical outliers, or whether particular groups such as African-Americans or other minorities were either cracked or packed within the cluster in ways that signaled improper attention to race. But we must be careful not to mistake failures to find statistically significant results at the cluster level with the absence of significant (and substantively important) bias in the plan as a whole, since what is a clear overall pattern of discrimination can be missed if we look only small groupings.

But, in looking at districts or clusters, just as in looking at stateside indicia of partisan gerrymandering, we must also ask whether difference from what is predicted in an ensemble takes us toward partisan equity or away from it (see below).

II. Baselines and Thresholds in Evaluating Partisan Gerrymandering

What is the appropriate baseline against which to judge whether some given value of a metric such as partisan bias or mean-median difference supports a claim of egregious gerrymandering?

There are two ways in which the question of appropriate baseline for statistical analyses of partisan gerrymandering effects has been addressed in the political science literature. The most obvious way to evaluate statistical metrics used to identify partisan gerrymandering effects, such as those shown in Table 1, is simply to ask questions such as: "How close is the mean-median gap to zero?" "How close to a zero level of (vote or seat) partisan bias does the plan have?, etc. As a result of my recent experiences as a special master I have come to the view that this is not just the simplest, but also the best, way to think about statistical metrics that seek to directly measure gerrymandering. But a second way in which this question has been addressed is to ask: "How does a map compare in its properties vis-a-vis various metrics to those in an ensemble of computer drawn maps constructed in a partisan blind fashion?"

Ensembles are sets of computer-generated plans based on the geographic distribution of population in the unit (usually at the level of census blocks) which may also have "built in" instructions to the computer to take into some features besides population, e.g., respecting county or other subunit borders, or avoiding pairing incumbents, or seeking to draw compact districts.[9] For ensembles, for any given metric, the baseline is established by answer the question: "Is a given map a statistical outlier with respect to the ensemble, with properties that by chance alone would occur only at the tails of the ensemble distribution, e.g., with probability less than .05 (the familiar two standard deviation test for *adverse impact* from *Griggs v. Duke Power Co*, 401 US

[9] In North Carolina, ensemble simulations for state legislative districts (NC House and NC Senate) introduced by experts in *Harper v. Hall* are programmed to take into account, the state's county clustering rule.

424 (1971))?" Ensemble analysis can be applied to features of maps such as splitting of counties or other subunits, or features such as compactness, but it can also be applied to measuring expected political effects of a map via the kinds of metrics used by experts in the *Hall v. Harper* litigation, that were subsequently referenced in the *Harper v. Hall* majority opinion.[10] Election-related metrics are calculated using a distribution of recent partisan (and/or racial) voting patterns in the unit (usually with data drawn from statewide elections that is projected into census geography). with the values of these metrics and of expected partisan outcomes in the plan (or portions of the plan) are compared to those in the ensemble.

In evaluating any map in terms of political effect metrics it is important to be able to separate out the effects of so-called "natural" bias, i.e., partisan bias that arises from historical patterns of electoral geography and environmental features such as mountains or rivers, [11] from partisan bias that arises from contemporaneous map-making practices, including and especially intentional gerrymandering. Using ensembles as the basis for our evaluations directly allows us to compare the bias (or other features) in any given map with the bias (or other feature) in the ensemble, since we are holding constant the electoral geography of the state and other features of the state, such as rivers or mountains.

The use of ensembles has allowed for major theoretical and empirical advances in studying redistricting and gerrymandering, and I strongly endorse their previous use in this litigation. If a map exhibits more evidence of bias or other kinds of distortions than we find in an ensemble to a statistically significant degree, I view this fact as very strong *prima facie* evidence of manipulation. But there are two ways to make errors based on ensemble analyses involving political election-based metrics: on the one hand, concluding that a plan is dilutive when instead it is vote-dilution reducing and, on the other hand, concluding that a plan is not dilutive because it is not an outlier in the ensemble for some parameters when, in fact, it is a carefully crafted gerrymander (Type I and Type II errors).

First, we must be careful to look at the directionality of deviation from ensemble expectation. **If a map has lower (absolute) values on metrics such as partisan bias than most of the maps in the ensemble, *ceteris paribus*, that is something to be desired, not condemned, even if the map is outside the 95% confidence range of the ensemble. It is only when the map** has higher values of metrics that show vote dilution than most of the maps in the ensemble that we see evidence of partisan gerrymandering that might rise to the level of unconstitutionality. Thus, even if we opt only for an ensemble based approach to evaluating vote dilution, when we do look at how far from an ensemble expectation is the observed value on some metric it is critical to

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[10] See, e.g., the discussion of the findings of Plaintiffs expert Dr. Jowei Chen in *League of Women Voters v. Pennsylvania* (J-1-2018, Supreme Court Of Pennsylvania Middle District).

[11] Although I have used the term "natural bias" because it has become standard, I regard it as a misnomer. For example, there is nothing natural about the disproportionate presence of African-Americans in areas good for cotton growing that continues to the present day, unless you think slavery is natural. And redlining and other practices have led to geographic segregation of minorities within cities.

distinguish whether the value in the map takes us in the direction of more dilution or in the direction of less dilution.

Second, **even if a map is within the 95% confidence bounds of an ensemble on some particular metric, that does not mean that the map is NOT a partisan gerrymander**. There are multiple statistical metrics to evaluate the level of partisan gerrymandering, and we need to be careful to look at multiple indicators, both at the state level and ones that are district or county-cluster specific. Also, there may be non-statistical evidence of intentional gerrymandering derived from careful analysis by knowledgeable observers of exactly where particular lines on the map have been drawn. Such evidence may lead to a conclusion of a constitutional violation even in the absence of use of ensembles or of statistical inference tests.[12] Or they may be inferences of intentional gerrymandering based on the redistricting process itself or based on statements made by mapmakers.

Third**, because of how ensembles are created, when we look at the political effects metrics, they may show a map to be non-dilutive even when dilution is present because the natural bias in a state favors a particular party and thus tilts the ensembles toward maps favorable to that party.**

An ensemble-based standard for vote dilution takes as given the distribution of voters in the state at some low level of census geography such as the block. But because it is built on the distribution of voters, when we look at partisan behavior in past elections, we often find that the voters of one party are more concentrated than voters in the other party. In particular, Democrats (and minorities) are likely to be highly concentrated in cities. When one group has its voters more geographically concentrated than another, redistricting can create inequities, e.g., by packing Democratic voters into districts in such a fashion as to "waste" their votes.

While I can attest from my own knowledge that Dr. Duchin (PX150, p. 4) is correct that North Carolina is a jurisdiction that has a low level of so-called natural bias compared to most other states, [13] a low level of natural bias is not zero bias.

Consider the ensembles created by Dr. Daniel Magleby which he uses to evaluate whether some given plan's mean-median value is (considerably) outside the 95% confidence range generated by the ensemble (see PX 1483). For Congress, Magleby finds the mean-median value in his ensemble to be around 1% more Republican than the statewide average (see Figure 5 in his first Report). A similar 1% pro-Republican bias is found for the Senate (see Figure 4 in his first

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[12] Much of the litigation involving claims involving racial gerrymandering or race as a preponderant motive illustrates this point.

[13] The existence of what has been called "natural bias," has led some commentators to claim that whatever bias is found in a given plan is due to geography, not intent to discriminate. However, as Dr. Duchin correctly points out, the level of natural bias in North Carolina in no way prevents the production of "maps that give the two major parties a roughly equal opportunity to elect their candidates" (PX150, p. 4).

Report), while the pro-Republican bias in the House for the mean-median ensemble is between 2% and 3%.(see Figure 2 in his first Report)

Further evidence of a pro-Republican "natural bias" obtain from simulations that focus on the expected number of seats a party will be expected to get if the partisan vote share is at the historical recent average. Dr. Magleby has done analyses of this kind (see PX1483), but so have other plaintiffs' experts. For example, with a projected 50.8% Republican vote share, while the 10-4 projected vote outcome in the 2022 enacted legislative congressional map is a clear statistical outlier, Dr. Chen finds that a modal congressional outcome in his simulation would have an expected 9 Republican and 5 Democratic seats for the U.S. House (see Report of Dr. Chen PX882, Figure 7, p. 33). Dr. Mageleby's simulation (Figure 6 in his first Report) is similar, with about 8-9 Republican seats.

In sum , so-called "natural bias" tilts the ensembles for the North Carolina upper and lower chambers and for the U.S. House of Representatives somewhat in a pro-Republican direction.[14]

Resting analyses of partisan bias solely on outlier analysis in ensembles creates a two-sided risk. On the one hand, **plans that are highly dilutive might be accepted if the only analysis of equal treatment is an ensemble-based comparison**. **Indeed, <u>if</u> we judge partisan outcomes only by whether they closely match the mean results in an ensemble, we might conclude that, in North Carolina, for both branches of the legislature and for Congress, only at least a somewhat pro-Republican gerrymander is non-dilutive.** [15] On the other hand, any attempt to move toward a truly unbiased map might require moving away from the level of bias that is created by geography, i.e., outside the middle zone of the ensembles, and thus be attacked as a gerrymandering outlier. Such perverse results would, in my view, fly in the face of the North Carolina Supreme Court's assertion that "We hold that our constitution's Declaration of Rights guarantees the equal power of each person's voice in our government through voting in elections that matter" (slip op. p.1).

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[14] As best I can judge all the ensembles created by plaintiffs' experts show an expected pro-Republican tilt in partisan effects measures such as mean-median difference.

[15] The ensemble analyses conducted by Plaintiffs experts in *Harper v. Hall* concluded that the enacted maps to be partisan gerrymanders in that these maps were so egregiously gerrymandered that, on multiple indicators, they fell very far outside the ensemble-based expectations of the amount of expected pro-Republican bias even though the computer-generated ensembles were themselves exhibiting a pro-Republican bias (see above). The ensembles-based conclusions that these maps were egregiously gerrymandered in favor of Republicans, combined with the other evidence of intent and examination of how gerrymandering was done in particular areas of the state, combined with the evidence that the extreme level of pro-Republican bias in these plans would continue throughout the decade under realistic scenarios of future changes in statewide vote, thus locking in a permanent Republican majority in both houses of the legislature and in the state's congressional delegation, made it apparent that the plans should have been struck down as unconstitutional once partisan vote dilution was held to be justiciable under North Carolina state law.

Can we specify some threshold value of a metric such as partisan bias or mean-median difference as being required to supports a claim of egregious gerrymandering that rises to the level of unconstitutionality ?

Both the zero baseline approach and the ensemble-based approach still leave open the question of the point at which the accumulated evidence of gerrymandering leads to a conclusion that this gerrymandering rises to a level of unconstitutionality. But there is one question on which I think there would be widespread agreement, namely that a legislative map does not have to be the "best possible map." The mere fact that a better map on multiple criteria exists does not require a court to choose that map over a map that is adopted through legal channels and due process. The Court's role as mapmaker only begins after the challenged map has been found to be unconstitutional and the legislature has forfeited any right to continue to prepare alternative maps. Moreover, if we think about criteria for demonstrating unconstitutional partisan gerrymandering, there probably also would be agreement that (a) the mere fact that the value of on some metric is a statistical outlier is not enough to show a violation, rather there must be evidence of the substantive importance of the discrepancy,[16] and (b) before a finding of a constitutional violation, it would be important to demonstrate that the political effects of a plan are likely to be non-ephemeral.

However, while it might be seen as desirable for courts to clearly set a threshold for what differences from zero for any given metric are *de minimis* with respect to a claim of unconstitutional partisan gerrymandering, there are two reasons to reject such an approach at this time. First, state courts are only recently come to grips with partisan gerrymandering claims brought under state law. There simply has not been time enough for a body of jurisprudence to emerge. Rather, as the Court Opinion in *Harper v. Hall* suggested, courts should strike down egregious examples of partisan gerrymandering. Only in later cases will courts be in a position to set clear "safe harbor" thresholds if they eventually determine, as the U.S. Supreme Court did in the "one person, one vote" cases, that numerical *de minimis* standards were appropriate.[17]

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[16] In the context of redistricting, this would translate as a finding that the consequences of the statistically significant disparate impact involved an expected seat share change of, say, at least one district (though that number might vary with the size of the legislature). For example, in *League of Women Voters v. Pennsylvania* (slip op. p. 128) the Pennsylvania Supreme Court favorably cites to Dr. Jowei Chen's finding that " while his simulated plans [the ensemble] created a range of up to 10 safe Republican districts… , the 2011 [enacted] Plan creates 13 safe Republican districts."

[17] There are multiple statistical measures of malapportionment such as *total deviation*, defined as the sum of the deviation from ideal in the largest district plus the deviation from ideal in the smallest district, and *average deviation*, among others measures (see e.g., Cervas, Jonathan R., and Bernard Grofman. 2021. Legal, political science and economics approaches to measuring malapportionment: The U.S. House, the Senate, and the Electoral College 1790-2010. *Social Sciences Quarterly*. 101(6): 2238-2256), but, after a while, the Supreme Court largely settled on total population deviation as the key metric for OPOV. In the OPOV cases, after dealing with "horribles," The US. Supreme Court eventually adopted a 10% total population deviation safe

Second, ascertaining the level of gerrymandering in a map is harder than ascertaining the degree of malapportionment in a map. Not only are some of the statistical tools, such as ensembles, much more complicated than simple arithmetic but, perhaps even more importantly, there are multiple (but related) metrics and multiple factors to consider, all of which require careful parsing in terms of forging an overall assessment. Thus, I see the early phases of state court partisan gerrymandering litigation employing a "totality of the circumstances approach," even though also relying on the various specific statistical indicators the *Harper v. Hall* opinion highlighted. [18]

III. Preliminary Evaluations from a Political Science Perspective of the New Legislatively-Drawn Maps for Congress, the NC Senate, and the NC House

Below is a table showing, for each of the five proposed plans and for the three previously enacted maps, a variety of metrics: projections of how many Democratic and Republican leaning seats would be expected and how many districts would be competitive (from 45% to 55%) and also, among the competitive seats, what is the relative balance of Democratic and Republican vote shares; the mean-median gap; two standard measures of partisan bias based on symmetry in a seats-votes curve (one based on how much above a 50% vote share the party with diluted votes would need to win a majority of seats, the other based on the seat share a minority party would get if it won 50% of the vote); the efficiency gap; and a composite measure of compactness that incorporates Polsby-Popper and Reock scores. The calculations are provided from a program, Dave's Redistricting App, which can calculate the standard election-based indices of partisan gerrymandering. The political data reflect major statewide races 2016-2020. The metrics used give a historical baseline of 49.4% Democratic two party vote and 50.8% Republican two-party vote.[19]

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harbor for legislative districts – at least absent evidence of discrepancies lacking a legitimate state purpose, but required population deviation as close as practicable to zero for congressional maps. Having read the OPOV cases and gone back to read key academic commentary both just before and just after *Baker v. Carr*, I think it fair to say that nobody could have predicted the final OPOV standards chosen .

[18] *Brnovich v. Democratic National Committee* 594 U.S. ___ (2021) makes it clear that, in federal jurisprudence, in the context of Section 2 of the Voting Rights Act, a finding of disparate impact is not sufficient, standing alone, to prove a Section 2 violation, since other factors need to be taken into account, the U.S. Supreme Court also asserted "§2 does not transfer the States' authority to set non-discriminatory voting rules to the federal courts." This observation is doubly relevant, in my view, to the present litigation. On the one hand, the Supreme Court recognized the power of the states to set non-discriminatory voting rules. On the other hand, the Supreme Court recognized that no single metric may be enough to prove (or disprove) a constitutional violation, and that contextual analysis is needed.

[19] There is no dispute among experts that, in Dr. Duchin's words, "North Carolina voting has displayed a partisan split staying consistently close to even between the two major

<<Table 1 about here. See below>>

parties over the last ten years." (PX150, p.4).

TABLE 1: Plan Comparisons on Multiple Metrics

Plan Name	Map Type	# of Districts	Rep Districts	Dem Districts	Competive Districts	Mean-Median Dist	Votes Bias	Seats Bias	Efficiency Gap	Compactness
Overturned Congress Plan	Congress	14	8	3	3 (2R, 1D)	5.78%	3.68%	16.86%	17.32%	51
Legislature Congress Plan	Congress	14	6	3	5 (2R, 3D)	0.66%	1.27%	5.27%	6.37%	45
Harper et al. Congress Plan	Congress	14	6	4	4 (1R, 3 D)	0.05%	0.32%	0.93%	1.50%	66
LCV et al. Congress Plan	Congress	14	5	3	6 (1R, 5D)	-1.66%	-0.10%	-0.36%	0.67%	74
Overturned Senate Plan	Senate	50	24	17	9 (5R, 4D)	3.66%	3.31%	7.22%	7.14%	61
Legislature Senate Plan	Senate	50	24	17	9 (4R, 5D)	0.77%	2.02%	4.07%	4.24%	69
Harper et al. Senate Plan	Senate	50	21	19	10 (7R, 3D)	-0.08%	0.48%	1.07%	1.21%	63
LCV et al. Senate Plan	Senate	50	22	17	11 (4R, 7D)	-0.07%	0.72%	1.56%	1.67%	69
Overturned House Plan	House	120	56	40	24 (14R, 10D)	3.61%	2.94%	6.77%	6.71%	65
Legislature House Plan	House	120	54	43	23 (9R,14D)	0.89%	1.29%	2.70%	2.72%	72
LCV et al. House Plan	House	120	55	44	21 (7R, 14D)	1.11%	0.91%	1.69%	1.58%	81

Because lack of constitutionality must be established before any consideration can be given to choosing an alternative map, here I will limit myself to political science perspectives on the constitutionality of each of the legislature's proposed maps. I will not discuss the question of which alternative map should be adopted by the court if the map proposed by the legislature is found to be unconstitutional, except to note that the maps proposed by one or more plaintiffs would seem to be ones that the Court could adopt (perhaps as is, perhaps with very minor modifications) if the corresponding legislative map was struck down. However, while I will not discuss which alternative map is best, since that issue is premature, I will use the alternative maps to show how much closer to zero values on the various metrics it would have been possible to come.

My discussion will be limited to the data presented in Table 1, which reports only metrics calculated at the statewide level.[20] I recognize that the information in this table is not the only relevant material. Thus, my conclusions might be changed upon exposure to expert witness testimony about the various plans. In particular, I am not able to incorporate into my conclusions finding about the maps in terms of the spatial configurations of individual districts or county clusters and how those might have been manipulated For these reasons, I have labeled my Report a Preliminary Report.

Before I turn to the three specific maps proposed by the legislature I should note that, on virtually all statistical metrics, the new plans are significant improvements from the old plans. But the plans previously rejected by the Court were such egregious gerrymanders that the standard of doing better is a very low bar. I would also note that perusal of Figure 4 in 22.2.21 NCLV Plaintiffs' Remedial Comments (at p. 18) suggests that the new proposed congressional map has the most pro-Republican bias of the three proposed maps, and the State House map has the least pro-Republican bias. This is generally consistent with my own findings. Thus, a legal decision about which proposed maps are constitutional/unconstitutional need not be the same for all three maps.

Congress

There are several key facts about the congressional map proposed by the legislature.

First and foremost, in a state that is in recent history one that is nearly evenly divided, it creates a distribution of voting strength across districts that is very lopsidedly Republican: 6 Republican leaning districts that, based on averaged recent data will, barring a political tsunami, elect Republicans; 3 Democratic leaning districts that will, barring a political tsunami, elect Democrats; and 5 competitive districts. A sports analogy may be helpful here. Imagine a playoff series of 14 games of which a majority (9 of 14) have already been played, with five games still to go. The team that has won only 3 of the 9 games would need to win all five of the remaining

[20] I believe the data presented in Table 1 to be a faithful representation of what is found App for the various metrics in Dave's Redistricting, but I recognize that there is always the possibility of error in converting shape files from one GIS program to another and always the possibility of typographical error in my entering data into this Report.

games in order to win the series, and it would need to win four of the five just to get a tie. If the teams were evenly matched in the remaining games of the series the likelihood of winning all five is under 5%.[21] Of course, we need to examine much more closely the expected degree of competition in the districts that DRA labels competitive districts in the proposed congressional map. While there is an apparent Democratic 3-2 advantage in the competitive seats, a close look at the data shows that in 2 of the 3 competitive seats showing a mean Democratic edge that edge is razor thin, and smaller than the still narrow pro-Republican edge in the two Republican leaning competitive districts, while the 3rd district labeled as competitive has a substantial Democratic edge and is a very heavily African-American district Looking at vote margins more closely, we might thus view this map as {6R, 4D, 4 very competitive}.[22] But even so, Democrats would still have to win four of the four competitive seats to win a majority in the delegation.

Second, while the results in the median district look a lot like the statewide average, but with a slight Republican edge, the median is only one district and we must look at the overall map. Here the 5.27% seats bias suggest a substantial pro-Republican bias in terms of the likelihood that a majority of the voters will be able to win a majority of the seats, and the 1.27% vote bias suggests that only a win by more than 50% of the statewide vote can yield the Democrats a majority of the seats. When we compare these levels of partisan bias to the level of partisan bias in the Harper and NCLCV maps we see that each of these two bias measures is multiple times higher in the legislative map than in the alternatives and, even when we look at differences in absolute value rather than ratios, it is still clear that the legislatively proposed congressional map is much more extreme with respect to partisan bias.

Third, the level of compactness of the districts in the previous map was a statistical outlier relative to the ensembles (Chen Expert Report PX482, pp. 17-19) and since the DRA compactness score the new congressional map proposed by the legislature is even lower, my expectation is that, with respect to district compactness the new map will also be a clear statistical outlier. However, unlike its predecessor (Chen Expert Report PX482, Figure 1, p. 14), doing a visual check, the new congressional map does not appear to split any counties in more than two pieces.

Fourth, there has been a substantial drop in the efficiency gap in the new map as compared to the congressional map found to be unconstitutional. But the efficiency gap is not directly a test for

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[21] Of course, this is an improved situation for the Democrats compared to the enacted congressional map, since that map (8 Rep, 3 Dem, 3 competitive) in effect said that the outcome was foreordained before the last three games were played. Barring a political tsunami, that map locked in a permanent Republican majority, and it was shown in the expert witness testimony to make a 10R-4D outcome very likely. Of course, that map was also one of the handful of most blatant and egregious partisan gerrymanders in the nation.

[22] Note that to do this exactly we would need to look election by election to see how often Democrats won, since the mean vote share averaged across elections can lead to misleading conclusions because of variation in Democratic performance. See discussion of essentially this point in Dr. Duchin's Rebuttal Expert Witness Report (PX234).

bias; rather it measures, roughly speaking, how far from a responsiveness level of 2 a map implements. As Dr. Duchin has argued in her previous work, in a view that I share, high values of the efficiency gap are a sign that something may be seriously wrong and signal a need to investigate carefully. However, in my view, low values of the efficiency gap, are not a proof that there is no vote dilution. By offering a map with an efficiency gap of 6.37% for their congressional map, i.e., one with an efficiency gap below 7, the legislative map drawers have apparently sought to draw a congressional map that just narrowly pass a supposed threshold test for partisan gerrymandering (see Memorandum on Remedial Process 4876-1419-931, at p. 7). And the efficiency gap is still a result in a pro-Republican direction.

Because they all point in the same direction, the political effects statistical indicators of partisan gerrymandering strongly suggest the conclusion that this congressional map should be viewed as a pro-Republican gerrymander, but whether these gerrymandering effect rises to the level of a constitutional violation must, of course, be left to legal determination. On the other hand, if I am correct that the compactness of the districts is at a level to show proof of severe outlier status, that in and of itself may be sufficient reason to reject the plan. But of course, that again is entirely a legal question up to the Court to resolve.

NC Senate

My analysis and conclusions for the legislatively proposed NC Senate map are similar to those for legislatively proposed congressional map. In a state that is in recent history one that is nearly evenly divided, this map, too, creates a distribution of voting strength across districts that is very lopsidedly Republican: 24 Republican leaning districts that, based on averaged recent data will, barring a political tsunami, elect Republicans; 17 Democratic leaning districts that will, barring a political tsunami, elect Democrats; and 5 competitive districts. Democrats would have to win nine of the nine competitive seats to win a majority in the Senate.

Second, while the median district again looks a lot like the statewide average, but again with a slight Republican edge, the median is only one district and we must look at the overall map. Here the 4.07% seats bias still suggest a <u>substantial</u> pro-Republican bias in terms of the likelihood that a majority of the voters will be able to win a majority of the seats, even though it is one percentage point or so lower than the comparable statistic in the congressional map, while the 2.00 % vote bias suggests that only a win by considerably more than 50% of the statewide vote can yield the Democrats a majority of the seats. Indeed, on this metric the new NC Senate map is more extreme by nearly a percentage point than the new NC House map. When we compare these levels of partisan bias to the level of partisan bias in the Harper and NCLCV maps we see that each of these two bias measures is at least twice as high in the legislative map as in the alternatives and, even when we look at differences in absolute value rather than ratios, it is still clear that the legislatively proposed congressional map is much more extreme with respect to partisan bias than either of the alternatives.

Third, the compactness level in the Senate map is comparable or higher than that in the alternative Senate maps.

Fourth, there has been a substantial drop in the efficiency gap in the new map as compared to the congressional map found to be unconstitutional. But it remains in a pro-Republican direction.

Because they all point in the same direction, the political effects statistical indicators of partisan gerrymandering argue for the conclusion that this NC Senate map should be viewed as a pro-Republican gerrymander. While, overall, the dilutive effects of this map do not appear quite as severe as in the congressional map they are still still quite substantial. However, I have not had time to analyze how the map may have been manipulated at the level of individual districts in terms of things like city cuts or county transversals. Of course, whether the clear indicators of partisan gerrymandering effects identified in Table 1 and my discussion rise to the level of a constitutional violation requires determination by this Court.

NC State House

My analysis for the legislatively proposed NC House map uses the same approach as for the previously considered maps. In a state that is in recent history one that is nearly evenly divided, this map, too, creates a distribution of voting strength across districts that is very lopsidedly Republican: 54 Republican leaning districts that, based on averaged recent data will, barring a political tsunami, elect Republicans; 43 Democratic leaning districts that will, barring a political tsunami, elect Democrats; and 23 competitive districts. In the House, however, unlike the other maps, the Democrats do not have to win all of the competitive seats to win a majority in the House. Moreover, unlike the other two proposed maps, when we look at the proposed NC House map we see that the competitive seats are substantially Democrat in directionality (9R, 14D). This map is genuinely far more competitive than either of the other two legislatively proposed maps even though (see below) it remains tilted in a pro-Republican direction.

Second, while the median district again looks a lot like the statewide average, but again with a slight Republican edge, the 2.70% seats bias still suggest a <u>substantial</u> pro-Republican bias in terms of the likelihood that a majority of the voters will be able to win a majority of the seats. But the value on this metric is one which is more than one percentage point lower than the comparable statistic in the Senate map, and the 1.29% vote bias in this map is again almost one percentage point lower than the 2.00 value of this metric for the Senate. But arguably quit important in judging the constitutionality of this map in the full context are the facts that: (a) the Harper plaintiffs have not chosen to offer an alternative NC House map but are apparently content to see the legislative map implemented by the Court, (b) the map was passed by a clear bipartisan consensus in the legislature, including members of the legislature who belong to particular minority communities, and (c) that while it still is further from being non-dilutive than the NCLCV House map alternative, it is <u>far</u> closer to Plaintiffs' map than it is to the rejected enacted NC House map.

Third, the compactness level in the Senate map is high relative to the other maps in Table 1, even though the NCLCV House map alternative has an even higher score.

Fourth, there has been a substantial drop in the efficiency gap in the new map as compared to the NC House map found to be unconstitutional. It is at the low level of 2.72 even though it remains in a pro-Republican direction.

I have not had time to analyze how this map may have been manipulated at the level of individual districts in terms of things like city cuts or county transversals or racial fragmentaion. But of the three legislatively proposed maps, for the reasons given above, this is the one that I would feel most comfortable with seeing ordered by the Court. Looking at the totality of the circumstances insofar as these are presently known to me, and recognizing that this map is still not ideal (nor need it be), this legislatively proposed NC House map simply lacks the same clear indicia of egregious bias found in the previously rejected maps and still found, but to a lesser extent than in the rejected maps, in the legislatively proposed maps for Congress and for the NC Senate that I discuss above.

Evaluation of Remedial Plans
Prof. Sam Wang, Princeton University
February 21, 2022

Summary: This report evaluates the likely performance and partisan fairness of remedial plans for North Carolina Congressional, state Senate, and state House maps in the cases of *Harper v. Hall* and *NCLCV v. Hall*. Remedial plans were submitted by the North Carolina General Assembly ("Legislative Defendants"). Harper plaintiffs offered two remedial maps, Congressional and state Senate. The NCLCV plaintiffs also offered a set of three remedial maps. This report finds that all three of the Legislative Defendants' plans favor Republicans in six metrics evaluated: seat partisan asymmetry, mean-median difference, partisan bias, lopsided wins, declination angle, and efficiency gap. The seat partisan asymmetry in 1.7 seats in the Congressional plan, 2.1 seats in the Senate plan, and 7.2 seats in the House plan. The Harper plaintiffs' plans show mixed or no advantage for either party. The NCLCV plaintiffs' plans show a Democratic advantage for the Congressional plan, mixed or no advantage for the Senate plan, and a Republican advantage for the House plan. In no case did the Legislative Defendants' remedial map come closer to partisan symmetry than the plaintiffs' alternative(s).

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About Prof. Wang: Sam Wang is a professor at Princeton University, appointed in neuroscience with affiliation with the Program in Law and Public Affairs. He directs the Electoral Innovation Lab, a policy and research group which uses statistics, science, and law to analyze election systems, and in which capacity he soversee the Princeton Gerrymandering Project (gerrymander.princeton.edu), which provides non-partisan analysis of redistricting plans and reforms. He has published extensively on the subject of redistricting. In particular, he has written in the Stanford Law Review and the Election Law Journal on the subject of practical tests for detecting partisan gerrymandering. In these articles he has analyzed the mean-median difference and introduced a new measure, the lopsided-wins test. These measures fall into a broad category of tests of partisan symmetry, a topic on which he has been cited in two U.S. Supreme Court decisions.

I. INTRODUCTION

This report analyzes the remedial plans offered by parties in the North Carolina redistricting cases *Harper v. Hall* and *NCLCV v. Hall*. Those cases found that North Carolina's new Congressional, state House, and state Senate redistricting plans were illegal partisan gerrymanders in violation of the state constitution. The state Supreme Court has instructed the General Assembly to provide remedial maps for all three plans. The General Assembly provided these remedial maps on Friday, February 18, 2022, two passed on a partisan vote (Congressional and Senate) and one passed on a bipartisan vote (House). At that time the NCLCV plaintiffs also offered a set of three remedial maps. Harper plaintiffs offered two remedial maps, Congressional and state Senate.

I have analyzed these plans to determine their likely partisan performance. I apply statistical measures of partisan fairness to determine the amount of partisan favor that these maps show to either Republicans or Democrats.

Before applying the many tests for partisan fairness, I will briefly review the rationale and interpretations of the various tests.

II. MEASURING PARTISAN FAIRNESS

The broad majority of metrics used by the court to evaluate partisan fairness address the question of whether voters, counted in total within the state, are represented fairly given a particular arrangement of Congressional or legislative districts. These metrics are calculated based on voter behavior in recent elections. Some of the metrics allow a variety of likely future scenarios to be explored empirically.

Because the relationship between voting and representation is complex, it is useful to evaluate multiple metrics. The use of multiple metrics helps guard against the possibility that a particular metric may vary by chance. The use of multiple metrics also guards against the possibility that redistricters might cater to one specific metric, to create the appearance of compliance while maintaining a hidden partisan advantage. I will therefore consider a variety of metrics together, in their totality.

A. Partisan seat asymmetry

An important concept is whether the two parties would have commensurate outcomes if their vote shares were exchanged. The general concept of partisan symmetry has old roots[1]. A particularly simple measure is to ask how many seats each party would win if it attained the same statewide share of the vote; in this report I refer to the difference between the two seat counts as partisan seat asymmetry. Partisan seat asymmetry can also be calculated for a variety of likely swings in voter behavior; in this case, the average amount of asymmetry serves as a straightforward measure of partisan advantage over a range of plausible scenarios.

Another method for evaluating the fairness in the number of seats, given a total statewide vote, is the efficiency gap. The efficiency gap measures how far a pattern of outcomes deviates from expectations for a particular statewide vote, and is therefore a way of quantifying partisan advantage (though not necessarily a bright-line test)[2]. It has been proposed that an efficiency gap of 7 percentage points be used as a threshold to define undue advantage. However, it must be noted that the efficiency gap can jump in value when a single close race is won or lost. Therefore it is helpful to average the efficiency gap across a range of scenarios.

B. The mean-median difference

The mean-median difference is a long-standing measure of what statisticians call skewness[3]. Applied to a district plan, the mean-median difference provides one way of testing whether an unusual pattern of districts is found above or below the statewide average. Such an unusual pattern is one way that an artful redistricting plan can build systematic advantage for one party. The mean-median difference can often help detect undue partisan advantage in a closely divided state such as North Carolina[4].

C. Tests of voter packing

When one side's voters are packed into a few districts to reduce their opportunities to elect representatives, they will be present in unusually large numbers in those districts. A direct way to measure packing is to compare the average vote share of Democratic-leaning and Republican-leaning districts. The party with the larger average win is potentially packed by its opponents in order to dilute

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[1] Gill v. Whitford, 138 S. Ct. 1916, 1933 (2018).(citing Brief of Heather K. Gerken et al. as Amici Curiae Supporting Appellees at 27.

[2] Eric McGhee, *Symposium: The efficiency gap is a measure, not a test.* SCOTUSblog, August 11, 2017. https://www.scotusblog.com/2017/08/symposium-efficiency-gap-measure-not-test/ (last visited on February 21, 2022).

[3] David P. Doane & Lori E. Seward, Measuring Skewness: A Forgotten Statistic?, J. STAT. EDUC., July 2011, at 9-10; Karl Pearson, Contributions to the Mathematical Theory of Evolution—1: Skew Variation in Homogeneous Material, PHIL.TRANSACTIONS ROYAL SOC'Y, 1895, at 343, 374-76.

[4] Samuel S.-H. Wang, Three Tests for Practical Evaluation of Partisan Gerrymandering, 68 STAN. L. REV. 1263, 1263–1321 (2016); Michael D. McDonald & Robin E. Best, Unfair Partisan Gerrymanders in Politics and Law1: A Diagnostic Applied to Six Cases, 14 ELECTION L.J. 312, 312 (2015).

voting power. The concept of comparing averages dates to the foundations of statistics[5], and when applied to redistricting such a comparison is called the "lopsided-wins test".

A more recent measure of packing is the declination, a measure that can be read from a graph visually. Declination takes advantage of the fact that a pattern of packing induces an elbow-like shape in the graph. The amount of bend in the elbow defines the declination. Declination also makes use of the number of districts won by each party. the larger the declination, the more voters are packed into a small number of districts.

III. ELECTION DATA AND ANALYSIS METHODS

I estimated the likely performance of Congressional, Senate, and House maps in two ways. First, I evaluated vote totals in the proposed districts using ten statewide elections from 2014 to 2020. Second, I allowed the vote totals to vary above and below an average of these elections, as a means of evaluating a range of future scenarios that may arise in the coming decade. After these two steps, I then evaluated a variety of measures of partisan symmetry.

I used datasets for the following elections:

- President: 2016, 2020
- Senate: 2014, 2016, 2020
- Governor: 2016, 2020
- Lieutenant Governor: 2016, 2020
- Attorney General: 2016, 2020

In these elections, the two-party vote share ranged between 46.7% and 52.3% for Democrats, and between 47.7% and 53.3% for Republicans.

In addition, I used a composite ("2016-2020 Composite") that is averaged with equal weights from three components: (1) the average of President 2016 and 2020, (2) the average of Senate 2016 and 2020, and (3) the average of Governor and Attorney General 2020. In the 2016-2020 Composite, the two-party vote share was 49.0% for Democrats and 51.0% for Republicans.

IV. EVALUATION OF CONGRESSIONAL REMEDIAL PLANS

A. Legislative Defendants' Plan

As an example of how the analysis is done, **Exhibit 1** shows calculations for the Legislative Defendants' plan in district-by-district form, using the 2016-2020 Composite. The plan is also evaluated according to the 10 individual election datasets (**Exhibit 2**).

[5] Rigorous methods for comparing averages were first developed for controlling the quality of ingredients in the production of Guinness beer. The "Student t test" was devised by a master brewer, William Sealy Gossett, working pseudonymously to protect the trade secret. S.L. Zabell, "On Student's 1908 Article 'The Probable Error of a Mean'", 103 JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION 1.

For all 10 election datasets evaluated, the projected outcome for the Legislative Defendants' map was always between 4 and 8 Democratic seats, and between 6 and 10 Republican seats. The average outcome for the 10 election datasets was 5.3 Democratic seats and 8.7 Republican seats.

Exhibit 1: A fairness "dashboard" for the Legislative Defendants' remedial Congressional plan. Pink shading indicates Republican advantage, and blue shading indicates Democratic advantage.

LEGISLATIVE DEFENDANTS' CONGRESSIONAL PLAN

District	D share	R share	Margin (%)
1	54.7%	45.3%	9.5
2	64.8%	35.2%	29.7
3	38.7%	61.3%	-22.5
4	67.5%	32.5%	35.1
5	44.2%	55.8%	-11.6
6	50.6%	49.4%	1.2
7	50.6%	49.4%	1.1
8	42.0%	58.0%	-16.0
9	38.7%	61.3%	-22.6
10	29.5%	70.5%	-40.9
11	44.9%	55.1%	-10.2
12	67.4%	32.6%	34.8
13	48.5%	51.5%	-2.9
14	48.9%	51.1%	-2.2
		-1.3	average margin

DISTRICT RATINGS	
6	D favored
8	R favored
4	competitive within 7 points
PROBABILISTIC OUTCOME	
5.8	Expected D wins
8.2	Expected R wins

LOPSIDED WINS	
59.3	Average D win voteshare (%)
58.1	Average R win voteshare (%)
1.2	R advantage

PARTISAN ASYMMETRY	
6.3	D seats in 50-50 election
7.7	R seats in 50-50 election
1.4	R seat advantage
2.4	average R seat advantage

MEAN-MEDIAN DIFFERENCE	
-1.26%	mean D-R (margin %)
-2.58%	median D-R (margin %)
0.7%	R advantage (vote %)

DECLINATION	
11.4	R advantage

EFFICIENCY GAP	
7.4%	R advantage (averaged)

Exhibit 2: Evaluation of the Legislative Defendants' remedial Congressional plan using data from ten elections.

	Lt. Gov. 2016	Senator 2016	President 2016	Lt. Gov. 2020	Senator 2020	Senator 2014	President 2020	Attorney Gen 2020	Attorney Gen 2016	Governor 2020	10-election average	2016-2020 composite
Democratic vote share (two-party)	46.7%	47.0%	48.1%	48.3%	49.1%	49.2%	49.3%	50.1%	50.3%	52.3%	49.0%	49.3%
Democratic seats	4	4	4	4	6	6	5	6	6	8	5.3	6
Republican seats	10	10	10	10	8	8	9	8	8	6	8.7	8
Partisan seat asymmetry	1	2	3	2	0	2	1	2	2	2	1.7	2
Mean-median difference	2.7%	2.1%	1.3%	0.3%	0.7%	2.1%	-0.1%	0.3%	2.2%	0.1%	1.2%	0.7%
Partisan bias	3.2%	4.1%	5.4%	4.8%	5.0%	5.2%	5.2%	5.1%	5.7%	4.5%	4.8%	5.2%
Lopsided wins difference	2.6%	4.2%	10.3%	10.4%	0.9%	0.6%	7.8%	5.2%	5.3%	4.2%	5.1%	2.4%
Declination angle (degrees)	28.5	30.5	37.3	37.9	9.1	8.5	27.0	15.7	15.9	-1.0	20.9	11.4
Efficiency gap	14.4%	14.1%	11.3%	10.0%	7.5%	8.3%	5.6%	2.4%	4.3%	-9.5%	6.8%	7.4%

Pink shading indicates a Republican advantage. Blue indicates a Democratic advantage.
The efficiency gap for the 2016-2020 composite is averaged over a range of possibilities within 7 points of the composite.

1. Partisan seat asymmetry

I calculated the partisan seat asymmetry, i.e. the difference in seat breakdown that would result if the two parties traded total vote shares. I did this by creating a counterfactual in which I added a fixed percentage to the vote share in all districts, an assumption called "uniform swing.' In 9 out of 10 cases[6], Republicans won more seats than the Democrats with the same vote share. For example, using the Governor 2020 race, Democrats win 52.3% of the vote and get 8 out of 14 districts. In my counterfactual, if Republicans win 52.3% of the vote, they would get 10 out of 14 districts. The difference between 10 and 8 is 2 - in other words, this plan has 2-seat partisan seat asymmetry.

Averaging across all 10 elections, the advantage was 1.7 more seats for Republicans, or 12% of the 14-seat Congressional delegation.

To test the robustness of this finding, I re-calculated the partisan seat asymmetry by taking the 2016-2020 composite and adding uniform swings to create scenarios in which Democrats and Republicans win an additional margin up to 7 points on top of their performance in the 2016-2020 composite. In each of these scenarios, I then calculated the partisan seat asymmetry as previously described. Averaging across these scenarios, the partisan seat asymmetry was again 1.7 seats favoring Republicans.

To summarize the partisan seat asymmetry analysis: The Legislative Defendants' remedial plan contains an average advantage of approximately 1.7 Congressional seats for Republicans, and this advantage persists across a wide range of likely scenarios that may arise.

2. Metrics of partisan fairness

I then calculated five metrics that are used to test for partisan advantage: (a) the mean-median difference, (b) partisan bias, (c) lopsided wins, (d) the efficiency gap, and (e) the declination. I found that for all five tests, the metric showed an advantage for Republicans.

Across 10 elections, the average mean-median difference was 1.2% favoring Republicans.

I calculated the efficiency gap for a variety of scenarios, in the same way that I calculated partisan seat asymmetry: I added uniform swings to create scenarios in which Democrats and Republicans win an additional margin up to 7 points on top of their performance in the 2016-2020 composite. Under these assumptions, the average efficiency gap was 6.8% favoring Republicans. In six out of 10 election datasets, the efficiency gap was greater than 7%.

B. Comparisons with the Harper and NCLCV Plans

To compare the Legislative Defendants' plan with two other Congressional plans offered by the Harper plaintiffs and the North Carolina League of Conservation Voters (NCLCV), I evaluated all three plans using the 2016-2020 Composite. This Composite has two advantages: it is close to 50% for each party

[6] The only case where there was no asymmetry was Senator 2020.

(favoring Republicans slightly), and it averages out effects that may be peculiar to a specific election or type of office.

The results are shown below in **Exhibit 3**.

Exhibit 3: Comparison of Legislative Defendants' Congressional Plan, the Harper plaintiffs' plan, and the NCLCV's plan.

	Legislative Defendants	Harper plaintiffs	NCLCV
Statewide Democratic vote share (2016-2020 composite)	49.3%	49.3%	49.3%
Estimated performance:			
Democratic-favored seats	6	7	8
Republican-favored seats	8	7	6
minimum Democratic seats	4	5	4
maximum Democratic seats	8`	8	8
Asymmetry measures (positive = Republican advantage):			
Seat partisan asymmetry	1.7 seats	0.2 seats	-0.6 seats
Technical metrics:			
Mean-median difference	0.7%	0.1%	-1.7%
Partisan bias	5.2%	1.0%	-0.4%
Lopsided wins difference	2.4%	-2.3%	-9.9%
Declination angle	11.4°	-3.1°	-18.6°
Efficiency gap	7.4%	1.1%	-0.5%
Color key:			
Democratic advantage	Republican advantage		

First, it should be noted that the Legislative Defendants' plan has 6 Democratic-favored districts, the Harper plaintiffs' plan has 7 Democratic-favored districts, and the NCLCV plan has 8 Democratic-favored districts. However, such an estimate does not capture the full complexity of the pattern of districts as constructed in each plan. For this reason it is helpful to evaluate the other measures. The Legislative Defendants' plan shows favor to Republicans in all six measures tested. The NCLCV plan shows favor to Democrats in all six measures.

The Harper plaintiffs' plan shows no clear pattern of advantages to either party. The metrics for the Harper plain are generally close to zero, including seat partisan asymmetry of 0.2 seat, a mean-median difference of 0.1%, and an efficiency gap of 1.1%. The smallness and mixed nature of these metrics indicates that the Harper plaintiffs' plan is balanced in a way that gives special favor to neither Democrats or Republicans.

Dashboards for the Harper and NCLCV plaintiffs' plans are given in **Exhbits 4 and 5**.

Exhibit 4: Fairness dashboard for the Harper plaintiffs' Congressional plan.

HARPER PLAINTIFFS' CONGRESSIONAL PLAN

District	D share	R share	Margin (%)
1	54.6%	45.4%	9.2
2	63.9%	36.1%	27.9
3	38.5%	61.5%	-23.0
4	67.1%	32.9%	34.1
5	34.9%	65.1%	-30.2
6	61.0%	39.0%	22.0
7	42.7%	57.3%	-14.5
8	31.8%	68.2%	-36.3
9	48.3%	51.7%	-3.5
10	32.7%	67.3%	-34.6
11	44.9%	55.1%	-10.2
12	68.6%	31.4%	37.2
13	52.5%	47.5%	5.1
14	50.5%	49.5%	1.0
		-1.1	average margin

DISTRICT RATINGS	
7	D favored
7	R favored
3	competitive within 7 points
PROBABILISTIC OUTCOME	
6.7	Expected D wins
7.3	Expected R wins

LOPSIDED WINS	
59.7	Average D win voteshare (%)
60.9	Average R win voteshare (%)
-1.1	D advantage

PARTISAN ASYMMETRY	
6.9	D seats in 50-50 election
7.1	R seats in 50-50 election
0.2	R seat advantage
0.8	average R seat advantage

MEAN-MEDIAN DIFFERENCE	
-1.14%	mean D-R (margin %)
-1.23%	median D-R (margin %)
0.05%	R advantage (vote %)

DECLINATION	
-3.1	D advantage

EFFICIENCY GAP	
1.1%	R advantage (averaged)

Exhibit 5: Fairness dashboard for the NCLCV plaintiffs' Congressional plan.

NCLCV PLAINTIFFS' CONGRESSIONAL PLAN

District	D share	R share	Margin (%)
1	46.2%	53.8%	-7.7
2	51.9%	48.1%	3.7
3	40.3%	59.7%	-19.3
4	51.8%	48.2%	3.6
5	65.0%	35.0%	29.9
6	64.0%	36.0%	28.0
7	50.5%	49.5%	0.9
8	32.3%	67.7%	-35.4
9	66.7%	33.3%	33.4
10	52.4%	47.6%	4.9
11	53.9%	46.1%	7.7
12	40.4%	59.6%	-19.1
13	32.3%	67.7%	-35.5
14	44.9%	55.1%	-10.2
		-1.1	average margin

DISTRICT RATINGS	
8	D favored
6	R favored
4	competitive within 7 points
PROBABILISTIC OUTCOME	
7.1	Expected D wins
6.9	Expected R wins

LOPSIDED WINS	
57.0	Average D win voteshare (%)
60.6	Average R win voteshare (%)
-3.6	D advantage

PARTISAN ASYMMETRY	
7.4	D seats in 50-50 election
6.6	R seats in 50-50 election
-0.8	D seat advantage
-0.6	average D seat advantage

MEAN-MEDIAN DIFFERENCE	
-1.08%	mean D-R (margin %)
2.24%	median D-R (margin %)
-1.66%	D advantage (vote %)

DECLINATION	
-18.6	D advantage

EFFICIENCY GAP	
-0.5%	D advantage (averaged)

V. EVALUATION OF STATE SENATE REMEDIAL PLANS

A. The Legislative Defendants' remedial plan

A comparison of metrics for the Legislative Defendants' remedial Senate plan, as well as the Harper plaintiffs' and NCLVL plaintiffs' proposed plans, are shown in **Exhibit 6**. Individual dashboards for the three plans are shown in **Exhibits 7, 8, and 9**.

The Legislative Defendants' plan favors 22 Democrats and 28 Republicans as scored according to the 2016-2020 election composite (**Exhibit 6**). The range of likely outcomes is 19 to 26 Senate seats for Democrats, and 24 to 31 Senate seats for Republicans. The seat partisan asymmetry is a 2.1-seat difference in favor of Republicans. All of the five other metrics also favor Republicans. This plan contains 7 competitive races, as defined as margins of 7 percentage points or smaller (**Exhibit 7**).

A. The Harper plaintiffs' and NCLCV plaintiffs' plans

The Harper plaintiffs' plan favors 22 Democrats and 28 Republicans. The range of likely outcomes is 21 to 28 Senate seats for Democrats, and 22 to 29 Senate seats for Republicans. The seat partisan asymmetry is a 1.3-seat difference in favor of Democrats. The five other metrics are of mixed effect, showing no clear advantage. This plan contains 7 competitive races (**Exhibit 8**).

The NCLCV plaintiffs' plan favors 24 Democrats and 26 Republicans. The range of likely outcomes is 19 to 28 Senate seats for Democrats, and 22 to 31 Senate seats for Republicans. The seat partisan asymmetry is a 1.3-seat difference in favor of Democrats. The five other metrics are of mixed effect, showing no clear advantage. This plan contains 9 competitive races (**Exhibit 9**).

Exhibit 6: Comparison of state Senate plans.

	Legislative Defendants	Harper plaintiffs	NCLCV
Statewide Democratic vote share (2016-2020 composite)	49.3%	49.3%	49.3%
Estimated performance:			
Democratic-favored seats	22	22	24
Republican-favored seats	28	28	26
minimum Democratic seats	19	21	19
maximum Democratic seats	26	28	28
competitive races (margin <7 points)	7	7	9
Asymmetry measures (positive = Republican advantage):			
Seat partisan asymmetry	2.1 seats	1.3 seats	1.3 seats
Technical metrics:			
Mean-median difference	0.8%	-0.1%	-0.1%
Partisan bias	4.2%	1.1%	1.6%
Lopsided wins difference	4.0%	3.5%	0.0%
Declination angle	11.4°	11.1°	2.3°
Efficiency gap	2.2%	-0.9%	-0.9%

Color key:	
Democratic advantage	Republican advantage

Exhibit 7: Fairness dashboard for the Legislative Defendants' state Senate remedial plan.

LEGISLATIVE DEFENDANTS' SENATE PLAN

District	D share	R share	Margin (%)
1	38.7%	61.3%	-22.5
2	42.2%	57.8%	-15.6
3	53.5%	46.5%	7.1
4	48.0%	52.0%	-3.9
5	57.2%	42.8%	14.4
6	34.6%	65.4%	-30.9
7	49.4%	50.6%	-1.2
8	39.8%	60.2%	-20.3
9	40.1%	59.9%	-19.8
10	37.8%	62.2%	-24.3
11	51.2%	48.8%	2.4
12	40.6%	59.4%	-18.9
13	63.7%	36.3%	27.4
14	71.9%	28.1%	43.7
15	67.6%	32.4%	35.2
16	65.0%	35.0%	30.1
17	50.9%	49.1%	1.8
18	51.2%	48.8%	2.4
19	55.7%	44.3%	11.3
20	72.3%	27.7%	44.5
21	49.7%	50.3%	-0.7
22	79.1%	20.9%	58.2
23	66.1%	33.9%	32.1
24	49.5%	50.5%	-1.0
25	40.7%	59.3%	-18.5
26	42.7%	57.3%	-14.5
27	57.1%	42.9%	14.2
28	75.8%	24.2%	51.5
29	33.2%	66.8%	-33.5
30	27.3%	72.7%	-45.4
31	44.6%	55.4%	-10.7
32	59.9%	40.1%	19.9
33	30.7%	69.3%	-38.6
34	44.8%	55.2%	-10.4
35	37.0%	63.0%	-25.9
36	23.8%	76.2%	-52.5
37	34.8%	65.2%	-30.4
38	80.1%	19.9%	60.3
39	64.8%	35.2%	29.6
40	70.5%	29.5%	41.0
41	67.6%	32.4%	35.1
42	54.6%	45.4%	9.1
43	37.4%	62.6%	-25.3
44	30.5%	69.5%	-39.0
45	30.0%	70.0%	-40.0
46	38.6%	61.4%	-22.7
47	36.8%	63.2%	-26.4
48	35.8%	64.2%	-28.3
49	63.2%	36.8%	26.3
50	36.2%	63.8%	-27.6

DISTRICT RATINGS	
22	D favored
28	R favored
7	competitive within 7 points
PROBABILISTIC OUTCOME	
22.5	Expected D wins
27.5	Expected R wins

LOPSIDED WINS	
63.6	Average D win voteshare (%)
61.6	Average R win voteshare (%)
2.0	R advantage

PARTISAN ASYMMETRY	
23.2	D seats for 50-50 vote
26.8	R seats for 50-50 vote
3.7	R seat advantage
2.1	average R seat advantage

MEAN-MEDIAN DIFFERENCE	
-1.0%	mean D-R (margin %)
-2.6%	median D-R (margin %)
0.8%	R advantage (vote %)

DECLINATION (angle, in degrees)	
11.4	R advantage

EFFICIENCY GAP	
2.2%	R advantage

Exhibit 8: Fairness dashboard for the Harper plaintiffs' state Senate plan.

HARPER PLAINTIFFS' SENATE PLAN

District	D share	R share	Margin (%)
1	38.7%	61.3%	-22.5
2	42.2%	57.8%	-15.6
3	53.5%	46.5%	7.1
4	48.0%	52.0%	-3.9
5	57.2%	42.8%	14.4
6	34.6%	65.4%	-30.9
7	49.6%	50.4%	-0.9
8	40.0%	60.0%	-20.0
9	40.1%	59.9%	-19.8
10	37.8%	62.2%	-24.3
11	51.2%	48.8%	2.4
12	40.6%	59.4%	-18.9
13	59.0%	41.0%	17.9
14	66.3%	33.7%	32.5
15	55.9%	44.1%	11.9
16	77.7%	22.3%	55.4
17	58.3%	41.7%	16.6
18	54.2%	45.8%	8.4
19	55.6%	44.4%	11.1
20	78.7%	21.3%	57.3
21	49.6%	50.4%	-0.7
22	72.8%	27.2%	45.6
23	66.1%	33.9%	32.1
24	49.5%	50.5%	-1.0
25	41.8%	58.2%	-16.4
26	49.1%	50.9%	-1.7
27	56.5%	43.5%	13.0
28	67.3%	32.7%	34.6
29	33.0%	67.0%	-33.9
30	27.3%	72.7%	-45.4
31	49.7%	50.3%	-0.5
32	56.2%	43.8%	12.3
33	30.7%	69.3%	-38.6
34	44.8%	55.2%	-10.4
35	36.2%	63.8%	-27.6
36	24.1%	75.9%	-51.8
37	35.2%	64.8%	-29.6
38	80.5%	19.5%	61.0
39	61.3%	38.7%	22.6
40	69.2%	30.8%	38.4
41	67.5%	32.5%	35.1
42	57.9%	42.1%	15.7
43	38.4%	61.6%	-23.1
44	31.1%	68.9%	-37.8
45	30.1%	69.9%	-39.7
46	28.2%	71.8%	-43.6
47	37.0%	63.0%	-26.0
48	46.0%	54.0%	-8.0
49	60.2%	39.8%	20.5
50	35.6%	64.4%	-28.8

DISTRICT RATINGS	
22	D favored
28	R favored
7	competitive within 7 points
PROBABILISTIC OUTCOME	
23.8	Expected D wins
26.2	Expected R wins

LOPSIDED WINS	
62.9	Average D win voteshare (%)
61.1	Average R win voteshare (%)
1.8	R advantage

PARTISAN ASYMMETRY	
24.6	D seats for 50-50 vote
25.4	R seats for 50-50 vote
0.8	R seat advantage
-1.3	average D seat advantage

MEAN-MEDIAN DIFFERENCE	
-1.1%	mean D-R (margin %)
-1.0%	median D-R (margin %)
-0.1%	D advantage (vote %)

DECLINATION (angle, in degrees)	
11.1	R advantage

EFFICIENCY GAP	
-0.9%	D advantage

Exhibit 9: Fairness dashboard for the NCLCV plaintiffs' state Senate plan.

NCLCV PLAINTIFFS' SENATE PLAN

District	D share	R share	Margin (%)
1	53.5%	46.5%	7.1
2	38.7%	61.3%	-22.5
3	42.2%	57.8%	-15.6
4	48.0%	52.0%	-3.9
5	57.2%	42.8%	14.4
6	34.6%	65.4%	-30.9
7	51.9%	48.1%	3.8
8	38.4%	61.6%	-23.3
9	40.1%	59.9%	-19.8
10	37.8%	62.2%	-24.3
11	51.2%	48.8%	2.4
12	40.6%	59.4%	-18.9
13	51.0%	49.0%	1.9
14	73.1%	26.9%	46.1
15	65.3%	34.7%	30.5
16	64.5%	35.5%	29.0
17	52.0%	48.0%	3.9
18	65.5%	34.5%	31.1
19	66.5%	33.5%	32.9
20	72.0%	28.0%	44.0
21	39.9%	60.1%	-20.2
22	79.6%	20.4%	59.2
23	66.1%	33.9%	32.1
24	49.5%	50.5%	-1.0
25	40.5%	59.5%	-19.1
26	51.4%	48.6%	2.8
27	59.0%	41.0%	17.9
28	62.6%	37.4%	25.2
29	33.4%	66.6%	-33.2
30	27.3%	72.7%	-45.4
31	49.3%	50.7%	-1.4
32	57.6%	42.4%	15.1
33	30.7%	69.3%	-38.6
34	44.8%	55.2%	-10.3
35	37.0%	63.0%	-25.9
36	24.1%	75.9%	-51.8
37	36.6%	63.4%	-26.9
38	66.6%	33.4%	33.1
39	73.1%	26.9%	46.3
40	72.5%	27.5%	45.0
41	54.4%	45.6%	8.9
42	68.8%	31.2%	37.6
43	38.2%	61.8%	-23.7
44	31.1%	68.9%	-37.8
45	29.7%	70.3%	-40.6
46	28.5%	71.5%	-42.9
47	36.8%	63.2%	-26.3
48	49.7%	50.3%	-0.7
49	56.6%	43.4%	13.3
50	36.4%	63.6%	-27.2

DISTRICT RATINGS	
24	D favored
26	R favored
9	competitive within 7 points
PROBABILISTIC OUTCOME	
24.1	Expected D wins
25.9	Expected R wins

LOPSIDED WINS	
62.2	Average D win voteshare (%)
62.2	Average R win voteshare (%)
0.0	R advantage

PARTISAN ASYMMETRY	
24.8	D seats for 50-50 vote
25.2	R seats for 50-50 vote
0.5	R seat advantage
-1.3	average D seat advantage

MEAN-MEDIAN DIFFERENCE	
-1.0%	mean D-R (margin %)
-0.8%	median D-R (margin %)
-0.1%	D advantage (vote %)

DECLINATION (angle, in degrees)	
2.3	R advantage

EFFICIENCY GAP	
-0.9%	D advantage

Exhibit 10: Comparison of state House plans.

	Legislative Defendants	NCLCV
Democratic vote share (two-party)	49.3%	49.3%
Democratic-majority seats	57	58
Republican-majority seats	63	62
minimum Democratic seats	47	51
maximum Democratic seats	64	65
Seat partisan asymmetry	7.2	4.1
Mean-median difference	0.9%	1.1%
Partisan bias	2.7%	1.7%
Lopsided wins difference	7.1%	3.5%
Declination angle (degrees)	4.5	2.7
Efficiency gap	3.0%	1.6%

Color key:

Democratic advantage	Republican advantage

Exhibit 11: Fairness dashboard for the Legislative defendants' state House plan.

LEGISLATIVE DEFENDANTS' REMEDIAL HOUSE PLAN

District	D %	R %	Margin (%)
1	38.0%	62.0%	-23.9
2	55.9%	44.1%	11.8
3	40.4%	59.6%	-19.2
4	40.6%	59.4%	-18.7
5	51.1%	48.9%	2.2
6	43.4%	56.6%	-13.2
7	43.8%	56.2%	-12.4
8	58.2%	41.8%	16.3
9	51.4%	48.6%	2.8
10	46.2%	53.8%	-7.7
11	66.1%	33.9%	32.2
12	47.3%	52.7%	-5.4
13	30.7%	69.3%	-38.6
14	37.1%	62.9%	-25.7
15	35.8%	64.2%	-28.4
16	33.0%	67.0%	-34.0
17	39.1%	60.9%	-21.7
18	55.1%	44.9%	10.2
19	38.9%	61.1%	-22.1
20	49.5%	50.5%	-1.1
21	66.7%	33.3%	33.4
22	42.2%	57.8%	-15.7
23	60.7%	39.3%	21.4
24	51.8%	48.2%	3.6
25	52.0%	48.0%	4.0
26	42.2%	57.8%	-15.6
27	63.1%	36.9%	26.2
28	33.8%	66.2%	-32.4
29	83.8%	16.2%	67.5
30	85.6%	14.4%	71.2
31	81.2%	18.8%	62.4
32	57.3%	42.7%	14.6
33	62.8%	37.2%	25.6
34	62.0%	38.0%	24.1
35	51.1%	48.9%	2.2
36	56.2%	43.8%	12.4
37	47.3%	52.7%	-5.4
38	85.4%	14.6%	70.9
39	61.2%	38.8%	22.4
40	54.7%	45.3%	9.4
41	63.1%	36.9%	26.3
42	71.2%	28.8%	42.3
43	49.6%	50.4%	-0.8

DISTRICT RATINGS	
57	D favored
63	R favored
17	competitive within 7 points
PROBABILISTIC OUTCOME	
55.9	Expected D wins
64.1	Expected R wins

LOPSIDED WINS	
64.0	Average D win voteshare (%)
63.2	Average R win voteshare (%)
0.8	R advantage (%)

PARTISAN ASYMMETRY	
56.7	D seats in 50-50 election
63.3	R seats in 50-50 election
4.0	R seat advantage
7.2	average R seat advantage

MEAN-MEDIAN DIFFERENCE	
-0.6%	mean D-R margin (%)
-2.4%	median D-R margin (%)
0.9%	R advantage

DECLINATION ANGLE (degrees)	
4.5	R advantage

EFFICIENCY GAP	
3.1%	R advantage (averaged)

44	62.3%	37.7%	24.6
45	57.4%	42.6%	14.8
46	37.9%	62.1%	-24.1
47	49.1%	50.9%	-1.9
48	54.6%	45.4%	9.2
49	67.7%	32.3%	35.3
50	57.5%	42.5%	15.1
51	40.7%	59.3%	-18.6
52	43.5%	56.5%	-13.0
53	35.2%	64.8%	-29.6
54	53.8%	46.2%	7.6
55	41.6%	58.4%	-16.7
56	85.9%	14.1%	71.8
57	57.6%	42.4%	15.2
58	73.0%	27.0%	46.0
59	50.3%	49.7%	0.7
60	62.3%	37.7%	24.6
61	80.7%	19.3%	61.4
62	50.3%	49.7%	0.6
63	52.2%	47.8%	4.5
64	40.5%	59.5%	-18.9
65	35.8%	64.2%	-28.5
66	70.7%	29.3%	41.4
67	28.9%	71.1%	-42.3
68	38.3%	61.7%	-23.5
69	34.8%	65.2%	-30.4
70	24.6%	75.4%	-50.9
71	71.0%	29.0%	42.1
72	75.2%	24.8%	50.5
73	50.9%	49.1%	1.9
74	47.5%	52.5%	-4.9
75	44.4%	55.6%	-11.1
76	39.2%	60.8%	-21.6
77	24.7%	75.3%	-50.6
78	26.3%	73.7%	-47.5
79	38.7%	61.3%	-22.6
80	25.6%	74.4%	-48.8
81	28.9%	71.1%	-42.2
82	46.2%	53.8%	-7.6
83	25.9%	74.1%	-48.2
84	33.9%	66.1%	-32.2
85	27.6%	72.4%	-44.8
86	31.5%	68.5%	-37.0
87	27.2%	72.8%	-45.5
88	69.5%	30.5%	39.0
89	26.0%	74.0%	-48.0
90	24.9%	75.1%	-50.1

91	30.9%	69.1%	-38.3
92	69.3%	30.7%	38.6
93	42.9%	57.1%	-14.2
94	24.0%	76.0%	-52.1
95	34.5%	65.5%	-30.9
96	37.1%	62.9%	-25.7
97	27.5%	72.5%	-45.0
98	48.6%	51.4%	-2.8
99	84.1%	15.9%	68.2
100	75.9%	24.1%	51.8
101	76.6%	23.4%	53.2
102	78.9%	21.1%	57.8
103	51.1%	48.9%	2.3
104	54.3%	45.7%	8.6
105	55.9%	44.1%	11.8
106	69.0%	31.0%	38.0
107	82.3%	17.7%	64.5
108	32.9%	67.1%	-34.3
109	40.8%	59.2%	-18.5
110	33.3%	66.7%	-33.5
111	31.2%	68.8%	-37.7
112	61.2%	38.8%	22.5
113	34.3%	65.7%	-31.4
114	65.7%	34.3%	31.3
115	55.1%	44.9%	10.2
116	59.3%	40.7%	18.6
117	40.4%	59.6%	-19.2
118	38.5%	61.5%	-22.9
119	43.9%	56.1%	-12.1
120	27.0%	73.0%	-46.1

Exhibit 12: Fairness dashboard for the NCLCV plaintiffs' state House plan.

NCLCV PLAINTIFFS' HOUSE PLAN

District	D %	R %	Margin (%)
1	40.9%	59.1%	-18.3
2	58.1%	41.9%	16.2
3	40.4%	59.6%	-19.2
4	35.5%	64.5%	-29.0
5	51.1%	48.9%	2.2
6	41.9%	58.1%	-16.3
7	43.9%	56.1%	-12.3
8	55.8%	44.2%	11.5
9	53.6%	46.4%	7.3
10	51.8%	48.2%	3.7
11	66.2%	33.8%	32.4
12	47.3%	52.7%	-5.4
13	30.7%	69.3%	-38.6
14	29.3%	70.7%	-41.4
15	49.3%	50.7%	-1.4
16	32.7%	67.3%	-34.6
17	52.3%	47.7%	4.6
18	55.3%	44.7%	10.6
19	35.0%	65.0%	-30.0
20	41.9%	58.1%	-16.2
21	54.2%	45.8%	8.3
22	42.2%	57.8%	-15.7
23	60.7%	39.3%	21.4
24	51.9%	48.1%	3.9
25	51.9%	48.1%	3.8
26	43.8%	56.2%	-12.4
27	63.1%	36.9%	26.2
28	35.0%	65.0%	-29.9
29	84.2%	15.8%	68.4
30	82.0%	18.0%	64.0
31	80.9%	19.1%	61.7
32	57.3%	42.7%	14.6
33	84.7%	15.3%	69.4
34	63.5%	36.5%	27.0
35	50.6%	49.4%	1.1
36	59.4%	40.6%	18.8
37	47.5%	52.5%	-5.0
38	65.7%	34.3%	31.4
39	59.7%	40.3%	19.4
40	69.8%	30.2%	39.7
41	66.6%	33.4%	33.2
42	54.8%	45.2%	9.6
43	53.7%	46.3%	7.4

DISTRICT RATINGS	
58	D favored
62	R favored
14	competitive within 7 points
PROBABILISTIC OUTCOME	
57.3	Expected D wins
62.7	Expected R wins

LOPSIDED WINS	
63.9	Average D win voteshare (%)
63.5	Average R win voteshare (%)
0.4	R advantage (%)

PARTISAN ASYMMETRY	
57.8	D seats in 50-50 election
62.2	R seats in 50-50 election
4.0	R seat advantage
4.1	average R seat advantage

MEAN-MEDIAN DIFFERENCE	
-0.5%	mean D-R margin (%)
-2.8%	median D-R margin (%)
1.1%	R advantage

DECLINATION ANGLE (degrees)	
2.7	R advantage

EFFICIENCY GAP	
1.9%	R advantage (averaged)

44	72.4%	27.6%	44.9
45	60.5%	39.5%	20.9
46	40.0%	60.0%	-20.0
47	46.8%	53.2%	-6.4
48	54.6%	45.4%	9.2
49	65.3%	34.7%	30.5
50	56.7%	43.3%	13.3
51	34.9%	65.1%	-30.2
52	41.3%	58.7%	-17.3
53	33.0%	67.0%	-33.9
54	58.0%	42.0%	16.1
55	43.0%	57.0%	-14.0
56	85.8%	14.2%	71.6
57	65.6%	34.4%	31.3
58	65.8%	34.2%	31.7
59	54.7%	45.3%	9.3
60	58.1%	41.9%	16.1
61	80.8%	19.2%	61.7
62	49.0%	51.0%	-2.0
63	54.2%	45.8%	8.3
64	39.2%	60.8%	-21.5
65	35.8%	64.2%	-28.5
66	63.6%	36.4%	27.2
67	28.9%	71.1%	-42.3
68	36.6%	63.4%	-26.7
69	35.2%	64.8%	-29.6
70	24.3%	75.7%	-51.4
71	69.7%	30.3%	39.4
72	74.0%	26.0%	48.1
73	44.3%	55.7%	-11.4
74	47.4%	52.6%	-5.2
75	42.6%	57.4%	-14.7
76	39.2%	60.8%	-21.6
77	24.7%	75.3%	-50.6
78	26.5%	73.5%	-47.0
79	36.0%	64.0%	-28.1
80	28.0%	72.0%	-44.1
81	26.4%	73.6%	-47.1
82	41.7%	58.3%	-16.5
83	35.2%	64.8%	-29.5
84	33.6%	66.4%	-32.8
85	27.7%	72.3%	-44.7
86	31.5%	68.5%	-37.0
87	26.6%	73.4%	-46.8
88	75.0%	25.0%	49.9
89	27.5%	72.5%	-45.0
90	24.8%	75.2%	-50.4

91	35.0%	65.0%	-30.0
92	69.5%	30.5%	39.0
93	43.0%	57.0%	-14.0
94	24.1%	75.9%	-51.8
95	34.3%	65.7%	-31.4
96	36.1%	63.9%	-27.9
97	27.5%	72.5%	-45.0
98	48.2%	51.8%	-3.5
99	59.9%	40.1%	19.9
100	69.1%	30.9%	38.2
101	75.0%	25.0%	50.0
102	80.5%	19.5%	61.1
103	50.7%	49.3%	1.4
104	56.9%	43.1%	13.7
105	57.1%	42.9%	14.2
106	83.1%	16.9%	66.2
107	76.3%	23.7%	52.7
108	32.7%	67.3%	-34.6
109	43.2%	56.8%	-13.6
110	31.5%	68.5%	-37.1
111	32.7%	67.3%	-34.7
112	75.6%	24.4%	51.2
113	33.1%	66.9%	-33.8
114	62.5%	37.5%	25.0
115	61.0%	39.0%	21.9
116	56.7%	43.3%	13.5
117	41.1%	58.9%	-17.8
118	38.5%	61.5%	-22.9
119	43.9%	56.1%	-12.1
120	27.0%	73.0%	-46.1

VIII. CONCLUSIONS

All three of the Legislative Defendants' plans favor Republicans in six metrics evaluated. The Harper plaintiffs' plans show mixed or no advantage for either party. The NCLCV plaintiffs' plans show a Democratic advantage for the Congressional plan, mixed or no advantage for the Senate plan, and a Republican advantage for the House plan. In each case, the plaintiffs' alternative(s) came closer to partisan symmetry than the Legislative Defendants' remedial maps.

To: Special Masters, North Carolina Superior Court, Wake County

From: Eric McGhee

Re: Measures of partisan fairness

Date: February 20, 2022

The Special Masters appointed by the North Carolina Superior Court of Wake County have asked me to provide my assessment of the partisan fairness of the remedial maps submitted by the parties to *NCLCV and Common Cause* v *Hall*, and *Harper* v *Hall*. I am a political scientist who studies elections, election administration, redistricting, public opinion, and legislative behavior. I am the creator of a popular measure of partisan gerrymandering called the efficiency gap, and co-creator with Nicholas Stephanopoulos of Harvard University of a legal test using the same. I am also a member of the Board of Directors of PlanScore, a nonpartisan website that scores redistricting plans on measures of partisan advantage. I have numerous published articles on the subject of partisan advantage in redistricting and am frequently consulted on the topic by policymakers and the media. I have a PhD in political science from the University of California, Berkeley.

The Special Masters have asked me to evaluate the remedial plans on four measures of partisan advantage: partisan symmetry, the mean-median difference, the efficiency gap, and the declination. In this memo I will explain the basis for each of these metrics to serve as background for the memos on the plans themselves.

All of these metrics measure some form of *partisan advantage*: an advantage for one party beyond what a normative concept of partisan balance would otherwise dictate. This normative baseline differs for each measure employed, meaning each captures a slightly different sense of fairness. As it happens, in a competitive state like North Carolina all the metrics tend to produce very similar results. I will describe the metrics and explain the particular sense of fairness each is meant to represent in the plainest language I can.

For those less inclined to learn the details, below is a quick summary of each measure:

- **Partisan symmetry** measures the excess seat share a party receives when it wins 50% of the votes. In a fair plan it should win 50% of the seats as well. It is measured in seat share.
- **Mean-median difference** measures the excess vote share required for a party to claim 50% of the seats. In a fair plan is should only take 50% of the vote to win half the seats. It is measured in vote share.

- **Efficiency gap** is the partisan balance of inefficient votes that do not contribute directly to a victory. In a fair plan the parties should have equal inefficient votes, reflecting no "packing" or "cracking." Despite using votes as its inputs it works out be a measure of seat share.
- **Declination** captures partisan differences in the pattern of district vote shares when plotted on a graph. In a fair plan the points will have similar patterns because they were drawn without the win/loss threshold specifically in mind. It is not measured in either vote share or seat share, so magnitudes are more difficult to compare with the other metrics.

Partisan Symmetry

Broadly speaking, partisan symmetry is the idea that parties with equal vote shares should receive equal seat shares. It is most commonly assessed at the point when both parties have half the votes, in which case both parties should also have half the seats. If one party has more than half the seats for exactly half the votes, it has managed to claim an outright majority of the legislative power without receiving majority support from the public. This violates the fundamental principle of majority rule.

Both parties rarely have exactly half the seats, so partisan symmetry almost always imagines what the outcome *might* be *if* both parties had equal vote shares. The most typical way of calculating this counterfactual is to simulate a uniform partisan tide that shifts each district's actual vote share an equal amount, to the point where both parties end up with half the votes in the aggregate. After shifting the vote shares this way, the analyst identifies how many seats have changed hands and records the new seat share. The difference between this new seat share and 50 percent is partisan symmetry. The larger the difference between the two numbers, the more unfair the plan. *This means partisan symmetry is measured in terms of seat share*: the seat share above or below 50%.

As an example, suppose there are two parties: Party A and Party B. Party A has 53 percent of the vote and Party B has 47 percent, and with that outcome Party A wins 60 of 100 seats in the state legislature. Partisan symmetry requires understanding what might happen if both parties had half the votes, so Party A must lose three percent of the vote in every district—a "uniform swing"—to bring its overall vote share down from 53 percent to 50 percent (and bring Party B's vote share up three points from 47 percent to 50 percent). If Party A loses, say, four seats as a result of this counterfactual, then it will end up with 56 percent of the seats (56/100) for 50 percent of the vote, a fairly clear violation of the principle of majority rule.

This is not the only way that partisan symmetry has been implemented. Since partisan symmetry says that

parties with equal vote shares should receive equal seat shares, it can actually be calculated for any pair of vote shares. In the example above, one might explore what happens if the party's roles were reversed, and Party A received 47 percent of the vote and Party B 53 percent. In a symmetric plan, Party A should receive 40 percent of the seats just as Party B did when *it* had 47 percent of the vote. If it has more than 40 percent, the plan favors Party A; if it has less than 40 percent, the plan favors Party B. This is the approach to symmetry used by plaintiffs Harper et al. and their experts.

As a practical matter this version of symmetry tends to give similar answers to the one calculated at 50 percent, but the two can diverge in any given plan. I prefer the "50%" version for two reasons. First, this "vote-swapping" version of symmetry necessarily requires a counterfactual twice as large as the 50% version. In the example above, the uniform swing is 3 points for the version assessed at 50%, and 6 points (53% - 47%) for the vote-swapping version. Sometimes this makes sense, but often it can take the counterfactual into highly fanciful scenarios.

Second, the vote-swapping version has a more tenuous connection to the principle of majority rule. The 50% version tests a normatively critical threshold: the point at which more voters support a party than support its opposition. If a party manages to acquire more power—in the form of seats in the relevant legislative body—without clearly winning more support, there is a universal sense that something is amiss.

When the parties are competitive with each other statewide, each has a vote share close to 50 percent already and the counterfactual is not very large—in fact, something close to it may have happened recently or could be expected to happen soon. This is the case with North Carolina, making partisan symmetry a useful metric for this state.

Mean-Median Difference

The mean-median difference is just like it sounds: it is the difference between the average district vote share and the median district vote share (where half the districts have a vote share higher and half lower). The mean-median difference favors a party when its median vote share is *higher* than its mean vote share.

Returning to the example above, Party A has an average (mean) vote share of 53 percent. Imagine that the median vote share is 60 percent, so that Party A has a vote share higher than 60 percent in half the seats, and lower than 60 percent in the other half. The mean-median difference in this case would be -7 percent: 53 percent minus 60 percent. This would be a substantial advantage for Party A.

The mean-median difference may appear to measure something purely mathematical, but in fact it captures something very straightforward: the vote share above (below) 50% that a party needs in order to capture

exactly half the seats. If a party needs more than 50 percent of the vote to claim half the seats, it is at a disadvantage. *This means the mean-median difference is measured in terms of vote share*: the vote share above or below 50% required to win half the seats.

The mean-median difference and the 50% version of partisan symmetry are close cousins. Partisan symmetry is the seat share above (below) 50% that a party receives when it has half the votes; the mean-median difference is the vote share above (below) 50% that a party needs in order to win half the seats. So the mean-median difference is a counterfactual every bit as much as partisan symmetry. Again, for a competitive state like North Carolina, the counterfactual is entirely plausible and so not an issue.

The Efficiency Gap

Every single-member district plan has "inefficient" votes that do not contribute directly to a victory. These include votes beyond the number needed for a candidate to win, and those cast for a candidate that will definitely lose. Though these votes do not change the outcome in the race where they were actually cast, they might be enough to help a candidate of the same party win in a neighboring district instead.

The party with fewer inefficient votes than the opposition has an advantage, because its support translates more efficiently into victories. This is why a gerrymander tries to "crack" most of the opposition's supporters across many districts where victory is close but still elusive, and "pack" the remainder in a small number of districts which that party will win by large margins.

The efficiency gap captures this partisan difference in efficient votes. It is the difference between each party's total inefficient votes, divided by all the votes cast in the election. If both parties have equal inefficient votes the efficiency gap is zero and the plan is as balanced as possible.

Despite using votes as its inputs, the efficiency gap works out mathematically to be a measure of excess seat share. A balanced efficiency gap expects that for every additional one percent of the vote beyond 50%, a party should get an extra two percent of the seats. This is the "winner's bonus" so common to single-member district electoral systems, where simple proportionality between seats and votes is extremely rare. The efficiency gap says a party can receive a higher seat share than vote share and still have a fair result, but there is a limit to how high that gap can go. *This means the efficiency gap is measured in terms of seat share*: the seat share above or below the ideal implied by balanced inefficient votes.

Though it comes at the problem from a very different direction, the efficiency gap also satisfies the symmetry principle. In fact, when both parties have half the votes, the efficiency gap says they should each have half the seats, and partisan symmetry and the efficiency gap are equal. For competitive states like North Carolina,

the two metrics tend to give very similar results, except that the efficiency gap is calculated at the actual election result instead of at a counterfactual.

The Declination

Another way of thinking about a gerrymandering party is that it pays very close attention to the win/loss threshold when designing the districts. It is acutely conscious of which party will win each seat because it is trying to extract as many winning seats as possible.

The declination captures this idea through some clever geometry. Imagine plotting a plan's districts in order from lowest to highest vote share for the minority party (left to right). The vertical axis is the vote share in each district. The districts are ordered by design, so each point is always higher than all the ones to its left. In a plan drawn without regard to which party wins each seat, these points will likely just climb higher until they cross the win/loss threshold. The constellation of points above and below the win/loss threshold will look similar. Examples of such patterns are in Figure 1.

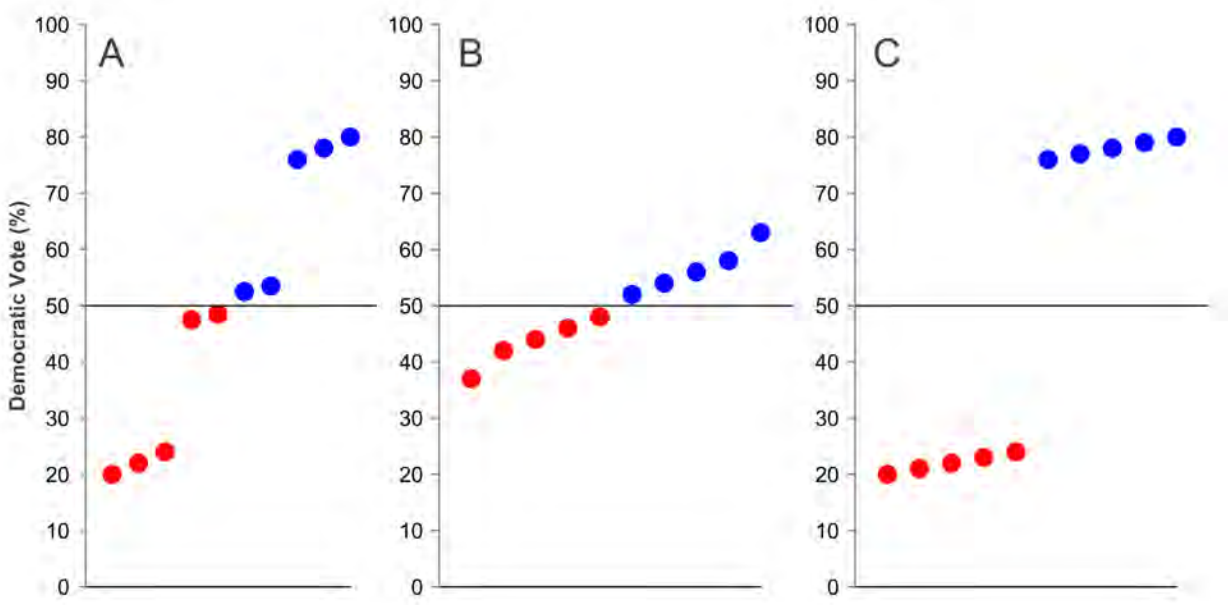

Figure 1: Fair plans are balanced around the win/loss threshold

In an unfair plan, the gerrymandering party will force as many seats on its side of the win/loss threshold as possible, leaving a few districts for the opposition to win by large margins. This is the basic logic of the efficiency gap. As an example, in Figure 2 the pattern of points on one side of the win/loss threshold is very different than on the other.[1]

[1] This example is an actual election from North Carolina's 2011 redistricting plan.

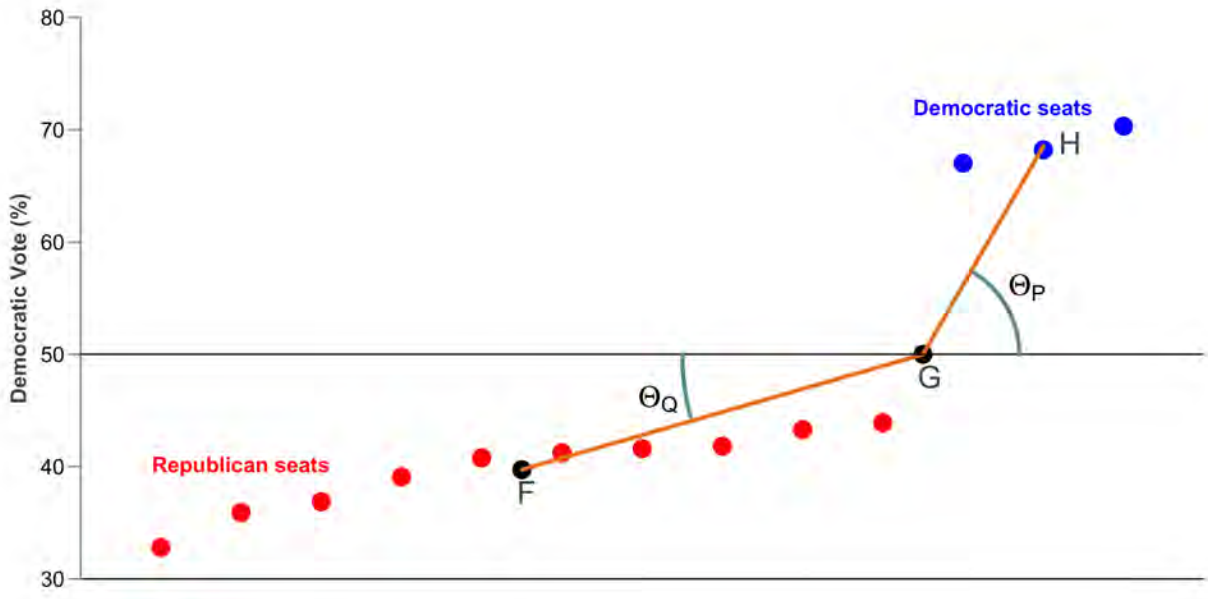

Figure 2: Unfair plans skirt the threshold in unequal ways

The declination connects the center of each party's points to a point on the win/loss threshold line. It turns out that differences between angles formed by these lines offer a way to summarize the difference between the two groups of points, and so to summarize the bias in the way the districts were drawn. However, *this means the declination is measured in units other than votes or seats*, making its magnitude difficult to compare to the other measures. It is best to first compare its direction to those of other measures of the same plan, and then compare its magnitude to the declination values of other plans.

Like the efficiency gap, the declination is calculated without a counterfactual, using the actual election results. The two metrics are in fact highly correlated, but the declination does not expect a particular relationship between vote share and seat share the way the efficiency gap does. The declination may best be considered a measure of intent: how much evidence is there that the pattern of election results is distorted in a way that implies an effort to win more seats for one side?

To: Special Masters, North Carolina Superior Court, Wake County

From: Eric McGhee

Re: Remedial congressional maps in *NCLCV* v *Hall* and *Harper* v *Hall*

Date: February 19, 2022

The Special Masters appointed by the North Carolina Superior Court of Wake County have asked me to provide my assessment of the partisan fairness of the remedial maps submitted by the parties to *NCLCV* v *Hall*, and *Harper* v *Hall*. I am a political scientist who studies elections, election administration, redistricting, public opinion, and legislative behavior. I am the creator of a popular measure of partisan gerrymandering called the efficiency gap, and co-creator with Nicholas Stephanopoulos of Harvard University of a legal test using the same. I am also a member of the Board of Directors of PlanScore, a nonpartisan website that scores redistricting plans on measures of partisan advantage. I have numerous published articles on the subject of partisan advantage in redistricting and am frequently consulted on the topic by policymakers and the media. I have a PhD in political science from the University of California, Berkeley.

In this memo I will evaluate the remedial congressional maps against each other and against the original enacted maps that were struck down. I will use four measures of partisan advantage: partisan symmetry (PS), the mean-median difference (MMD), the efficiency gap (EG), and the declination (D). I will also offer some evidence of the competitiveness of each plan, the compactness of the districts, and how many counties have been split. I will use PlanScore to conduct the great majority of this analysis.

PlanScore's Approach

The parties to the lawsuits have tended to use averages of statewide races, disaggregated to individual districts, as a measure of predicted partisan outcomes. PlanScore takes a different approach. It estimates a statistical model of elections with data from the past 10 years, and then uses the results to generate expected partisan outcomes.

The model includes two predictors: the presidential vote in each district, and whether an incumbent was running for reelection in that district (and the party of that incumbent). The model then estimates the correlations between these two predictors and state legislative or congressional results. Using the values of the presidential vote and incumbency for the new districts, the model can predict what it thinks will happen.

The resulting predictions give a sense of how elections in the past *would have been* different *if* they had been conducted under the proposed remedial districts. Specifically, PlanScore shows what would have happened in an election like the 2020 presidential election if the proposed districts had been used instead.

This has several advantages over the simple averaging of statewide races:

1. **The model focuses on the outcome of interest.** Votes for state legislative or congressional contests are the basis for allocating winners in each district, and so are the true focus of partisan advantage evaluations. A given average of many statewide races *might* be well correlated with these contests, but it is helpful to validate it. As a practical matter, presidential votes are a very strong predictor of votes for state legislature or Congress, but to the extent that they are not, the model will adjust to identify the relationship that has actually been observed in recent years.

2. **The model can explore the effect of incumbency.** Despite the growing importance of partisanship to American elections, incumbents still outperform their challengers on average. The districts that incumbents are drawn into can therefore impact the overall outcome of a plan. This is especially true if a modest incumbency boost changes the expected outcome of a race. Since the legislature considered incumbency when drawing districts but was obligated to be even-handed about it, this is an important question to test.

3. **The model measures how much it doesn't know.** No statewide contest can perfectly predict how a district will perform. Among its other results, the model offers measures of uncertainty about the correlations it estimates, including uncertainty about the kind of election year (good for Democrats, good for Republicans, etc.) we will see in any given November. We can propogate this uncertainty into the predictions we make. So while PlanScore predicts for an election like 2020, it is possible to talk about probabilities and ranges for these outcomes rather than certainties.

As will become apparent, the results from PlanScore are broadly similar, though not identical, to the results that the parties themselves reported. So in this particular application PlanScore's advantage is to confirm that the possible confounding issues mentioned above are not driving our conclusions.

While I believe the model has distinct advantages, PlanScore also calculates the EG with results from the last two presidential elections and the last two U.S. Senate elections. I will report the model results in the main tables, but I will also identify any important differences between these model results and the results from the simpler calculations with presidential and U.S. Senate vote.

Partisan fairness

Table 1 contains a comparison of PlanScore results for the original enacted plans that were struck down and each of the proposed remedial plans. The columns headed "Open" contain predictions that simulate what might happen if no incumbents ran for reelection and every seat was open. The columns headed "Incumb." place incumbents in the seats they were drawn into and treat as open any seat where the Legislative Defendants indicated the incumbent was retiring (see footnote 13 on p. 24 of the file "22.02.18 - LD Memo re Remedial Maps and Related Materials.pdf").[1] The difference between these columns in each case is the effect of incumbency on the outcome.

The PlanScore pages for these results can be found at each of the links below:

- **Enacted**
  - Open
  - Incumbent
- **Legislative Defendants**
  - Open
  - Incumbent
- **NCLCV**
  - Open
  - Incumbent
- **Harper**
  - Open
  - Incumbent

The metrics are on different scales (see the memo on metrics) so the best way to understand the values is to compare the plans to each other on the same metric, to compare the direction of the bias across different measures of the same plan, and to see how likely those directions are to persist over the life of the plan. To facilitate this last evaluation, I have added an asterisk (∗) to those values that are likely to favor the same party over all five elections of the plan according to the model.

[1] Since Members of Congress do not need to live in the districts they represent, they have some flexibility to make a different choice than the one imagined here. But it is still is a reasonable approximation for analytical purposes.

Table 1: Legislative Defendants' plan is fairer than enacted plans but not plaintiff submissions

	Efficiency Gap		**Mean-Median Diff.**		**Symmetry**		**Declination**	
	Open	Incumb.	Open	Incumb.	Open	Incumb.	Open	Incumb.
Enacted	$16.6R^*$	$17.1R^*$	$3.8R^*$	$4.1R^*$	$16.4R^*$	$17.0R^*$	$0.44R^*$	$0.47R^*$
Legislative Defendants	$6.4R$	$7.6R$	$1.1R$	$1.6R$	$4.9R$	$5.8R$	$0.14R$	$0.19R$
NCLCV	$2.8R$	$3.6R$	$0.4R$	$0.6R$	$1.4R$	$2.1R$	$0.05R$	$0.08R$
Harper	$2.2R$	$3.1R$	$0.5R$	$0.8R$	$1.7R$	$2.3R$	$0.05R$	$0.08R$

Note: "Open" values are predictions from the PlanScore model that simulate an election where all incumbents stepped down and every seat was open. "Incumb." values assume incumbents will run in the district that contains their home residence. The districts containing the residences of the incumbents who are retiring—according to the Legislative Defendants—are treated as open in both calculations. * = value that is more than 50% likely to favor the same party over the course of the decade, using the uncertainty estimates from the PlanScore model.

First note the significant pro-Republican bias in the original enacted plans across all four of the metrics considered here. If all seats were open, all the metrics point in a Republican direction (EG: 16.6%; MMD: 3.8%; PS: 16.4%; D: 0.44) and are likely (over 95% likely, as it happens) to point that direction regardless of the ups and downs of party performance over the course of the decade. When incumbency is incorporated, the bias moves somewhat further in a Republican direction (EG: 17.1%; MMD: 4.1%; PS: 17.0%; D: 0.47). In short, all four metrics agree that this plan was a partisan gerrymander.

The plans the Legislative Defendants submitted still favor Republicans but half as much or less in each case (EG: 6.4%; MMD: 1.1%; PS: 4.9%; D: 0.14). The EG value falls below the commonly identified threshold of 7%, though the MMD value falls above the 1% number cited by the Legislative Defendants (see p. 7 of their brief). The values with incumbency factored in all lean more Republican (EG: 7.6%; MMD: 1.6%; PS: 5.8%; D: 0.19), and this incumbency effect is greater than it was in the enacted plan. The EG and MMD values exceed the 7% and 1% thresholds respectively. None of these values is more than 50% likely to favor Republicans throughout the decade, but they are all close, with probabilities higher than 40% in each case.

The PlanScore model predictions are also closer to balanced than are the model-free calculations using presidential and U.S. Senate votes. Three out of four of these EG values suggest substantial bias (2020 presidential vote: 12.9% R; 2016 presidential vote: 17.6% R; 2020 U.S. Senate: 5.3% R; 2016 U.S. Senate: 15.5% R). The size of these EG values is driven in part by extremely close outcomes in several districts,

something the model smooths out by allowing for a range of outcomes through its uncertainty estimates. Nonetheless, while I continue to favor the model predictions, the magnitudes of these simpler calculations do give pause.

The remaining two remedial plans in Table 1 are very similar to each other on these metrics. The values are only fractionally different within the open seats and incumbency scenarios. Like the other plans in Table 1, these also favor Republicans in all cases, and more so in the incumbency scenario than in the open seat scenario. However, this Republican advantage is often less than half the size of the same advantage in the Legislative Defendants' plan. In contrast to the Legislative Defendants' plan, these plans look similar when the EG is calculated with presidential or U.S. Senate votes.

Competition and traditional geography

In addition to these questions of partisan fairness, it is possible to evaluate the maps in terms of competitiveness and respect for traditional geography.

A plan can favor one party but have more or fewer competitive seats. PlanScore identifies districts that are more than 50% likely to switch party hands at least once in the five elections under the plan. As a practical matter, this works out to districts with expected two-party vote shares between about 45 and 55 percent.

For traditional geography, I look at two dimensions of the issue. The first is compactness: the extent to which the districts resemble a simple shape like a circle. I capture this concept with two different metrics: the Reock score and the Polsby-Popper score. Neither is dispositive of compactness, but they tend to capture some sense of what is meant by the concept and they are correlated with each other. I also report the total number of counties that have have been split across multiple districts, as reported by Dave's Redistricting App.

The enacted plan has the fewest seats that are competitive when open (3), but the three remedial plans are all fairly similar to each other (Legislative Defendants 6; NCLCV 7; Harper 5). Adding incumbency mostly reduces the number of competitive seats, and it makes all *four* plans virtually indistinguishable (enacted 4; Legislative Defendants 5; NCLCV 5; Harper 4).

The Reock and Polsby-Popper measures suggest that all four plans are similar in terms of compactness as well, though the enacted and Legislative Defendants' plans are somewhat less compact. None of these plans are particularly noncompact.[2] Conversely, the enacted plan splits the fewest counties, at 11, while the others

[2]For comparison, I recently analyzed the maps drawn by the independent redistricting commission in California. The commission's mandate includes compactness, but it is ranked lower than some other goals. The Polsby Popper scores for the commission's plans were all substantially lower than the ones reported here.

Table 2: Competition and compactness are largely similar across remedial plans

	Competitive Seats		**Compactness**		
	Open	Incumb.	Reock	Polsby-Popper	**Split Counties**
Enacted	3	4	0.42	0.30	11
Legislative Defendants	6	5	0.38	0.30	14
NCLCV	7	5	0.47	0.38	13
Harper	5	4	0.45	0.36	14

Note: "Open" values are predictions from the PlanScore model that simulate an election where all incumbents stepped down and every seat was open. "Incumb." values assume incumbents will run in the district that contains their home residence. The districts containing the residences of the incumbents who are retiring—according to the Legislative Defendants—are treated as open in both calculations. "Competitive Seats" are those more than 50% likely to favor the same party over the course of the decade, using the uncertainty estimates from the PlanScore model. The Reock and Polsby-Popper compactness scores both range from zero for not compact to one for maximally compact. "Split Counties" is the number of counties that have been divided into more than one district, as identified in Dave's Redistricting App.

all split between 13 and 14.

Conclusion

In sum, the Legislative Defendants' remedial congressional plan appears to fall in between the original enacted plan and the plaintiffs' remedial proposals on a number of dimensions. On partisan fairness the Legislative Defendants' plan is best described as a borderline case that is marginally fair but falls just on the cusp of unfairness. On competitiveness and compactness it is closer to the plaintiffs' plans but not clearly better in the way that its fairness is clearly worse.

KeyCite Yellow Flag - Negative Treatment
Unconstitutional or PreemptedPrior Version Limited on Constitutional Grounds by Stephenson v. Bartlett, N.C., Apr. 22, 2004

KeyCite Yellow Flag - Negative TreatmentProposed Legislation

West's North Carolina General Statutes Annotated
Chapter 1. Civil Procedure
Subchapter VIII. Judgment
Article 26a. Three-Judge Panel for Redistricting Challenges and for Certain Challenges to State Laws (Refs & Annos)

N.C.G.S.A. § 1-267.1

§ 1-267.1. Three-judge panel for actions challenging plans apportioning or redistricting State legislative or congressional districts; claims challenging the facial validity of an act of the General Assembly

Effective: January 1, 2019
Currentness

(a) Any action challenging the validity of any act of the General Assembly that apportions or redistricts State legislative or congressional districts shall be filed in the Superior Court of Wake County and shall be heard and determined by a three-judge panel of the Superior Court of Wake County organized as provided by subsection (b) of this section.

(a1) Except as otherwise provided in subsection (a) of this section, any facial challenge to the validity of an act of the General Assembly shall be transferred pursuant to G.S. 1A-1, Rule 42(b)(4), to the Superior Court of Wake County and shall be heard and determined by a three-judge panel of the Superior Court of Wake County, organized as provided by subsection (b2) of this section.

(b) Whenever any person files in the Superior Court of Wake County any action challenging the validity of any act of the General Assembly that apportions or redistricts State legislative or congressional districts, a copy of the complaint shall be served upon the senior resident superior court judge of Wake County, who shall be the presiding judge of the three-judge panel required by subsection (a) of this section. Upon receipt of that complaint, the senior resident superior court judge of Wake County shall notify the Chief Justice, who shall appoint two additional resident superior court judges to the three-judge panel of the Superior Court of Wake County to hear and determine the action. Before making those appointments, the Chief Justice shall consult with the North Carolina Conference of Superior Court Judges, which shall provide the Chief Justice with a list of recommended appointments. To ensure that members of the three-judge panel are drawn from different regions of the State, the Chief Justice shall appoint to the three-judge panel one resident superior court judge from the First through Third Judicial Divisions and one resident superior court judge from the Fourth through Fifth Judicial Divisions. In order to ensure fairness, to avoid the appearance of impropriety, and to avoid political bias, no member of the panel, including the senior resident superior court judge of Wake County, may be a former member of the General Assembly. Should the senior resident superior court judge of Wake County be disqualified or otherwise unable to serve on the three-judge panel, the Chief Justice shall appoint another resident superior court judge of Wake County as the presiding judge of the three-judge panel. Should any other member of the three-judge panel be disqualified or otherwise unable to serve on the three-judge panel, the Chief Justice shall appoint as a replacement another resident superior court judge from the same group of judicial divisions as the resident superior court judge being replaced.

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(b1) Any facial challenge to the validity of an act of the General Assembly filed in the Superior Court of Wake County, other than a challenge to plans apportioning or redistricting State legislative or congressional districts that shall be heard pursuant to subsection (b) of this section, or any claim transferred to the Superior Court of Wake County pursuant to subsection (a1) of this section, shall be assigned by the senior resident Superior Court Judge of Wake County to a three-judge panel established pursuant to subsection (b2) of this section.

(b2) For each challenge to the validity of statutes and acts subject to subsection (a1) of this section, the Chief Justice of the Supreme Court shall appoint three resident superior court judges to a three-judge panel of the Superior Court of Wake County to hear the challenge. The Chief Justice shall appoint a presiding judge of each three-judge panel. To ensure that members of each three-judge panel are drawn from different regions of the State, the Chief Justice shall appoint to each three-judge panel one resident superior court judge from the First or Second Judicial Division, one resident superior court judge from the Third or Fourth Judicial Division, and one resident superior court judge from the Fifth Judicial Division. Should any member of a three-judge panel be disqualified or otherwise unable to serve on the three-judge panel or be removed from the panel at the discretion of the Chief Justice, the Chief Justice shall appoint as a replacement another resident superior court judge from the same group of judicial divisions as the resident superior court judge being replaced.

(c) No order or judgment shall be entered affecting the validity of any act of the General Assembly that apportions or redistricts State legislative or congressional districts, or finds that an act of the General Assembly is facially invalid on the basis that the act violates the North Carolina Constitution or federal law, except by a three-judge panel of the Superior Court of Wake County organized as provided by subsection (b) or subsection (b2) of this section. In the event of disagreement among the three resident superior court judges comprising a three-judge panel, then the opinion of the majority shall prevail.

(d) This section applies only to civil proceedings. Nothing in this section shall be deemed to apply to criminal proceedings, to proceedings under Chapter 15A of the General Statutes, to proceedings making a collateral attack on any judgment entered in a criminal proceeding, or to civil proceedings filed by a taxpayer pursuant to G.S. 105-241.17.

Credits

Added by S.L. 2003-434 (Ex. Sess.), § 7(a), eff. Nov. 25, 2003. Amended by S.L. 2014-100, § 18B.16(a), eff. Aug. 7, 2014; S.L. 2015-264, § 1(a), eff. Oct. 1, 2015; S.L. 2018-145, § 8(b), eff. Jan. 1, 2019; S.L. 2018-146, § 4.10(a), eff. Jan. 1, 2019.

Notes of Decisions (17)

N.C.G.S.A. § 1-267.1, NC ST § 1-267.1

The statutes and Constitution are current through S.L. 2022-67 of the 2022 Regular Session of the General Assembly, subject to changes made pursuant to direction of the Revisor of Statutes. Some statute sections may be more current; see credits for details

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Proposed Legislation

West's North Carolina General Statutes Annotated
Chapter 120. General Assembly
Article 1. Apportionment of Members; Compensation and Allowances

N.C.G.S.A. § 120-2.3

§ 120-2.3. Contents of judgments invalidating apportionment or redistricting acts

Currentness

Every order or judgment declaring unconstitutional or otherwise invalid, in whole or in part and for any reason, any act of the General Assembly that apportions or redistricts State legislative or congressional districts shall find with specificity all facts supporting that declaration, shall state separately and with specificity the court's conclusions of law on that declaration, and shall, with specific reference to those findings of fact and conclusions of law, identify every defect found by the court, both as to the plan as a whole and as to individual districts.

Credits
Added by S.L. 2003-434 (Ex. Sess.), § 8, eff. Nov. 25, 2003.

Notes of Decisions (1)

N.C.G.S.A. § 120-2.3, NC ST § 120-2.3
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Proposed Legislation

West's North Carolina General Statutes Annotated
Chapter 120. General Assembly
Article 1. Apportionment of Members; Compensation and Allowances

N.C.G.S.A. § 120-2.4

§ 120-2.4. Opportunity for General Assembly to remedy defects

Effective: December 27, 2018
Currentness

(a) If the General Assembly enacts a plan apportioning or redistricting State legislative or congressional districts, in no event may a court impose its own substitute plan unless the court first gives the General Assembly a period of time to remedy any defects identified by the court in its findings of fact and conclusions of law. That period of time shall not be less than two weeks, provided, however, that if the General Assembly is scheduled to convene legislative session within 45 days of the date of the court order that period of time shall not be less than two weeks from the convening of that legislative session.

(a1) In the event the General Assembly does not act to remedy any identified defects to its plan within that period of time, the court may impose an interim districting plan for use in the next general election only, but that interim districting plan may differ from the districting plan enacted by the General Assembly only to the extent necessary to remedy any defects identified by the court.

(b) Notwithstanding any other provision of law or authority of the State Board of Elections under Chapter 163 of the General Statutes, the State Board of Elections shall have no authority to alter, amend, correct, impose, or substitute any plan apportioning or redistricting State legislative or congressional districts other than a plan imposed by a court under this section or a plan enacted by the General Assembly.

Credits
Added by S.L. 2003-434 (Ex. Sess.), § 9, eff. Nov. 25, 2003. Amended by S.L. 2016-125, § 20(a), eff. Dec. 16, 2016; S.L. 2018-146, § 4.7, eff. Dec. 27, 2018.

Notes of Decisions (1)

N.C.G.S.A. § 120-2.4, NC ST § 120-2.4
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No. 413PA21 TENTH DISTRICT

SUPREME COURT OF NORTH CAROLINA

****

NORTH CAROLINA LEAGUE OF CONSERVATION VOTERS, INC., et al., COMMON CAUSE v. REPRESENTATIVE DESTIN HALL, in his official capacity as Chair of the House Standing Committee on Redistricting, et al.	)	From Wake County 21 CVS 015426 21 CVS 500085
REBECCA HARPER, et al., COMMON CAUSE v. REPRESENTATIVE DESTIN HALL, in his official capacity as Chair of the House Standing Committee on Redistricting, et al.	)	

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ADDENDUM TO JOINT BRIEF OF PLAINTIFFS-APPELLEES

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CONTENTS OF ADDENDUM

Common Cause v. Lewis, No. 18 CVS 014001,
2019 WL 4569584 (N.C. Super. Sept. 3, 2019) .....Add. 1

2019 WL 4569584 (N.C.Super.) (Trial Order)
Superior Court of North Carolina.
Wake County

COMMON CAUSE, et al., Plaintiffs,

v.

Representative David R. LEWIS, in his official capacity as Senior Chairman of the House Select Committee on Redistricting, et al., Defendants.

No. 18 CVS 014001.
September 3, 2019.

Judgment

Paul C. Ridgeway, Judge.
Joseph N. Crosswhite, Judge.
Alma L. Hinton, Judge.

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***1** The People of North Carolina have delegated, through the State's Constitution, the drawing of the State's legislative districts to the General Assembly. The delegation of this task, however, is not so unconstrained that legislative discretion is unfettered. Rather, the power entrusted by the People to the General Assembly to draw districts is constrained by other constitutional provisions that the People have also ordained. Some of these constitutional constraints are explicit—for example, the Whole County Provision of the Constitution limits a mapmaker's discretion to traverse county boundaries. But other constitutional constraints that limit the legislative process of map drawing are not explicit or limited in applicability only to map drawing—some constraints apply to all acts of the General Assembly, and indeed all acts of government. These principles include the obligation that our government provide all people with equal protection under law, that our government not restrict all peoples' rights of association and political expression, and that our government allow for free elections. Plaintiffs in this case challenge the legislative districts enacted by the General Assembly in 2017 and assert that the General Assembly has exceeded the map drawing discretion afforded to it by the People by creating maps that impermissibly infringe upon the equal protection, speech, association, and free election rights of citizens.

The People of North Carolina have also entrusted, through the State's Constitution, the task of reviewing acts of other branches of government to the judicial branch. While it is solely the province of the General Assembly to make law reflecting the policy choices of the People, it is the province—and indeed the duty—of the courts of our State through judicial review to ensure that enacted law comports with the State's Constitution. The Court cannot indiscriminately wield this power because the Court is also appropriately constrained by long-standing principles of law. Significantly, the Court must presume the constitutionality of acts of the General Assembly and must declare acts unconstitutional only when such a conclusion is so clear that no reasonable doubt can arise or the statute cannot be upheld on any ground.[1]

1 "It is well settled in this State that the courts have the power, and it is their duty in proper cases, to declare an act of the General Assembly unconstitutional—but it must be plainly and clearly the case. If there is any reasonable doubt, it will be resolved in favor of the lawful exercise of their powers by the representatives of the people." *City of Asheville v. State*, 369 N.C. 80, 87-88, 794 S.E.2d 759, 766 (2016) (quoting *Glenn v. Bd. of Educ.*, 210 N.C. 525, 529-30, 187 S.E. 781, 784 (1936)); *State ex rel. Martin v. Preston*, 325 N.C. 438, 449, 385 S.E.2d 473, 478 (1989).

The voters of this state, since 2011, have been subjected to a dizzying succession of litigation over North Carolina's legislative and Congressional districts in state and federal courts. Today marks the third time this trial court has entered judgment. Two times, the North Carolina Supreme Court has spoken. Eight times, the United States Supreme Court has ruled. Yet, as we near the end of the decade, and with another decennial census and round of redistricting legislation ahead, the litigation rages on with little clarity or consensus. The conclusions of this Court today reflect the unanimous and best efforts of the undersigned trial

judges—each hailing from different geographic regions and each with differing ideological and political outlooks—to apply core constitutional principles to this complex and divisive topic. We are aided by advances in data analytics that illuminate the evidence; we are aided by learned experts who inform our analysis; and, we are aided by skilled lawyers who have masterfully advanced the positions of their clients. But, at the end, we are guided, and must be guided, by what we conclude the North Carolina Constitution requires.

***2** The issue before the Court is distilled to simply this: whether the constitutional rights of North Carolina citizens are infringed when the General Assembly, for the purpose of retaining power, draws district maps with a predominant intent to favor voters aligned with one political party at the expense of other voters, and in fact achieves results that manifest this intent and cannot be explained by other non-partisan considerations. In this case, as is set out in detail below, the Court finds as fact that Plaintiffs have met their burden of proof on several critical points. Plaintiffs have established that:

- the General Assembly, in enacting the 2017 legislative maps, had a partisan intent to create legislative districts that perpetuated a Republican-controlled General Assembly;

- the General Assembly deployed this intent with surgical precision to carefully craft maps that grouped many voters into districts predominantly based upon partisan criteria by packing and cracking Democratic voters to dilute their collective voting strength, thereby creating partisan gerrymandered legislative maps;

- the 2017 legislative maps throughout the state and on a district-by-district level, when compared on a district-by-district level to virtually all other possible maps that could be drawn with neutral, non-partisan criteria, are, in many instances, "extreme outliers" on a partisan scale to the advantage of the Republican party;

- partisan intent predominated over all other redistricting criteria resulting in extreme partisan gerrymandered legislative maps; and,

- the effect of these carefully crafted partisan maps is that, in all but the most unusual election scenarios, the Republican party will control a majority of both chambers of the General Assembly.

In other words, the Court finds that in many election environments, it is the carefully crafted maps, and not the will of the voters, that dictate the election outcomes in a significant number of legislative districts and, ultimately, the majority control of the General Assembly. Faced with these facts, as proven by the evidence, the Court must now say whether this conduct violates the constitutional guarantees afforded to all citizens—Democrats, Republicans, and others—of equal protection, the right to associate, to speak freely through voting, and to participate in free elections.

Recently, the United States Supreme Court, in *Rucho v. Common Cause,* 139 S. Ct. 2484 (2019), held that even where enacted maps – *i.e.*, North Carolina's 2016 Congressional Map – were "blatant examples of partisanship driving districting decisions," challenges of partisan gerrymandering were "beyond the reach of the federal courts" because the federal Constitution provides no "constitutional directive or legal standard" to guide the courts. *Id.* at 2507-08. However, the Supreme Court added that "our conclusion does not condone excessive partisan gerrymandering" and does not "condemn complaints about redistricting to echo into a void." *Id.* at 2507. Rather, the Supreme Court observed that provisions of "state constitutions can provide standards and guidance for state courts to apply." *Id.* The case before this Court asserts only North Carolina constitutional challenges to the enacted legislative maps. Hence, this Court considers whether the North Carolina Constitution provides the "standards and guidance" necessary to address extreme partisan gerrymandering.

Of particular significance to this Court is Article I, § 10 of the North Carolina Constitution. This provision, originally enacted in 1776 and contained in the "Declaration of Rights" of our Constitution, simply states that "[a]ll elections shall be free." The North Carolina Supreme Court has long and consistently held that "our government is founded on the will of the people," that "their will is expressed by the ballot," *People ex rel. Van Bokkelen v. Canady,* 73 N.C. 198, 220 (1875), and "the object of all elections is to ascertain, fairly and truthfully the will of the people," *Hill v. Skinner*, 169 N.C. 405, 415, 86 S.E. 351, 356 (1915)

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(quotation omitted). The Court has also held that it is a "compelling interest" of the state "in having fair, honest elections." *State v. Petersilie*, 334 N.C. 169, 184, 432 S.E.2d 832, 840 (1993). This Court concludes, for these and other reasons more fully set out below, that the Free Elections Clause of the North Carolina Constitution guarantees that all elections must be conducted freely and honestly to ascertain, fairly and truthfully, the will of the People and that this is a fundamental right of North Carolina citizens, a compelling governmental interest, and a cornerstone of our democratic form of government.

***3** Our understanding of the Free Elections Clause shapes the application of the Equal Protection Clause, N.C. Const. art. I, § 19, the Freedom of Speech Clause, *id.* at art. I, § 12, and the Freedom of Assembly Clause, *id.* at art. I, § 14, to instances of extreme partisan gerrymandering. In the context of the constitutional guarantee that elections must be conducted freely and honestly to ascertain, fairly and truthfully, the will of the People, these clauses provide significant constraints against governmental conduct that disfavors certain groups of voters or creates barriers to the free ascertainment and expression of the will of the People.

Six years ago, this three-judge panel observed, perhaps presciently, the competing principles that are at the heart of the case before it today: "Political losses and partisan disadvantage are not the proper subject for judicial review, and those whose power or influence is stripped away by shifting political winds cannot seek a remedy from courts of law, but they must find relief from courts of public opinion in future elections." *Dickson v. Rucho*, No. 11 CVS 16896 (N.C. Super Ct. July 8, 2013). This, the Court believes, is as true today as it was then. It is not the province of the Court to pick political winners or losers. It is, however, most certainly the province of the Court to ensure that "future elections" in the "courts of public opinion" are ones that freely and truthfully express the will of the People. All elections shall be free—without that guarantee, there is no remedy or relief at all.

This Court is acutely aware that the process employed by the General Assembly in crafting the 2017 Enacted House and Senate maps is a process that has been used for decades—albeit in less precise and granular detail—by Democrats and Republicans alike. However, long standing, and even widespread, historical practices do not immunize governmental action from constitutional scrutiny. *See, e.g., Citizens United v. FEC*, 558 U.S. 310, 365, 130 S. Ct. 876, 913 (2010); *Reynolds v. Sims*, 377 U.S. 533, 582, 84 S. Ct. 1362, 1392 (1964) (holding that malapportionment of state legislative districts violates the Equal Protection Clause, notwithstanding that malapportionment was widespread in the Nineteenth and early Twentieth Centuries).

With this as our guide, this Court, in exercising its duty of reviewing acts of other branches of government to ensure that those governmental acts comport with the rights of North Carolina citizens guaranteed by the North Carolina Constitution, concludes that the 2017 Enacted House and Senate Maps are significantly tainted in that they unconstitutionally deprive every citizen of the right to elections for members of the General Assembly conducted freely and honestly to ascertain, fairly and truthfully, the will of the People. The Court bases this on the inescapable conclusion that the 2017 Enacted Maps, as drawn, do not permit voters to freely choose their representative, but rather representatives are choosing voters based upon sophisticated partisan sorting. It is not the free will of the People that is fairly ascertained through extreme partisan gerrymandering. Rather, it is the carefully crafted will of the map drawer that predominates. This Court further concludes that the 2017 Enacted Maps are tainted by an unconstitutional deprivation of all citizens' rights to equal protection of law, freedom of speech, and freedom of assembly. These conclusions are more fully set out in the following Findings of Fact and Conclusions of Law.

FINDINGS OF FACT

A. Republicans Drew the 2017 Plans to Maximize Their Political Power

1. Republican Mapmakers Drew the 2011 Plans

***4** 1. In the 2010 elections, as part of a national Republican effort to flip state legislative chambers in order to gain control of redistricting after the 2010 Census, Republicans won majorities in the North Carolina House of Representatives and the North Carolina Senate for the first time since 1870. PX587 ¶ 5; Tr. 867.

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2. With their newfound control of both chambers of the General Assembly, Republican legislative leaders set out to redraw the boundaries of the State's legislative districts. In North Carolina, legislative redistricting is performed exclusively by the General Assembly. The Governor cannot veto redistricting bills. N.C. Const. art. II, § 22(5)(b),(c).

3. Legislative Defendant Representative David Lewis and Senator Robert Rucho oversaw the drawing of the 2011 state House and state Senate plans (the "2011 Plans"). PX587 ¶ 8 (Leg. Defs.' Responses to Requests for Admission); Tr. 95:17-21 (Sen. Blue). They hired Dr. Thomas Hofeller to draw the plans. *Id.* ¶ 7; Tr. 95:8-9. Dr. Hofeller and his team drew the plans at the North Carolina Republican Party's headquarters in Raleigh using mapmaking software licensed by the North Carolina Republican Party. PX587 ¶¶ 10-11.

4. Legislative Defendants did not make Dr. Hofeller available to Democratic members of the General Assembly during the 2011 redistricting process, nor did Dr. Hofeller communicate with any Democratic members in developing the 2011 Plans. PX587 ¶¶ 12-13. No Democratic member of the General Assembly saw any part of any draft of the 2011 Plans before they were publicly released. *Id.* ¶ 14.

5. Legislative Defendants have stated in court filings that the 2011 Plans were "designed to ensure Republican majorities in the House and Senate." PX575 at 55 (Defs.-Appellees' Br. on Remand, *Dickson v. Rucho*, No. 201PA12-3, 2015 WL 4456364 (N.C. July 13, 2015)); *see id.* at 16 ("Political considerations played a significant role in the enacted [2011] plans."). Legislative Defendants asserted that they were "perfectly free" to engage in constitutional partisan gerrymandering, and that they did so in constructing the 2011 Plans. PX574 at 60 (Defs.-Appellees' Br., *Dickson v. Rucho*, No. 201PA12-2, 2013 WL 6710857 (N.C. Dec. 9, 2013)).

6. To "ensure Republican majorities in the House and Senate," PX575 at 55, Legislative Defendants and Dr. Hofeller used prior election results to construct the district boundaries to advantage Republicans. PX587 ¶¶ 6, 17. "[T]he recommendation of Tom Hofeller" was to "create a master database that would contain all [statewide] NC elections from the past decade … , each processed into a form that matches up with the 2010 VTD geography." PX769 at 3 (Jan. 14, 2011 memorandum to Senator Rucho). Legislative Defendants obtained Census block-level election results from "all statewide election contests for each general election [from] 2004-2010." PX760.

7. When reviewing the draft plans, all members of the General Assembly had access to a "Stat Pack" containing data on how the districts would perform using the results of prior statewide elections. Tr. 98:4-99:9 (Sen. Blue). Specifically, the Stat Pack showed the partisan vote share for each drafted district for each specific prior election. *Id.* Members of the General Assembly viewed the Stat Pack as containing "pretty reliable predictors of how [draft] districts would perform in the future based on how they performed in the past." Tr. 99:6-9 (Sen. Blue).

***5** 8. In July 2011, the General Assembly enacted the 2011 Plans. N.C. Sess. Laws 2011-404 (House), 2011-402 (Senate). No Democrat voted for either plan, and only one Republican voted against them. PX587 ¶¶ 23-24.

9. In the 2012 elections, the parties' vote shares for the House were nearly evenly split across the state, with Democrats receiving 48.4% of the two-party statewide vote. Joint Stipulation of Facts ("JSF") ¶ 41. But Democrats won only 43 of 120 seats (36%). *Id.* ¶ 42. Republicans thus won a veto-proof majority in the state House—64% of the seats (77 of 120)—despite winning just a bare majority of the statewide vote. In the Senate, Democrats won nearly half of the statewide vote (48.8%) but won only 17 of 50 seats (34%). *Id.* ¶¶ 44-45.

10. In 2014, Republican candidates for the House won 54.4% of the statewide vote, and again won a super-majority of seats (74 of 120, or 61.6%). JSF ¶ 66. In the 2014 Senate elections, Republicans won 54.3% of statewide vote and 68% of the seats (34 of 50). *Id.* ¶ 66.

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11. In 2016, Republicans again won 74 of 120 House seats, or 61.6%, this time with 52.6% of the statewide vote. *Id.* ¶ 66. In the 2016 Senate elections, Republicans won 55.9% of the statewide vote and 70% of the seats (35 of 50). *Id.* ¶ 66.

2. The *Covington* Court Struck Down Certain 2011 Districts as Unconstitutional Racial Gerrymanders

12. On May 19, 2015, a group of individual plaintiffs initiated a lawsuit—*Covington v. North Carolina*, No. 1:15-CV-00399 (M.D.N.C.)—against the State Board of Elections, Speaker Timothy Moore, President Pro Tempore Philip Berger, Chair of the Senate Redistricting Committee, Robert Rucho, and Chair of the House Redistricting Committee, David Lewis challenging 28 total House and Senate districts under the 2011 Plans as unconstitutional racial gerrymanders. This case was referenced at trial, the related briefs, and in these findings as the "*Covington* case" or "*Covington* litigation."

13. On August 11, 2016, the federal district court ruled for the plaintiffs as to all of the challenged districts. *Covington v. North Carolina*, 316 F.R.D. 117 (M.D.N.C. 2016). The *Covington* court found that racial considerations rather than political considerations "played a primary role" with respect to the specific 28 "challenged districts" in *Covington*. 316 F.R.D. at 139. The *Covington* litigation did not involve any of the districts drawn in 2011 that are at issue in the present case.

14. Following appeal, on June 5, 2017, the U.S. Supreme Court summarily affirmed the district court's decision invalidating the 28 challenged districts as racial gerrymanders. 137 S. Ct. 2211 (mem.).

15. The district court subsequently ordered briefing on whether to order enactment of remedial maps under a timeline that would enable special elections in 2017. Ultimately, the court declined to order special elections in 2017 and instead allowed a longer timeline for the General Assembly to enact remedial plans. *Covington v. North Carolina*, 267 F. Supp. 3d 664 (M.D.N.C. 2017).

3. The General Assembly Enacted the 2017 Plans

16. On June 30, 2017, Senator Berger appointed 15 senators—10 Republicans and 5 Democrats—to the Senate Committee on Redistricting. PX587 ¶ 44. Senator Hise was appointed Chair. *Id.* Also on June 30, 2017, Representative Moore appointed 41 House members—28 Republicans and 13 Democrats—to the House Select Committee on Redistricting. PX629 at 4-5. Representative Lewis was appointed Senior Chair. PX587 ¶ 45.

***6** 17. On July 26, 2017, the Senate Redistricting Committee and the House Select Committee on Redistricting met jointly ("Redistricting Committee") for organizational and informational purposes. *Covington v. North Carolina*, 1:15-cv-00399, ECF No. 184-7 at 3-4. At the meeting, Representative Lewis and Senator Hise stated that Republican leadership would again employ Dr. Hofeller to draw the new plans. PX601 at 23:3-6; *see* PX587 ¶¶ 46-47. When Democratic Senator Van Duyn asked whether Dr. Hofeller would "be available to Democrats and maybe even the Black Caucus to consult," Representative Lewis answered "no." PX601 at 22:24-23:6. Representative Lewis explained that, "with the approval of the Speaker and the President Pro Tem of the Senate," "Dr. Hofeller is working as a consultant to the Chairs," *i.e.*, as a consultant only to Legislative Defendants. *Id.* at 23:3-6; Tr. 101:6-18 (Sen. Blue).

18. In explaining the choice of Dr. Hofeller to draw the 2017 Plans, Representative Lewis stated that Dr. Hofeller was "very fluent in being able to help legislators translate their desires" into the district lines using "the [M]aptitude program." PX590 at 36:17-19.

19. On August 4, 2017, at another joint meeting of the Redistricting Committees, Representative Lewis and Senator Hise advised Committee members that the *Covington* decision invalidating 28 districts on federal constitutional grounds had rendered a large number of additional districts invalid under the Whole County Provision of the North Carolina Constitution, and those districts would also have to be redrawn. PX602 at 2:14-11:23.

20. At the same August 4, 2017, meeting, the Redistricting Committees allowed 31 citizens to speak for two minutes each. PX602 at 28:3-68:23. All speakers urged the members to adopt fair maps free of partisan bias. *See id.*

21. At another joint meeting on August 10, 2017, the House and Senate Redistricting Committees voted on criteria to govern the creation of the new plans. PX603 at 4:23-5:5.

22. Representative Lewis proposed as one criterion, "election data[:] Political consideration[s] and election results data may be used in drawing up legislative districts in the 2017 House and Senate plans." PX603 at 132:10-13. Representative Lewis provided no further explanation or justification for this proposed criterion, stating only: "I believe this is pretty self-explanatory, and I would urge members to adopt the criteria." *Id.* at 132:13-15.

23. Democratic members pressed Representative Lewis for details on how Dr. Hofeller would use elections data and for what purpose. Democratic Senator Ben Clark asked: "You're going to collect the political data. What specifically would the Committee do with it?" PX603 at 135:11-13. Representative Lewis answered that "the Committee could look at the political data as evidence to how, perhaps, votes have been cast in the past." *Id.* at 135:15-17. When Senator Clark inquired why the Committees would consider election results if not to predict future election outcomes, Representative Lewis stated only that "the consideration of political data in terms of election results is an established districting criteria, and it's one that I propose that this committee use in drawing the map." *Id.* at 141:12-16.

24. Representative Lewis had also stated that Dr. Hofeller used ten specific prior statewide elections in drawing the 2017 Plans: the 2010 U.S. Senate election, the 2012 elections for President, Governor, and Lieutenant Governor, the 2014 U.S. Senate election, and the 2016 elections for President, U.S. Senate, Governor, Lieutenant Governor, and Attorney General. PX603 at 137:22-138:3.

25. The House and Senate Redistricting Committees adopted Representative Lewis's "election data" criterion on a straight party-line vote. PX603 at 141-48.

26. Senator Clark proposed an amendment that would prohibit the General Assembly from seeking to maintain or establish a partisan advantage for any party in redrawing the plans. PX603 at 166:9-167:3. Representative Lewis opposed the amendment, stating he "would not advocate for [its] passage." *Id.* at 167:10-11. The Redistricting Committees rejected Senator Clark's proposal, again on a straight party-line vote. *Id.* at 168-74.

***7** 27. As explained in extensive detail below, Dr. Hofeller's own files establish that he used prior elections results and partisanship formulas to draw district boundaries to maximize the number of seats that Republicans would win in the House and the Senate, and to ensure that Republicans would retain majorities in both chambers. PX123 at 48-76 (Chen Rebuttal Report); PX329 at 3-35 (Cooper Rebuttal Report); PX153, PX166; PX167; PX168; PX170; PX171; PX172; PX241; PX244; PX246; PX248; PX330; PX332; PX333; PX334; PX335; PX336; PX337; PX340; PX342; PX344; PX345; PX346; PX347; PX350; PX352; PX353; PX354; PX724; PX730; PX731; PX732; PX733; PX734; PX735; PX736; PX738; PX739; PX742; PX744; PX746; PX748; PX753; PX754; PX755; PX756.

28. As a further criterion, Representative Lewis proposed incumbency protection—namely that "reasonable efforts and political considerations may be used to avoid pairing incumbent members of the House or Senate with another incumbent in legislative districts drawn in 2017 House and Senate plans. The Committee may make reasonable efforts to ensure voters have a reasonable opportunity to elect non-paired incumbents of either party to a district in the 2017 House and Senate plans." PX603 at 119:9-17. He clarified that the second sentence of this proposed criterion meant "simply" that "the map makers may take reasonable efforts not to pair incumbents unduly." *Id.* at 122:16-18; *see* PX606 at 9:24-10:1 (Sen. Hise: "The Committee adopted criteria pledging to make reasonable efforts not to double-bunk incumbents.").

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29. The House and Senate Redistricting Committees adopted Representative Lewis's incumbency-protection criterion, once more on a straight-party line vote. PX603 at 125-32.

30. The Redistricting Committees also adopted as criteria, yet again on straight party-line votes, that they (1) would make "reasonable efforts" to "improve the compactness of the current districts," PX603 at 24:24-25:2; (2) would make "reasonable efforts" to "split fewer precincts" than under the 2011 Plans, *id.* at 79:8-12; and (3) "may consider municipal boundaries" in drawing the new districts, *id.* at 66:15-16; *see id.* at 98-104, 112-19 (adopting criteria). Representative Lewis clarified that these criteria meant "trying to keep towns, cities and precincts whole where possible." PX607 at 10:5-6; *see, e.g.,* PX603 at 66:22-23 (Rep. Lewis explaining that the Committees would "consider not dividing municipalities where possible").

31. As a final criterion, Representative Lewis proposed prohibiting the consideration of racial data in drawing the new plans. PX603 at 148:11-15.

32. The full criteria adopted by the Committees for the 2017 Plans (the "Adopted Criteria") read as follows:

Equal Population. The Committees shall use the 2010 federal decennial census data as the sole basis of population for drawing legislative districts in the 2017 House and Senate plans. The number of persons in each legislative district shall comply with the +/- 5 percent population deviation standard established by *Stephenson v. Bartlett*, 355 N.C. 354, 562 S.E. 2d 377 (2002).

Contiguity. Legislative districts shall be comprised of contiguous territory. Contiguity by water is sufficient.

County Groupings and Traversals. The Committees shall draw legislative districts within county groupings as required by *Stephenson v. Bartlett*, 355 N.C. 354, 562 S.E. 2d 377 (2002) (*Stephenson I*), *Stephenson v. Bartlett*, 357 N.C. 301, 582 S.E.2d 247 (2003) (*Stephenson II*), *Dickson v. Rucho*, 367 N.C. 542, 766 S.E.2d 238 (2014) (*Dickson I*) and *Dickson v. Rucho*, 368 N.C. 481, 781 S.E.2d 460 (2015) (*Dickson II*). Within county groupings, county lines shall not be traversed except as authorized by *Stephenson I*, *Stephenson II*, *Dickson I*, and *Dickson II*.

***8** *Compactness*. The Committees shall make reasonable efforts to draw legislative districts in the 2017 House and Senate plans that improve the compactness of the current districts. In doing so, the Committees may use as a guide the minimum Reock ("dispersion") and Polsby-Popper ("perimeter") scores identified by Richard H. Pildes and Richard G. Neimi in *Expressive Harms, "Bizarre Districts," and Voting Rights: Evaluating Election-District Appearances After Shaw v. Reno*, 92 Mich. L. Rev. 483 (1993).

Fewer Split Precincts. The Committees shall make reasonable efforts to draw legislative districts in the 2017 House and Senate plans that split fewer precincts than the current legislative redistricting plans.

Municipal Boundaries. The Committees may consider municipal boundaries when drawing legislative districts in the 2017 House and Senate plans.

Incumbency Protection. Reasonable efforts and political considerations may be used to avoid pairing incumbent members of the House or Senate with another incumbent in legislative districts drawn in the 2017 House and Senate plans. The Committees may make reasonable efforts to ensure voters have a reasonable opportunity to elect non-paired incumbents of either party to a district in the 2017 House and Senate plans.

Election Data. Political considerations and election results data may be used in the drawing of legislative districts in the 2017 House and Senate plans.

No Consideration of Racial Data. Data identifying the race of individuals or voters shall not be used in the drawing of legislative districts in the 2017 House and Senate plans.

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PX587 ¶ 53; LDTX007.

33. On August 11, 2017, Representative Lewis and Senator Hise notified Dr. Hofeller of the criteria adopted by the redistricting committees and "directed him to utilize those criteria when drawing districts in the 2017 plans." PX629 at 7. The criteria were also placed on legislative websites for the public to view and comment. *Covington v. North Carolina*, 1:15-cv-00399, ECF No. 184-9 at 193.

34. Dr. Hofeller drew the 2017 Plans under the direction of Legislative Defendants and without consultation with any Democratic members. PX587 ¶¶ 48-51, 55-56. Representative Lewis claimed that he "primarily … directed how the [House] map was produced," and that he, Dr. Hofeller, and Republican Representative Nelson Dollar were the only "three people" who had even "seen it prior to its public publication." PX590 at 40:14-21. None of Legislative Defendants' meetings with Dr. Hofeller about the 2017 redistricting were public. PX587 ¶ 51. Legislative Defendants did not make Dr. Hofeller available to Democratic members during the 2017 redistricting process, nor did Dr. Hofeller communicate with any Democratic members in developing the 2017 Plans. PX587 ¶¶ 48-49; Tr. 126:16-18 (Sen. Blue). No Democratic member of the General Assembly saw any part of any draft of the 2017 Plans before they were publicly released. PX587 ¶ 50.

35. On August 19, 2017, the proposed 2017 House plan was released on the General Assembly website. PX629 at 7. The House Redistricting Committee made only minor adjustments to Dr. Hofeller's draft, swapping precincts between a few districts. PX605 at 16:2-17:16.

36. On August 20, 2017, the proposed 2017 Senate plan was released on the General Assembly website. PX629 at 7. At a Senate Redistricting Committee hearing on August 24, 2017, Senator Van Duyn asked Senator Hise how prior elections data had been used in drawing the proposed maps. PX606 at 26:4-6. Senator Hise replied that the mapmaker, Dr. Hofeller, "did make partisan considerations when drawing particular districts." *Id.* at 26:9-10.

***9** 37. The Senate Redistricting Committee adopted only two minor amendments to the district boundaries drawn by Dr. Hofeller. One change, proposed by Senator Clark, moved a small population from Senate District 19 to District 21. PX606 at 49:20-52:9. The other change, proposed by Democratic Senator Daniel Blue, swapped a few precincts between Senate Districts 14 and 15, two heavily Democratic districts in Wake County. *Id.* at 52:19-53:19. Senator Blue's amendment passed by a unanimous vote. *Id*. at 67:13-19.

38. As in 2011, Stat Packs measuring the partisan performance of the draft districts under recent elections were made available to members of the Redistricting Committees. Tr. 113:17-115:15 (Sen. Blue). The Stat Packs, released on August 21, 2017, *see* PX629 at 7, contained information for each proposed district based on the ten statewide elections that Representative Lewis had claimed would be used in drawing the 2017 Plans. PX591; PX597.

39. Following the public release of the draft House and Senate maps, Legislative Defendants held public meetings on August 22, 2017, in Raleigh and at six satellite locations across the state. PX607 at 7:22-8:11, 9:1-3. Many citizens spoke at the meetings and expressed grave concerns about the draft maps. As Senator Blue testified, "overwhelmingly they were saying that they wanted districts drawn that were not partisan in nature." Tr. 105:8-12.

40. On August 24, 2017, the Senate Redistricting Committee adopted the Senate plan drawn by Dr. Hofeller with the minor modifications discussed above. PX606 at 131:10-23. The next day, the House Redistricting Committee adopted Dr. Hofeller's proposed House plan, also with the minor modifications discussed above. PX605 at 120:2-125:25.

41. During a Floor Session Hearing on August 28, 2017, Representative Lewis proposed an amendment to modify several House districts in Wake County. PX590 at 30:13-32:2. The amendment passed on a straight party-line vote. *Id.* at 31:18-32:2.

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42. On August 31, 2017, the General Assembly passed the House plan (designated HB 927) and the Senate plan (designated SB 691), with only a few minor modifications from the versions passed by the Committees. PX629 at 8-9; *see* PX627 (HB 927); PX628 (SB 691). No Democratic Senator voted in favor of either plan. PX587 ¶ 71. The lone Democratic member of the House who voted for the plans was Representative William Brisson, who switched to become a Republican several months later. *Id.*

43. The 2017 Plans altered 79 House districts and 35 Senate districts from the 2011 Plans. JSF ¶¶ 169-70.

4. The *Covington* Special Master Redrew Several Districts That Remained Racially Gerrymandered

44. On September 15, 2017, the *Covington* plaintiffs filed an objection to the 2017 draft plans, alleging that Senate Districts 21 and 28 and House Districts 57 and 21 were still racial gerrymanders. *Covington v. North Carolina*, 283 F. Supp. 3d 410, 429 (M.D.N.C. 2018). The *Covington* Court agreed. *Id.* at 429-42. The court further held that the General Assembly's changes to five House districts (36, 37, 40, 41, and 105) violated the North Carolina Constitution's prohibition on mid-decade redistricting. *Id.* at 443-45.

45. The court appointed Dr. Nathaniel Persily as a Special Master to assist in redrawing the districts for which the court had sustained the plaintiffs' objections. To cure the racially gerrymandered districts, the Special Master made adjustments to certain neighboring districts as well. *Covington*, ECF No. 220 at 46, 64. The court adopted the Special Master's recommended changes to all of these districts. 283 F. Supp. 3d at 458.

***10** 46. The Special Master also restored the districts that the court had found were redrawn in violation of the ban on mid-decade redistricting to the 2011 versions of those districts. *Covington*, 283 F. Supp. 3d at 456-58. The court adopted these changes as well. *Id.*

47. On June 28, 2018, the U.S. Supreme Court affirmed the district court's adoption of the Special Master's remedial plans for House Districts 21 and 57 (and the adjoining districts, 22, 59, 61, and 62) and Senate Districts 21 and 28 (and the adjoining districts, 19, 24, and 27). *North Carolina v. Covington*, 138 S. Ct. 2548, 2553-54 (2018). But the U.S. Supreme Court reversed the district court's adoption of the Special Master's plans for the districts allegedly enacted in violation of the mid-decade redistricting prohibition, holding that the court's remedial authority was limited to curing the racial gerrymanders and nothing more. *Id.* at 2554-55.

48. Ultimately, the Special Master's Final Report altered the following districts: Senate Districts 19, 21, 24, 27, 28; House Districts 21, 22, 57, 59, 61. LDTX159. The Special Master also reviewed the 2017 Enacted Plan and chose to keep the General Assembly's version of House Districts 58 and 60 in his recommended changes. *Id.*

49. Plaintiffs in this case do not challenge the following districts that were altered by the *Covington* Special Master: House Districts 21, 22, 57, 61, 62; Senate Districts 19, 21, 24, 28.

B. The 2017 Plans Were Designed Intentionally and Effectively to Maximize Republican Partisan Advantage on a Statewide Basis

1. Legislative Defendants Admitted That They Were Drawing the 2017 Plans for Partisan Gain

50. At trial, there was little meaningful dispute that Legislative Defendants drew the 2017 Plans to advantage Republicans and reduce the effectiveness of Democratic votes.

51. The 2017 Adopted Criteria expressly provided for the use of "election data" in drawing the 2017 Plans. LDTX007. The Joint Select Committee on Redistricting considered results from 10 statewide elections, captured in Stat Packs available to legislators when they considered whether to adopt Dr. Hofeller's draft House and Senate plans. Tr. 113:17-115:15. The Stat

Packs demonstrated that, under those 10 statewide elections, Republicans would be expected to win between 72 and 82 seats in the House and between 31 and 35 seats in the Senate. PX591; PX597. In other words, Republicans would win a supermajority in both chambers of the General Assembly under each and every one of the 10 statewide elections used to evaluate the 2017 Plans (72 seats provides a supermajority in the House and 30 seats does in the Senate).

52. As Senator Blue testified, the election data used by Legislative Defendants— and in particular the performance of the proposed House and Senate plans under the range of 10 prior statewide elections—revealed that the plans were "designed specifically to preserve the supermajority" that the Republican Party had gained under the 2011 Plans. Tr. 115:19-22.

53. At the Senate Redistricting Committee hearing on August 24, 2017, Senator Hise confirmed that the mapmaker, Dr. Hofeller, "did make partisan considerations when drawing particular districts" in 2017. PX606 at 26:9-10. And as discussed above, Legislative Defendants stated in prior court filings that the districts drawn in 2011 were "designed to ensure Republican majorities in the House and Senate." PX575 at 16, 55 (*Dickson v. Rucho*, No. 201PA12-3, 2015 WL 4456364 (N.C. July 13, 2015)).

2. Dr. Hofeller's Files Establish That the Predominant Goal Was to Maximize Republican Partisan Advantage

***11** 54. Files from Dr. Hofeller's storage devices provide direct evidence of Dr. Hofeller's predominant focus on maximizing Republican partisan advantage in creating the 2017 Plans. The Court specifically finds, based upon the direct and circumstantial evidence of record, that the partisan intent demonstrated in Dr. Hofeller's files, as detailed below, is attributable to Legislative Defendants inasmuch that Dr. Hofeller, at all relevant times, worked under the direction of, and in concert with, Legislative Defendants. *See, e.g.,* FOF § F.7.

55. Plaintiffs obtained this evidence through a subpoena to Dr. Hofeller's daughter. PX676; PX781 (S. Hofeller deposition). Plaintiffs issued the subpoena to Ms. Hofeller on February 13, 2019 and provided notice to all other parties the same day. PX676. After no party objected to the subpoena, on March 13, 2019, Ms. Hofeller produced 22 electronic storage devices that had belonged to her father and that her mother gave her after Dr. Hofeller's death. PX781 at 1-43. The Hofeller files admitted into evidence at trial all came from these storage devices. PX123 at 2, 39, 48 (Chen Rebuttal Report); PX329 at 3-4 (Cooper Rebuttal Report).[2]

2 The Court at trial allowed the parties to admit expert reports as "corroborative evidence"—*i.e.*, as evidence that "tends to add weight or credibility" to the experts' testimony. *State v. Garcell*, 363 N.C. 10, 40, 678 S.E.2d 618, 637 (2009); *see* Tr. 537:8-538:7.

56. This Court granted Plaintiffs' pretrial motion *in limine* to admit the relevant files from Dr. Hofeller's storage devices, finding sufficient evidence of authenticity and chain of custody. As the Court suggested in its pretrial ruling, and now holds, these files are public records pursuant to N.C. Gen. Stat. § 120-133(a) and Dr. Hofeller's contract with the General Assembly to draw the 2017 Plans. PX641. The Court denied Legislative Defendants' motion *in limine* to exclude the Hofeller files based on purported misconduct by Plaintiffs or their counsel.

57. Dr. Hofeller maintained two folders related to the 2017 redistricting, titled "NC 2017 Redistricting" and "2017 Redistricting." Tr. 449:20-450:5. Plaintiffs' expert Dr. Chen reviewed the entire contents of these two folders and found that, other than verifying that draft districts met the equal population and county grouping requirements, the files exhibited a consistent focus on partisan considerations. PX123 at 76 (Chen Rebuttal Report); Tr. 450:6-13. Among the hundreds of files in these two folders, there were a "few files" that report on VTD and county splits, "[b]ut beyond these few files," these hundreds of files focused overwhelmingly on each party's expected vote share in the draft districts and on the identities and party affiliations of the incumbent members in each district. PX123 at 76 (Chen Rebuttal Report). The fact that these folders focused overwhelmingly on partisan considerations is persuasive evidence that partisan intent predominated in the drawing of the 2017 Plans.

a. *Dr. Hofeller's partisanship formulas*

58. The specific contents of the two folders confirm Dr. Hofeller's focus on Republican partisan advantage. In the folders, Dr. Hofeller had three partisanship formulas. First, as reflected in a Microsoft Word document titled "FORMULA FOR POLITICAL ANALYSIS OF LEGISLATIVE DISTRICTS," Dr. Hofeller used a formula that measured the average Republican vote share in each VTD across nine statewide elections from 2008 to 2014. Tr. 450:24-451:15; PX123 at 49-52 (Chen Rebuttal Report). These nine elections were different from the ten elections Representative Lewis claimed would be used. Tr. 451:20-452:6. Dr. Hofeller used this partisanship formula based on 2008-2014 elections to measure the partisanship of his draft districts through at least July 2017, Tr. 452:7-10, by which point he had already substantially completed drawing preliminary drafts for most of the final districts, FOF § F.7. Plaintiffs' Exhibit 153 is a screenshot of Dr. Hofeller's Microsoft Word document containing this partisanship formula:

***12 Dr. Hofeller's "FORMULA FOR POLITICAL ANALYSIS OF LEGISLATIVE DISTRICTS.doc"**

FORMULA FOR POLITICAL ANALYSIS OF LEGISLATIVE DISTRICTS USING 2-PARTY VOTE

(G08P_RV+ G08G_RV+ G08S_RV+ G08K_RV+ G12P_RV+ G12G_RV+ G12O_RV_ G10S_RV+ G14S_RV)/ (G08P_DV+ G08P_RV+ G08G_DV+ G08S_DV+ G08S_DV+ G08S_RV+ G08K_DV+ G08K_RV+ G12P_DV+ G12P_RV+ G12G_DV+ G12G_RV+ G12O_DV+ G12O_RV+ G10S_DV+ G10S_RV+ G14S_DV+ G14S_RV)

2008	President
2008	Governor
2008	U.S. Senate
2008	insurance Commissioner
2010	U. S. Senate
2012	President
2012	Governor
2012	Commissioner of Labor
2014	U.S. Senate

59. Dr. Hofeller's second partisanship formula was based on the ten statewide elections from 2010-2016 that Representative Lewis claimed would be used in 2017. Tr. 452:12-453:21. Dr. Hofeller did not employ this formula, however, in the Excel worksheets where he analyzed the partisanship of his draft districts. Tr. 453:12-17.

60. Dr. Hofeller's final partisanship formula, titled "Off Year," was based on the results of statewide elections during non-Presidential election years, namely 2010 and 2014. Tr. 453:22-454:9; PX123 at 65 (Chen Rebuttal Report). It is apparent that Dr. Hofeller used this formula to evaluate how his districts might perform in non-Presidential years. Tr. 454:10-17.

61. Dr. Hofeller's "NC 2017 Redistricting" and "2017 Redistricting" folders contain numerous Microsoft Excel spreadsheets analyzing partisan considerations, using his partisanship formulas, for the draft House and Senate plans that he was developing and modifying from November 2016 through June 2017. *See* PX123 at 53-64 (Chen Rebuttal Report).

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62. First, Dr. Hofeller placed a special focus on how many of his draft House and Senate districts had an average Republican vote share of 53% or higher using his partisanship formulas. For instance, in a spreadsheet last modified on November 26, 2016, analyzing a draft Senate plan, Dr. Hofeller wrote "23 Under 53%" at the bottom to indicate the number of draft districts for which Democrats had less than a 53% vote share and Republicans had a 53% or higher vote share. Tr. 456:14-20; PX248 at 2. In other words, as shown in Plaintiffs' Exhibit 248 below, Dr. Hofeller projected that 27 of the 50 districts in this draft Senate plan would have a Republican vote share at or above 53%.

Dr. Hotelier's Draft Plan File: "Senate Minimum-Partisan-Members.xlsx" (November 26, 2016)

New 2016 Senate Plan

Group Type	Dist	Avg R	Incumbent	Pty	Note	Old Ave R
New	1	52.70%	Cook	R		
Old	2	60.16%	Sanderson	R		
New	3	35.11%	Smith-Ingram	D		
New	4	37.39%	Horner	R		
New	5	45.94%	Davis	D		
Old	6	59.16%	Brown	R		
New	7	50.94%	Pate	R		
Old	S	54.69%	Rabon	R		
Old	9	53.05%	Lee	R		
New	10	55.32%	Jackson	R		
New	11	54.35%	Bryant	D		
New	12	56.83%	Rabin	R		
Old	13	41.09%	Britt	R		
Wake-Franklin	14	24.66%	Blue	D		
Wake-Franklin	15	52.45%	Alexander	R		
Wake-Franklin	16	40.50%	Chaudhuri	D		
Wake-Franklin	17	54,36%	Barringer	R		
Wake-Franklin	18	52.70%	Barefoot	R		
Cumberland	19	50.64%	Meredith	R		
New	20	27.50%	McKissick	D		

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Cumberland	21	29.64%	Clark	D	
New	22	33.39%	Woodard	D	
Old	23	34.84%	Foushee	D	
New	24	56.91%	Gunn	R	
New	25	51.51%	McInnis	R	
New	26	59.18%	Berger	R	
New	27	58.05%	Wade	R	
New	28	23.67%	Robinson	D	
New	29	***13** 50.90%	Tillman	R	
New	30	60.87%	Randleman, Ballard	R,R	#
New	31	64.87%	Brock, Krawiec	R,R	#
New	32	30.42%	Lowe	D	
Old	33	55.39%	Dunn	R	
New	34	66.29%	Vacant	R	#
Old	35	65.63%	Tucker	R	
Old	36	61.81%	Newton	R	
Mecklenburg	37	32.84%	Vacant	D	#
Mecklenburg	38	26.55%	Jackson	D	
Mecklenburg	39	63.97%	Bishop	R	
Mecklenburg	40	28.50%	Waddell	D	
Mecklenburg	41	49.66%	Ford, Tarte	D,R	#
Old	42	65.81%	Wells	R	
New	43	62.82%	Jarromgtpm	R	
New	44	62.81%	Curtis	R	
New	45	64.46%	Vacant	R	#
New	46	63.85%	Danniel	R	
Old	47	59.28%	Hise	R	
Old	48	58.81%	Edwards	R	

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Old	49	40.90%	Van Duyn	D
Old	50	56.29%	Davis	R

Notes: # = Double Bunk or Vacant, ## = Partisan Mismatch

23 Under 53%

63. In subsequent June 2017 spreadsheets analyzing draft House and Senate plans, Dr. Hofeller color-coded the districts to differentiate between districts that had slightly-under and slightly-over a 53% expected Republican vote share. Dr. Hofeller shaded the "Avg R" column yellow for draft districts with an expected Republican vote share of 50-53%, and shaded cells in the column a peach color for districts with an expected Republican vote share of 53-55%. Tr. 460:6-461:8, 464:19-465:11; PX244; PX241; PX246; PX123 at 66 (Chen Rebuttal Report).

64. Dr. Hofeller stratified all of the Republican-leaning districts in his draft House and Senate plans using highly granular gradations. Tr. 461:1-8, 463:6-25, 465:16-466:20; PX241 at 3; PX244 at 2; PX246 at 3. As illustrated in Plaintiffs' Exhibits 244 below, Dr. Hofeller counted how many districts in each draft House and Senate plan had between a 50-53%, 53-55%, 55-60%, 60-65%, and 65%-100% expected Republican vote share. *Id.* In contrast, Dr. Hofeller did not analyze Democratic-leaning districts with such granularity. Whereas Dr. Hofeller analyzed the Republican-leaning districts in five different bands, he analyzed Democratic-leaning districts in just two bands of 0-45% Republican vote share and 45-50% Republican vote share. Tr. 466:1-20; PX241 at 3; PX244 at 2; PX246 at 3.

Dr. Hotelier's Draft Plan File: "NC Senate Minimum Partisan J-2" (June 13, 2017)

New 2016 Senate Plan

Group Type	Dist	Avg R	14 Sen %	Incumbent	Pty	Note	Old Ave R	11 ti 17
New	1	47.94%	52.31%	Cook	R		53.54%	-5.60%
Old	2	60.16%	63.13%	Sanderson	R		60.16%	0.00%
New	3	40.10%	43.10%	Smith-Ingram	D		34.18%	5.93%
New	4	37.39%	39.24%	Horner	R	##	31.88%	5.51%
New	5	45.94%	48.68%	Davis	D		36.80%	9.15%
Old	6	59.16%	64.83%	Brown	R		59.16%	0.00%
New	7	50.94%	53.60%	Pate	R		59.37%	-8.43%
Old	8	54.69%	56.14%	Rabon	R		54.69%	0.00%
Old	9	53.05%	51.05%	Lee	R		53.05%	0.00%
New	10	54.75%	57.91%	Jackson	R		57.13%	-2.38%

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New	11	54.47%	56.42%	Bryant	D	##	57.61%	-3.13%
New	12	57.19%	58.83%	Rabin	R		57.19%	0.00%
Old	13	41.09%	47.12%	Britt	R	##	41.09%	0.00%
Wake-Franklin	14	25.37%	22.89%	Blue	D		25.54%	-0.17%
Wake-Franklin	15	53.04%	49.97%	Alexander			53.32%	-0.28%
Wake-Franklin	16	39.77%	35.22%	Chaudhuri	D		38.80%	0.97%
Wake-Franklin	17	54.36%	51.52%	Barringer	R		53.45%	0.91%
Wake-Franklin	18	52.57%	53.26%	Barefoot	R		52.76%	-0.19%
Cumberland	19	50.79%	53.27%	Meredith	R		49.30%	1.48%
New	20	20.93%	18.06%	McKissick	D		24.15%	-3.23%
Cumberland	21	29.52%	29.98%	Clark	D		30.53%	-1.01%
New	22	40.57%	39.77%	Woodard	D		37.71%	2.86%
Old	23	34.84%	31.50%	Foushee	D		34.84%	0.00%
New	24	56.91%	58.10%	Gunn	R		59.06%	-2.14%
New	25	51.51%	54.18%	McInnis	R		55.19%	-3.68%
New	26	59.18%	62.59%	***14** Berger	R		57.51%	1.67%
New	27	57.95%	56.89%	Wade	R		55.06%	2.90%
New	28	22.97%	22.18%	Robinson	D		18.65%	4.32%
New	29	60.90%	64.77%	Tillman	R		67.04%	-6.14%
New	30	60.87%	63.71%	Randleman,Ballard	R,R	#	66.15%	-5.28%
New	31	64.87%	65.07%	Brock, Krawiec	R,R	#	62.71%	2.16%
New	32	30.42%	29.53%	Lowe	D		31.20%	-0.78%
Old	33	65.39%	68.87%	Dunn	R		65.39%	0.00%
New	34	66.29%	67.96%	Vacant	R	#	63.53%	2.76%
Old	35	65.63%	65.84%	Tucker	R		65.36%	0.27%
Old	36	61.81%	60.28%	Newton	R		62.18%	-0.38%
Mecklenburg	37	31.35%	29.21%	Vacant	D	#	37.87%	-6.52%
Mecklenburg	38	28.06%	23.76%	Jackson	D		23.36%	4.70%

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Mecklenburg	39	63.96%	59.63%	Bishop	R		61.93%	2.03%
Mecklenburg	40	29.05%	25.80%	Waddell	D		20.96%	8.09%
Mecklenburg	41	49.59%	45.44%	Ford, Tarte	D,R	# ##	57.53%	-7.94%
Old	42	65.81%	67.05%	Wells	R		65.81%	0.00%
New	43	62.82%	63.14%	Jarromgtpm	R		62.82%	0.00%
New	44	62.81%	64.31%	Curtis	R		65.66%	-2.85%
New	45	64.46%	65.33%	Vacant	R	#	61.05%	3.41%
New	46	63.85%	63.85%	Danniel	R		58.59%	5.26%
Old	47	59.28%	61.81%	Hise	R		59.28%	0.00%
Old	48	58.81%	58.70%	Edwards	R		58.81%	0.00%
Old	49	40.90%	38.15%	Van Duyn	D		40.90%	0.00%
Old	50	56.29%	58.76%	Davis	R		56.29%	0.00%

Pressure Points for GOP Incumbents:

1. Sen. Cook in District 1 (Northeast Coast) is now in a toss-up district

2. Sentors Randleman & Ballard are double-bunked in a strong GOP District 30 (Northwest of State).

3.Senators Brock & Krawiec are double-bunked in a strong GOP District 31(Davie & Forsyth)

4. Senators Tate [R] & Ford [D] are double-bunked in a leaning-Dem. District 41 (N. Mecklenburg).

5. There are 2 strong GOP and 1 Strong Dem vacant districts (34, 37 and 45).

6. 34% (12) of Republican Incumbents do not have to run in a Special Election.

7. 12% (2) Democrats do not have to run in a Special Election.

Notes: # = Double Bunk or Vacant, ## = Partisan Mismatch

Average Republican

65-100	4	4
60-65	10	14
55-60	8	22

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53-55	6	28
50-53	4	32
45-50	3	35
0-45	15	50
	50	
2014 Republican Senate		
65-100	7	7
60-65	9	16
55-60	9	25
53-55	4	29
50-53	3	32
45-50	4	36
0-45	14	50
	50	

65. The Court finds that Dr. Hofeller's granular sorting and analysis of Republican-leaning districts—and his particular emphasis on districts with an over-53% expected Republican vote share—provide substantial evidence of the partisan intent and effects of the 2017 plans. The evidence establishes that Dr. Hofeller drew the 2017 Plans very precisely to create as many "safe" Republican districts as possible, so that Republicans would maintain their supermajorities, or at least majorities even in a strong election year for Democrats. Tr. 456:21-457:25. For instance, Dr. Hofeller's June 13, 2017, spreadsheet above estimated that 28 of 50 draft Senate districts had an expected Republican vote share above 53%, PX244 at 2, and Dr. Hofeller's June 14, 2017 spreadsheet for a draft House map estimated that 74 of 120 districts in the draft House plan had an expected Republican vote share above 53%, PX246 at 3. The Court is persuaded that Dr. Hofeller drew the maps with an intent to preserve Republicans' control of the House and Senate.

66. As further evidence of partisan intent, using his partisanship formula, Dr. Hofeller calculated the difference in the Republican vote share between the new draft version of each district and the prior 2011 version of that district, showing precisely how his draft plans would alter the partisanship of each district. Tr. 459:8-460:5; PX241; PX244; PX246; PX248.

***15** 67. Dr. Hofeller's spreadsheets also highlighted in yellow many of North Carolina's largest and most-Democratic counties, such as Wake, Mecklenburg, Cumberland, Forsyth, and Guilford Counties. Tr. 461:9-462:2, 468:9-20; PX244; PX246. As Dr. Chen explained, the spreadsheets show Dr. Hofeller's specific focus on trying to "squeeze out" as many Republican-leaning districts as he could in these counties. *Id.*

68. For both his draft House and Senate plans, Dr. Hofeller analyzed what he described as "Pressure Points for GOP Incumbents." Tr. 462:3-463:5, 467:7-468:8; PX244 at 2; PX246 at 2. He analyzed draft districts that could create concerns or vulnerabilities for Republican incumbents. *Id.* Dr. Chen did not find any comparable analysis by Dr. Hofeller of "pressure points" for Democratic incumbents. *Id.* Dr. Hofeller's spreadsheets contradict Legislative Defendants' contention at trial that the 2017 Plans sought

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to place *all* incumbents in politically favorable districts. It is clear from Dr. Hofeller's files that the mapmaker predominantly focused on benefitting and electorally protecting Republican incumbents and not Democratic incumbents.

69. Dr. Hofeller's spreadsheets also reveal that he evaluated the partisanship of draft maps created by Campbell University Law students at an exercise by Common Cause. In 2017, Common Cause invited two Campbell Law students to draw new legislative maps without using political data. Bob Phillips, the Executive Director of Common Cause North Carolina, testified that the purpose of the exercise was to raise awareness and show how a nonpartisan redistricting process could occur. Tr. 53:17-54:14.

70. Emails introduced at trial reveal that, in late June 2017, an aide to Legislative Defendants asked the General Assembly's legislative services office for copies of the "block assignments files" for the simulated maps created by the Campbell Law students. PX757. Common Cause had the Campbell Law students create the maps using the General Assembly's public computer because it had Maptitude installed on it. Tr. 55:18-56:17. Within roughly a week, Dr. Hofeller had created Excel spreadsheets analyzing the partisanship of the Campbell Law students' simulated districts. Tr. 471:6-472:15; PX167; PX170; PX123 at 70-75 (Chen Rebuttal Report). In spreadsheets last modified on July 5 and 8, 2017, Dr. Hofeller scored every one of the Campbell Law students' House and Senate districts using his partisanship formula derived from the 2008-2014 statewide elections. *Id.* Dr. Hofeller then evaluated, for every district, whether Republicans could obtain a "Better Possible" district than the version the Campbell Law students had drawn, with Dr. Hofeller writing "No," "Yes," or "Little" for each district. Tr. 473:8-474:6; PX168; PX123 at 70-71 (Chen Rebuttal Report).

71. The final enacted 2017 House plan contains two county groupings, with four districts in total, that match the districts in those county groupings drawn by the Campbell Law students. Tr. 474:7-475:23; PX123 at 71. Those two groupings—Nash-Franklin and Granville-Person-Vance-Warren—are two small groupings for which there are a very limited number of ways to draw the groupings, and the Campbell Law students happened to draw these groupings in the way that is most favorable to Republicans. *Id.*

72. Dr. Chen thus concluded that Dr. Hofeller evaluated the partisanship of all of the Campbell Law students' districts and then included in the 2017 maps four districts for which the students happened to draw the districts in the way maximally favorable to Republicans. *Id.* The Court agrees with Dr. Chen's assessment, which went unrebutted by Legislative Defendants at trial.

b. *Dr. Hofeller's Maptitude files*

***16** 73. Dr. Hofeller's Maptitude files from his storage devices further demonstrate that partisanship considerations were "front and center" in his drafting of the relevant districts in both 2011 and 2017. Tr. 944:5-15, 968:4-5 (Dr. Cooper). The Maptitude files remove any doubt that Dr. Hofeller "was clearly working with partisan data on the same maps at the same time that he [was] drawing lines for our state," all to maximize Republican partisan advantage. Tr. 945:4-11.

74. As Dr. Cooper explained, the Maptitude files indicate that Dr. Hofeller used partisanship formulas, along with multiple color-coding systems to visually depict partisanship on his draft maps, in order to deliberately pack and crack Democratic voters into particular districts with precision. Tr. 939:1-940:12, 944:9-945:8; PX329 at 3-4 (Cooper Rebuttal Report).

75. In the "NC Senate J-24" Maptitude file last modified in July 2017, Dr. Hofeller calculated the Republican vote share for each North Carolina VTD based on his formula using nine statewide elections from 2008-2014. PX330; Tr. 939:9-940:2, 942:22-943:2; PX565. Dr. Hofeller then color-coded the VTDs on the "Map" window based on this partisanship formula, using more granular stratifications for competitive and Republican-leaning VTDs than for Democratic-leaning VTDs, just as he had done in his Excel spreadsheets assessing district-wide partisanship. Tr. 944:16-21. Dr. Hofeller used a "traffic light" color-coding scheme, in which he shaded Democratic-leaning VTDs pink and red, Republican-leaning VTDs green, and more competitive VTDs yellow. Tr. 940:23-941:4. Plaintiffs' Exhibit 335 below is one example of Dr. Hofeller's use of this color-coding scheme. As is apparent in the example below and discussed in more detail with respect to additional county groupings discussed below, Dr. Hofeller drew district boundaries based on this color-coded partisanship data with remarkable precision.

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Figure 6: Partisan Targeting in Senate Districts 31 and 32

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76. Dr. Hofeller used the same partisanship formula in his Maptitude files containing draft 2017 House districts. Tr. 979:6-19; PX337; PX329 at 13 (Cooper Rebuttal Report). Dr. Hofeller also employed a color-coding system to visually represent the partisanship scores for each VTD in his 2017 House plan, but with the more familiar red coloring for Republican-leaning VTDs, blue for Democratic-leaning VTDs, and yellow and green for more competitive VTDs. Tr. 979:20-980:19; PX329 at 13 (Cooper Rebuttal Report). For example, Dr. Hofeller's Maptitude file labeled "NC House J-25," which he created on June 26, 2017, and last modified on August 7, 2017, depicted boundaries (in red) of House Districts 8, 9, and 12 in the Pitt-Lenoir House county grouping. Tr. 981:2-5; PX340; PX562. Plaintiffs' Exhibit 340 below shows that Dr. Hofeller used his color-coding system to pack the bluest VTDs in Pitt County into House District 8. Tr. 982:1-7, 983:5-984:7; PX340; PX329 at 16 (Cooper Rebuttal Report).

Figure 11: Partisan Targeting in House Districts 8, 9, and 12

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77. Dr. Hofeller similarly used a partisanship formula and color-coding scheme in drawing the districts at issue in this case enacted in 2011 and kept unchanged in 2017. Tr. 991:9-992:6, 994:4-996:11; PX347; PX350; PX352; PX329 at 23, 27, 30 (Cooper Rebuttal Report). For example, Dr. Hofeller's Maptitude file titled "NC House w New Raleigh - June 28," which was last modified on June 30, 2011, contained Dr. Hofeller's drafts of the 2011 House districts at issue in this case. Tr. 995:20-997:11; PX329 at 30-35; PX564. There, Dr. Hofeller scored the partisanship of each VTD using the results of the 2008 Presidential election and then colored each VTD based on those results, with Democratic-leaning VTDs shaded blue, Republican-leaning VTDs shaded red, and competitive VTDs shaded yellow and tan. *Id.* Plaintiffs' Exhibit 353 below is an example of Dr. Hofeller's use of this partisanship data to draw the 2011 House districts—in this example, to crack Democratic voters across House Districts 55, 68, and 69.

Figure 25: Partisan Targeting in House Districts 55, 68, and 69

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***17** 78. Legislative Defendants offered no additional files from Dr. Hofeller's storage devices to rebut Dr. Chen's and Dr. Cooper's analyses. They offered no plausible alternative explanation of Dr. Hofeller's intent as he drew the State's House and Senate districts in 2011 and 2017.

3. Plaintiffs' Experts Established that the Plans Are Extreme Partisan Gerrymanders Designed to Ensure Republican Control

79. The analysis and conclusions of Plaintiffs' experts further establish that the 2017 Plans are extreme partisan outliers intentionally and carefully designed to maximize Republican advantage and to ensure Republican majorities in both chambers of the General Assembly. Three of Plaintiffs' experts—Drs. Chen, Mattingly, and Pegden—employed computer simulations to generate alternative House and Senate plans to serve as a baseline for comparison to each enacted plan. Even though these experts employed different methodologies, each expert found that the enacted plans are extreme outliers that could only have resulted from an intentional effort to secure Republican advantage on a statewide basis. Plaintiffs' fourth expert, Dr. Christopher Cooper, explained how this gerrymandering was carried out across the State. The Court gives great weight to the analysis and conclusions, to the extent set forth below, of each of Plaintiffs' experts individually, and the Court finds that the

consistent findings of each of these experts, using different methodologies, powerfully reinforce that the 2017 Plans are extreme, intentional, and effective partisan gerrymanders.

a. *Dr. Jowei Chen*

80. Plaintiffs' expert Jowei Chen, Ph.D., is an Associate Professor in the Department of Political Science at the University of Michigan, Ann Arbor. Tr. 237:6-9. Dr. Chen has extensive experience in redistricting matters. Tr. 238:2-239:3 (Dr. Chen). By the admission of Intervenor Defendants' own expert, Dr. Chen is one of the "foremost political science scholars on the question of political geography" and how it can impact the partisan composition of a legislative body. Tr. 2220:14-18 (Dr. Barber). Dr. Chen also helped pioneer the methodology of using computer simulations to evaluate the partisan bias of a redistricting plan, and he has published four peer-reviewed articles employing this approach since 2013. Tr. 240:1-241:2; PX2. The Court accepted Dr. Chen in this case as an expert in redistricting, political geography, and geographic information systems ("GIS"). Tr. 245:4-8.

81. Dr. Chen has presented expert testimony regarding his simulation methodology in numerous prior partisan gerrymandering lawsuits, and his analysis has been consistently credited and relied upon by the courts in these cases. Tr. 241:15-242:19; *see League of Women Voters v. Commonwealth*, 178 A.3d 737, 818 (Pa. 2018) (finding "Dr. Chen's expert testimony" to be "[p]erhaps the most compelling evidence" in invalidating Pennsylvania's congressional plan as an unconstitutional partisan gerrymander); *Raleigh Wake Citizens Ass'n v. Wake Cty. Bd. of Elecs.*, 827 F.3d 333, 344 (4th Cir. 2016) ("[T]he district court clearly and reversibly erred in rejecting Dr. Chen's expert testimony."); *League of Women Voters of Mich. v. Benson*, 373 F. Supp. 3d 867, 907 (E.D. Mich. 2019) ("[T]he Court has determined that Dr. Chen's data and expert findings are reliable."); *Common Cause v. Rucho*, 279 F. Supp. 3d 587, 666 (M.D.N.C.), *vacated on other grounds*, 138 S. Ct. 2679 (2018) ("Dr. Mattingly's and Dr. Chen's simulation analyses not only evidence the General Assembly's discriminatory intent, but also provide evidence of the 2016 Plan's discriminatory effects."); *City of Greensboro v. Guilford Cty. Bd. of Elecs.*, 251 F. Supp. 3d 935, 943 (M.D.N.C. 2017) (relying upon the "computer simulations by Dr. Jowei Chen" to find impermissible partisan intent).

***18** 82. Using his simulation methodology, Dr. Chen analyzed whether partisan intent predominated in the drawing of the 2017 Plans and subordinated the traditional nonpartisan districting principles of compactness and avoiding the splitting of municipalities and VTDs. Tr. 245:13-17, 248:6-18. Dr. Chen further analyzed the effects of the 2017 Plans on the number of Democratic-leaning House and Senate districts statewide. Tr. 247:6-10.

83. Based on his analysis, Dr. Chen concluded that partisan intent predominated over the traditional districting criteria in drawing the current House and Senate districts, that the Republican advantage under the 2017 Plans cannot be explained by North Carolina's political geography, and that the effect of the 2017 Plans is to produce fewer Democratic-leaning districts than would exist if the map-drawing process had followed traditional districting principles. Tr. 246:18-22, 247:12-18, 248:20-249:1; PX1 at 3-4 (Chen Report). With respect to the effects in particular, Dr. Chen found that the gap between the enacted 2017 Plans and the nonpartisan simulated plans in terms of Democratic-leaning districts gets wider in electoral environments more favorable to Democrats, and is widest around the point when Democrats would win majorities in the House or Senate under the simulated nonpartisan plans. Tr. 247:25-248:3, 296:7-24, 330:17-23. The Court gives great weight to Dr. Chen's findings and, to the extent set forth below, adopts his conclusions.

84. In what Dr. Chen described as his Simulation Set 1, Dr. Chen programmed his algorithm to follow the traditional districting principles embodied within the Adopted Criteria. Tr. 281:12-16. In addition to following the equal population and contiguity requirements, as well as conforming to the same county groupings and number of county aatraversals that exist under the 2017 Plans, Dr. Chen programmed his algorithm to prioritize the traditional districting principles set forth in the Adopted Criteria of compactness, avoiding splitting municipalities, and avoiding splitting VTDs. Tr. 251:18-259:10; PX1 at 10-18 (Chen report).

85. Dr. Chen explained that, other than the county traversals requirement, his algorithm did not attempt to "maximize or optimize" any one criterion. Tr. 262:24-263:3. Rather, the algorithm equally weighted the criteria of compactness, avoiding splitting municipalities, and avoiding splitting VTDs. Tr. 263:4-12. In creating districts within each county grouping, the

algorithm considered thousands of random iterations, measuring for each proposed iteration whether the change would make the districts in the grouping better or worse on net across these three criteria. Tr. 261:18-263:19. The algorithm accepted a change only if it would improve the districts across these three criteria on net. *Id.*

86. In his Simulation Set 1, Dr. Chen ran the algorithm 1,000 times for each House county grouping and 1,000 times for each Senate county grouping, producing 1,000 unique statewide maps for both the House and the Senate. Tr. 263:23-264:16.

87. Beginning with the House, Dr. Chen compared the 1,000 simulated plans in his House Simulation Set 1 to the enacted 2017 House plan along a number of measures. First, Dr. Chen compared the number of municipalities that the simulated and enacted plans split. The enacted House plan splits 79 municipalities. Tr. 266:22-269:15; PX1 at 38, 41 (Chen Report). The 1,000 plans in House Simulation Set 1 split a range of only 38 to 55 municipalities, with most splitting just 43 to 48 municipalities. *Id.* From this, Dr. Chen concluded with over 99.9% statistical certainty that the enacted House plan subordinates the traditional districting criterion of following municipal boundaries, and splits substantially more municipalities than would be split if the map-drawing process had prioritized, and not subordinated, this traditional districting principle. Tr. 269:21-270:4; PX1 at 38 (Chen Report).

***19** 88. Plaintiffs' Exhibit 15 depicts the number of municipalities split under the enacted plan and the 1,000 simulations in House Simulation Set 1:

Figure 5:

House Simulation Set 1 (Following Only Non-Partisan Redistricting Criteria):

Split Municipalities in 2017 House Plan Versus 1,000 Simulated Plans

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89. The Court finds that the enacted House plan subordinates to partisanship the traditional districting principle of avoiding the unnecessary splitting of municipalities. The Court finds that the current House plan splits substantially more municipalities than would be split if the map-drawing process had not subordinated to partisanship this traditional districting principle.

90. Dr. Chen also compared the number of VTDs split in the enacted 2017 House plan and the 1,000 simulations in House Simulation Set 1. Dr. Chen found that, while the simulated House plans split between 6 and 18 VTDs, the enacted House plan splits 48 VTDs, more than four times as many as the vast majority of the simulations. Tr. 270:6-271:3; PX1 at 38, 42 (Chen Report). From this, Dr. Chen concluded with over 99.9% statistical certainty that the enacted House plan subordinates the traditional districting criterion of following VTD boundaries, and splits far more VTDs than is reasonably necessary. Tr. 271:5-12.

91. Plaintiffs' Exhibit 16 depicts the number of VTDs split under the enacted House plan and the 1,000 simulations in House Simulation Set 1:

Figure 6:

House Simulation Set 1 (Following Only Non-Partisan Redistricting Criteria):

Split VTDs in 2017 House Plan Versus 1,000 Simulated Plans

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92. The Court finds that the enacted House plan subordinates to partisanship the traditional districting principle of avoiding the unnecessary splitting of VTDs. The Court finds that the current House plan splits substantially more VTDs than would be split if the map-drawing process had not subordinated to partisanship this traditional districting principle.

93. Dr. Chen found the enacted House plan is also less compact than all 1,000 of his simulations in House Simulation Set 1. Dr. Chen employed the measures of compactness set forth in the Adopted Criteria, known as Reock and Polsby-Popper scores. Tr. 271:16-273:15; PX1 at 38 (Chen Report). For both measures, a higher score indicates that a plan's districts are more compact. *Id.* Dr. Chen found that, as measured by both Reock and Polsby-Popper scores, the compactness of the enacted House plan is outside the range of scores produced by the 1,000 simulated House plans. *Id.* From this, Dr. Chen concluded with over 99% statistical certainty that the enacted House plan subordinates the traditional districting criterion of compactness, and that the current districts are less compact than they would be under a map-drawing process that prioritizes and follows the traditional districting criteria. Tr. 273:18-274:4.

94. Plaintiffs' Exhibit 14 depicts the compactness of the enacted House plan and the 1,000 simulations in House Simulation Set 1:

Figure 4:

House Simulation Set 1 (Following Only Non-Partisan Redisricting Criteria):

Comparison of 2017 House Plan Versus 1,000 Simulated Plans on Compactness

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95. The Court finds that the enacted House plan subordinates to partisanship the traditional districting principle of compactness. The Court finds that the current House districts are less compact than they would be under a map-drawing process that had not subordinated to partisanship this traditional districting criteria.

***20** 96. To compare the partisanship of his simulated plans to the enacted House and Senate plans, Dr. Chen used Census Block-level election results from recent statewide elections in North Carolina. Tr. 274:5-275:20; PX1 at 19-20 (Chen Report). For most of his analysis, Dr. Chen used the following ten statewide elections: 2010 U.S. Senate, 2012 U.S. President, 2012 Governor, 2012 Lieutenant Governor, 2014 U.S. Senate, 2016 U.S. President, 2016 U.S. Senate, 2016 Governor, 2016 Lieutenant Governor, and 2016 Attorney General. *Id.* Dr. Chen provided several reasons for his choice of these ten statewide elections.

97. First, Representative Lewis indicated at an August 10, 2017, hearing that these ten statewide elections would be the elections that the Joint Redistricting Committees would use to evaluate the 2017 Plans. Tr. 275:8-11; PX1 at 20 (Chen Report).

98. Second, Dr. Chen testified that it is well-accepted in academic literature and in redistricting practice that statewide elections, rather than legislative elections, provide the best basis for measuring the partisanship of a district and for comparing the partisanship of districts across alternative possible plans. Tr. 276:3-27:18; PX1 at 19-20 (Chen Report). Dr. Chen explained that legislative elections, such as state House and state Senate elections, do not provide a sound basis for measuring the partisanship of Census Blocks and districts because the results of legislative elections can be skewed by various factors. *Id.* For instance, if districts are gerrymandered or otherwise uncompetitive, the results of the legislative elections can be biased by the district boundaries in a way that they would not be under an alternative plan. *Id.* As Dr. Chen noted, the General Assembly did not have Dr. Hofeller use legislative elections to measure partisanship in drawing the 2017 Plans. Tr. 277:9-14.

99. Third, Dr. Chen testified he did not use party registration to measure the partisanship of districts because it is well-known in academic literature and in the redistricting community that party registration is not a reliable indicator of actual partisan voting behavior. Tr. 277:19-278:10. That is particularly true in southern states such as North Carolina, where many registered Democrats now consistently vote for Republicans. *Id.* As Dr. Chen again noted, Legislative Defendants did not have Dr. Hofeller use party registration to measure partisanship in drawing the 2017 Plans. Tr. 278:11-15.

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100. The Court finds the use of statewide elections by Plaintiffs' experts to measure the partisanship of simulated and enacted districts is a reliable methodology.

101. To measure the partisanship of his simulated districts and the enacted districts, Dr. Chen determined the set of Census Blocks that comprise each district. Tr. 278:24-283:10; PX1 at 20-22 (Chen Report). Dr. Chen then aggregated the elections results from the ten 2010-2016 statewide elections for that set of Census Blocks. *Id.* In other words, Dr. Chen calculated the total votes cast for Democratic candidates in those ten 2010-2016 statewide elections across the relevant set of Census Blocks and the total votes cast for Republican candidates in that set of Census Blocks. *Id.* If there were more votes in aggregate for the Democratic candidates, Dr. Chen classified the district as a Democratic district, and if there were more votes for the Republican candidates, Dr. Chen classified the district as a Republican district. *Id.*

102. Using this measure of partisanship, Dr. Chen compared the number of Democratic districts under the enacted 2017 House plan and under the 1,000 simulated plans in his House Simulation Set 1. While the enacted House plan has 42 Democratic districts using the 2010-2016 statewide elections, not a single one of the 1,000 simulated plans produce so few Democratic districts. Tr. 285:15-287:8; PX1 at 29-30 (Chen Report). The vast majority of simulated plans produce 46 to 51 Democratic districts using the 2010-2016 statewide elections, with the two most common outcomes in the simulations being 46 or 47 Democratic districts—*i.e.*, four or five more Democratic districts than exist under the enacted House plan. *Id.* From these results, Dr. Chen concluded with over 99% statistical certainty that the current House plan is an extreme partisan outlier, and one that could not have occurred under a districting process that adhered to the traditional districting criteria. Tr. 287:2-8; PX1 at 29 (Chen Report).

***21** 103. Plaintiffs' Exhibit 9 depicts the distribution of Democratic seats under the enacted House plan and under the 1,000 simulations in Dr. Chen's House Simulation Set 1:

Figure 2:

House Simulation Set 1 (Following Only Non-Partisan Redistricting Criteria):

Democratic-Favoring Districts in 2017 House Plan Versus 1,000 Simulated Plans

(Measured Using 2010-2016 Election Composite)

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104. Dr. Chen explained that the number of Democratic districts estimated for his simulated plans is depressed by the fact that the 2010-2016 statewide elections he used were relatively favorable for Republicans. Tr. 284:1-285:12; PX1 at 29 (Chen Report). Three of the four elections cycles in this period—2010, 2014, and 2016—were favorable for Republicans nationally. *Id.* Consequently, the aggregate Democratic share of the two-party vote across the ten statewide elections in the 2010-2016 composite used by Dr. Chen was just 47.92%. *Id.*

105. Dr. Chen also measured the number of Democratic districts that would exist under his simulated plans and the enacted House plan under electoral environments that are more neutral or even favorable to Democrats. Tr. 287:15-22. First, Dr. Chen analyzed the number of Democratic districts using only the 2016 Attorney General election, which was a near tie. Tr. 287:19-289:14; PX1 at 29 (Chen Report). Using the 2016 Attorney General results, the enacted House plan produces 44 Democratic districts, while the 1,000 simulated House plans produce 48 to 55 Democratic districts, with the most common outcome being 52 Democratic districts. Tr. 287:24-289:14; PX119; PX1 at 29, 174, A1. The gap between the enacted House plan and the simulated plans therefore grows to eight Democratic seats in the most common outcome under the neutral electoral environment that was the 2016 Attorney General election. *Id.*

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106. Dr. Chen also performed a "uniform swing" analysis to compare the enacted plan and the simulated plans under different electoral environments. Uniform swing analysis is a common technique used in academic literature and the redistricting community to measure how districts would perform under varying electoral conditions. Tr. 289:25-290:8. For his uniform swing analysis, Dr. Chen started with the Democratic vote share in every enacted and simulated district using the 2010-2016 statewide elections, and then increased or decreased the Democratic vote share uniformly in every district in 0.5% increments. Tr. 290:4-296:3.

107. Dr. Chen's uniform swing analysis revealed a "striking trend." Tr. 296:7. As the uniform swing increases in the direction of more favorable Democratic performance, the gap between the number of Democratic districts under the enacted plan and the simulated plans grows more and more. Tr. 296:7-20. In other words, "in electoral environments that are more favorable to Democrats, the gap between the enacted plan and all of the computer-simulated plans is widened." Tr. 296:18-20.

108. Plaintiffs' Exhibit 10 below depicts Dr. Chen's uniform swing analysis for House Simulation Set 1. The starting point is the row on the vertical axis for "47.92%," which represents the statewide Democratic vote share under the ten 2010-2016 statewide elections. Tr. 290:23-296:3; PX1 at 31-33 (Chen Report). Each row above this point represents the results when increasing the Democratic vote share in every enacted and simulated district by increments of 0.5%. *Id.* The red stars in each row represent the number of Democratic districts under the enacted 2017 House plan, and the numbers to the right of each red star represent the number of simulations (out of 1,000) that produce the number of Democratic districts found on the horizontal axis below. *Id.* For instance, for the starting row of a 47.92% statewide Democratic vote share, the enacted plan (the red star) produces 42 Democratic districts, six simulated plans produce 43 Democratic districts, 48 simulated plans produce 44 Democratic districts, 172 simulated plans produce 45 Democratic districts, and so on. *Id.*

Figure U1: Number of Democratic Districts Under Alternative Uniform Swings in House Simulation Set 1 Plans

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***22** 109. Dr. Chen found that the gap between the enacted and simulated plans not only grew as the electoral environment became more favorable for Democrats, but the gap is "widest" at the point when Democrats would start winning a majority of House seats under the simulated plans. Tr. 296:20-297:21. Plaintiffs' Exhibit 11 (Figure U2) below depicts Dr. Chen's results for a uniform swing corresponding to a statewide Democratic vote share of 52.42%. In this scenario, the enacted House plan contains only 48 Democratic districts, but roughly one-third of the 1,000 simulations produce 60 or more Democratic districts, with a 60-60 tie being the second most common outcome. Tr. 298:2-299:7. Plaintiffs' Exhibit 12 (Figure U3) below depicts Dr. Chen's results for a uniform swing corresponding to a statewide Democratic vote share of 52.92%. In this scenario, there are 60 or more Democratic districts in nearly two-thirds of the simulations, and Democrats would win a majority (61 or more seats) in more than 40% of the simulations. Tr. 299:16-301:12. But Democrats would hold just 51 districts under the enacted House plan. *Id.*

Figure U2:

Number of Democratic House Districts Measured Using the 2010-2016 Election Composite With a +4.5% Uniform Swing, Corresponding to a 52.42% Statewide Democratic Vote Share

(House Simulation Set 1)

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Figure U3:

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Number of Democratic House Districts Measured Using the 2010-2016 Election Composite With a +5% Uniform Swing, Corresponding to a 52.92% Statewide Democratic Vote Share

(House Simulation Set 1)

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110. Dr. Chen analyzed the type of electoral environment that would produce 55 Democratic districts under the enacted House plan, which is the number of House districts that Democrats won in 2018. Tr. 301:16-302:14. Dr. Chen found that, in the type of electoral environment that would produce 55 Democratic districts under the enacted plan in his uniform swing analysis, Democrats would win *60 or more* House districts in over 99% of his simulated plans, and would win a majority of districts in over 98% of the simulated plans. *Id.*; PX10. In other words, while Democrats improved their seat share in 2018, they may well have won a majority had a nonpartisan plan been in place.

111. The Court finds Dr. Chen's uniform swing analysis to be substantial evidence of the intent and effects of Legislative Defendants' partisan gerrymander. The analysis establishes that the effects of the gerrymander are most extreme in electoral environments that are better for Democrats, specifically in electoral environments where Democrats could win a majority of House seats under a nonpartisan map. Dr. Chen's uniform swing analysis is persuasive evidence the enacted House plan was designed specifically to ensure that Democrats would not win a majority of House seats under any reasonably foreseeable electoral environment.

112. The Court further gives weight to Dr. Chen's overall conclusions from his House Simulation Set 1. Dr. Chen concluded with over 99% statistical certainty that partisanship predominated in the drawing of the enacted House plan and subordinated the traditional districting criteria of compactness, avoiding splitting municipalities, and avoiding splitting VTDs. Tr. 307:12-24. The Court adopts these conclusions and finds the current House districts, regardless of whether they were drawn in 2017 or 2011, subordinated these three traditional districting criteria in order to accomplish Legislative Defendants' predominant partisan goals.

113. In his House Simulation Set 2, Dr. Chen programmed his algorithm to add avoiding pairing incumbents as an additional criterion. Dr. Chen performed this analysis to determine whether a hypothetical, nonpartisan effort to avoid pairing the incumbents in place at the time each of the relevant districts was drawn could account for the extreme partisan bias and subordination of traditional districting principles that Dr. Chen found in his Simulation Set 1. Tr. 308:15-21. Dr. Chen programmed his algorithm in Simulation Set 2 to avoid pairing the maximum number of incumbents possible who were in office at the time of the relevant redistrictings, and to ensure that the very same incumbents who were not paired with another incumbent under the enacted plans were not paired in the simulations. Tr. 308:3-14, 310:21-311:16; PX1 at 43 (Chen Report).

***23** 114. The method by which Dr. Chen avoided pairing incumbents in Simulation Set 2 is consistent with the Adopted Criteria's incumbency protection provision. The Court gives no weight to Legislative Defendants' contention that the Adopted Criteria required incumbency protection beyond merely avoiding pairing incumbents; namely, that the Adopted Criteria required creating districts politically favorable to incumbents. As Representative Lewis stated, this criterion was interpreted as simply an intent to avoid pairing incumbents. *See* FOF ¶ 28. At the time of the 2017 redistricting, Republicans held supermajorities in both chambers of the General Assembly. Hence, seeking to enhance the reelection chances of every incumbent, Democrat and Republican alike, would have been a means of seeking to lock-in the Republican supermajorities. It would also have been particularly inappropriate to seek to preserve the “core” of the existing districts, as Legislative Defendants' expert Dr. Brunell suggested, since many of the existing districts had been found to constitute illegal racial gerrymanders.

115. In addition, the Court finds that Legislative Defendants did not seek to protect Democratic and Republican incumbents alike in a neutral manner. For example, in Buncombe County, the enacted plan paired two Democratic incumbents who were in office at the time these House districts were drawn in 2011, but Dr. Chen's algorithm was able to avoid pairing these two

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Democratic incumbents in all 1,000 of his simulations. Tr. 312:14-313:9; PX1 at 45, 47 (Chen Report). Legislative Defendants thus unnecessarily paired these two Democratic incumbents in creating the Buncombe County House districts, ensuring that one of the two would not be reelected. *Id.* Dr. Hofeller's Excel files further show that, in 2017, Dr. Hofeller focused solely on concerns for Republican incumbents and not Democratic incumbents. FOF § B.2.a. Dr. Hofeller analyzed "Pressure Points for GOP Incumbents" in both the House and the Senate, but performed no similar analysis for Democratic incumbents. *Id.*

116. Based on his House Simulation Set 2 analysis, Dr. Chen found that a nonpartisan effort to avoid pairing incumbents cannot explain the extreme partisan bias of the enacted House plan or its subordination of traditional districting criteria. Dr. Chen found that the enacted House plan is an extreme outlier with respect to the number of Democratic districts it produces, the number of municipalities and VTDs it splits, and the compactness of its districts compared to the 1,000 simulated plans in House Simulation Set 2. Tr. 313:11-317:24; PX7; PX18; PX23; PX1 at 44-56 (Chen Report). The Court gives weight to Dr. Chen's findings in House Simulation Set 2 and finds that a nonpartisan effort to protect incumbents cannot explain the extreme partisan bias and subordination of traditional districting principles in the enacted House plan.

117. For the Senate, Dr. Chen ran two sets of 1,000 simulations just as he did for the House. Tr. 318:11-319:9. Dr. Chen's Senate Simulation Set 1 applied the same algorithm used for House Simulation Set 1, prioritizing and equally weighting the traditional districting principles within the Adopted Criteria of compactness and avoiding splitting municipalities and VTDs.[3] Dr. Chen ran his algorithm 1,000 times for each Senate county grouping, producing 1,000 unique statewide plans in Senate Simulation Set 1. Tr. 319:10-320:10.

3 Dr. Chen used the same Senate county groupings that exist under the enacted Senate plan, minimized the number of county traversals, and applied the Adopted Criteria's equal population and contiguity requirements. Tr. 318:11-319:9.

118. With respect to municipal splits, Dr. Chen found the enacted Senate plan splits 25 municipalities, while the 1,000 simulated plans in Senate Simulation Set 1 split between just 8 and 12 municipalities. Tr. 320:12-321:9; PX1 at 69, 71 (Chen Report). From this, Dr. Chen concluded with over 99.9% statistical certainty that the enacted Senate plan subordinates the traditional districting criterion of following municipal boundaries, and splits far more municipalities than is reasonably necessary. Tr. 321:12-17.

***24** 119. Plaintiffs' Exhibit 34 depicts the number of municipalities split under the enacted Senate plan and the 1,000 simulations in Senate Simulation Set 1:

Figure 17:

Senate Simulation Set 1 (Following Only Non-Partisan Redisricting Criteria):

Split Municipalities in 2017 Senate Plan Versus 1,000 Simulated Plans

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120. The Court finds the enacted Senate plan subordinates to partisanship the traditional districting principle of avoiding the unnecessary splitting of municipalities. The Court finds the current Senate districts split substantially more municipalities than would be split if the map-drawing process had not subordinated to partisanship this traditional districting principle.

121. With respect to VTDs, Dr. Chen found the enacted Senate plan splits 5 VTDs, while his simulations split between 0 and 3 VTDs. Tr. 321:19-322:9; PX1 at 69, 72 (Chen Report). From this, Dr. Chen concluded with over 99.9% statistical certainty that the enacted Senate plan subordinates the traditional districting criterion of following VTD boundaries, and splits more VTDs than is reasonably necessary. Tr. 322:12-15.

122. Plaintiffs' Exhibit 35 depicts the number of VTDs split under the enacted Senate plan and the 1,000 simulations in Senate Simulation Set 1:

Figure 18:

Senate Simulation Set 1 (Following Only Non-Partisan Redistricting Criteria):

Split VTDs in 2017 Senate Plan Versus 1,000 Simulated Plans

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123. The Court finds the enacted Senate plan subordinates to partisanship the traditional districting principle of avoiding the unnecessary splitting of VTDs. The Court finds the current Senate districts split more VTDs than would be split if the map-drawing process had not subordinated to partisanship this traditional districting principle.

124. Dr. Chen found the enacted Senate plan is also less compact than all 1,000 of his Senate simulations. Using both the Reock and Polsby-Popper measures of compactness, all 1,000 simulated plans in Senate Simulation Set 1 are more compact than the enacted Senate plan. Tr. 322:17-324:3; PX1 at 67-69 (Chen Report). From this, Dr. Chen concluded with over 99% statistical certainty that the enacted Senate plan subordinates the traditional districting criterion of compactness, and that the current districts are less compact than they would be under a map-drawing process that prioritizes and follows the traditional districting criteria. Tr. 324:6-15.

125. Plaintiffs' Exhibit 33 depicts the compactness of the enacted Senate plan and the 1,000 simulations in Senate Simulation Set 1:

Figure 16:

Senate Simulation Set 1 (Following Only Non-Partisan Redistricting Criteria):

Comparison of 2017 Senate Plan Versus 1,000 Simulated Plans on Compactness

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126. The Court finds the enacted Senate plan subordinates to partisanship the traditional districting principle of compactness. The Court finds the current Senate districts are less compact than they would be under a map-drawing process that had not subordinated to partisanship this traditional districting criteria.

127. As with the House, Dr. Chen compared the partisanship of his simulated Senate plans to the partisanship of the enacted Senate plan using the same ten statewide elections from 2010-2016 that Representative Lewis stated would be used. Tr. 324:16-325:5.

***25** 128. Using the 2010-2016 statewide elections, Dr. Chen found that the enacted Senate plan produces 18 Democratic districts. Tr. 325:7-326:11; PX1 at 57, 60 (Chen Report). In contrast, none of the 1,000 simulated plans produce such an outcome. *Id.* The simulated Senate plans produce 19 to 21 Democratic districts using the 2010-2016 statewide elections, with the most common outcome in the simulations being 20 Democratic districts—*i.e.*, two more Democratic districts than exist under the enacted Senate plan. *Id.* From these results, Dr. Chen concluded with over 99% statistical certainty that the current Senate plan is an extreme partisan outlier, and one that could not have occurred under a districting process that adhered to the traditional districting criteria. Tr. 326:12-21; PX1 at 59 (Chen report).

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129. Plaintiffs' Exhibit 28 depicts the distribution of Democratic seats under the enacted Senate plan and under the 1,000 simulations in Senate Simulation Set 1:

Figure 14:

Senate Simulation Set 1 (Following Only Non-Partisan Redisricting Criteria):

Democratic-Favoring Districts in 2017 Senate Plan Versus 1,000 Simulated Plans

(Measured Using 2010-2016 Election Composite)

130. Like he did for the House, Dr. Chen measured the number of Democratic districts that would exist under his simulated plans and the enacted plan under electoral environments that are more neutral or even favorable to Democrats. Dr. Chen again analyzed the number of Democratic districts when using just the 2016 Attorney General election, which was a near tie. Tr. 327:8-11; PX121; PX1 at 59, 61, A3 (Chen Report). Dr. Chen found that the enacted Senate plan produces 20 Democratic districts using the 2016 Attorney General results, while the 1,000 simulated Senate plans most commonly produce 23 Democratic districts under the 2016 Attorney General results. Tr. 328:1-13. The gap between the enacted Senate plan and the simulated plans therefore grows to three Democratic seats in the most common outcome under the neutral electoral environment of the 2016 Attorney General election. *Id.*

131. Dr. Chen also performed a uniform swing analysis to compare the enacted Senate plan to the simulated Senate plans under different electoral environments. Just as he did for the House, in his uniform swing analysis for the Senate, Dr. Chen started with the Democratic vote share in every enacted and simulated district using the 2010-2016 statewide elections and then increased or decreased the Democratic vote share uniformly in every district in 0.5% increments. Tr. 328:25-329:7.

132. Dr. Chen found the same trend in his uniform swing analysis of the Senate that he found for the House. Tr: 330:7-23. He found that as he increases the uniform swing in the more Democratic direction, the gap between the number of Democratic districts under the enacted Senate plan and the simulated plans grows. *Id.* And the gap again becomes widest around the points where Democrats would come close to gaining a majority or would actually gain a majority under the nonpartisan simulated plans. *Id.*

133. Plaintiffs' Exhibit 29 below depicts Dr. Chen's uniform swing analysis for the Senate. The red stars again reflect the number of Democratic districts under the enacted Senate plan and the numbers to the right of the red stars reflect the number of simulations (out of 1,000) that produce the number of Democratic districts listed on the horizontal axis.

Figure U7: Number of Democratic Districts Under Alternative Uniform Swings in Senate Simulation Set 1 Plans

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134. Plaintiffs' Exhibit 30 (Figure U8) below depicts Dr. Chen's Senate results for a uniform swing corresponding to a statewide Democratic vote share of 51.92%. The figure reveals that, in this scenario, the enacted Senate plan contains only 22 Democratic districts, but the vast majority of simulations would give Democrats a tie or an outright majority in the Senate. Tr. 331:2-332:23. Plaintiffs' Exhibit 31 (Figure U9) below depicts Dr. Chen's Senate results for a uniform swing corresponding to a statewide Democratic vote share of 52.42%. In this environment, Democrats would win half or more of the districts in over 95% of the simulations and would win an outright majority in over 62% of the simulations. Tr. 333:7-334:2. Yet, under the enacted Senate plan, Democrats would hold just 22 Senate districts in this scenario. *Id.*

Figure U8:

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Number of Democratic Senate Districts Measured Using the 2010-2016 Election Composite With a +4% Uniform Swing, Corresponding to a 51.92% Statewide Democratic Vote Share

(Senate Simulation Set 1)

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Figure U9:

Number of Democratic Senate Districts Measured Using the 2010-2016 Election Composite With a +4.5% Uniform Swing, Corresponding to a 52.42% Statewide Democratic Vote Share

(Senate Simulation Set 1)

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***26** 135. Dr. Chen also analyzed the type of electoral environment that would produce 21 Democratic districts under the enacted plan, which is the number of Senate districts that Democrats won in 2018. Tr. 334:3-335:7. Dr. Chen found that, in the type of environment that would produce 21 Democratic districts under the enacted plan in his uniform swing analysis, Democrats would win *25 or more* Senate districts in the vast majority of simulations. *Id.*; PX29. In other words, while Democrats improved their seat share in 2018, they may well have won a majority had a nonpartisan plan been in place.

136. The Court again finds Dr. Chen's uniform swing analysis to be substantial evidence of the intent and effects of the partisan gerrymander. Dr. Chen's analysis establishes that the effects of the gerrymander are most extreme in electoral environments that are better for Democrats, and in particular in environments under which Democrats could win a majority of Senate seats under a nonpartisan map. Dr. Chen's uniform swing analysis is persuasive evidence that the enacted Senate plan was designed specifically to ensure that Democrats would not win a majority of Senate seats under any reasonably foreseeable electoral environment.

137. The Court further gives weight to Dr. Chen's overall conclusions from his Senate Simulation Set 1. Dr. Chen concluded with over 99% statistical certainty that partisanship predominated in the drawing of the enacted Senate plan and subordinated the traditional districting criteria of compactness, avoiding splitting municipalities, and avoiding splitting VTDs. Tr. 336:22-337:7. The Court adopts these conclusions and finds the current Senate districts, regardless of whether they were drawn in 2017 or 2011, subordinated these three traditional districting criteria in order to accomplish Legislative Defendants' predominant partisan goals.

138. Dr. Chen generated 1,000 more simulated plans in his Senate Simulation Set 2, adding the same incumbency criteria he used for the House. Dr. Chen found that a hypothetical, nonpartisan effort to avoid pairing the incumbents in place at the time each of the relevant districts was drawn could not explain the extreme partisan bias of the enacted Senate plan and its subordination of traditional districting principles. Tr. 341:18-342:8. Dr. Chen found the enacted Senate plan is an extreme outlier with respect to the number of Democratic districts it produces, the number of municipalities and VTDs it splits, and the compactness of its districts compared to the 1,000 simulated plans in Senate Simulation Set 2. Tr. 337:8-341:22, 26, 37, 42; PX1 at 73-85 (Chen Report). The Court gives weight to Dr. Chen's findings in Senate Simulation Set 2 and finds a nonpartisan effort to protect incumbents cannot explain the extreme partisan bias and subordination of traditional districting principles in the enacted Senate plan.

139. The Court also gives weight to and adopts Dr. Chen's conclusions that the partisan bias of the 2017 House and Senate Plans cannot be explained by North Carolina's political geography, meaning the geographic locations of Republican and Democratic voters. Tr. 307:3-11, 336:11-19. Political geography can create a natural advantage for Republicans in winning seats where, for example, Democratic voters are clustered in urban areas. Tr. 304:9-18; PX1 at 7-8 (Chen Report). But Dr. Chen designed his

simulations with the specific purpose of accounting for North Carolina's political geography and any other built-in advantages either party may have in redistricting. Tr. 304:19-305:19; *see* PX1 at 7-8 (Chen Report). The simulations build districts using the *same* Census geographies and population data that existed when the enacted plans were drawn; thus, the simulated plans capture any natural advantage one party may have had based on population patterns when the General Assembly passed the enacted plans. *Id.*

***27** 140. Dr. Chen found that Republicans may have a small degree of natural advantage in winning districts in both the House and Senate; Dr. Chen's analysis suggests that even under his nonpartisan plans, Democrats may win less than 50% of the seats when they win 50% of the votes. Tr. 305:21-307:2, 335:17-336:10; PX1 at 36, 66 (Chen Report). But Dr. Chen concluded, and the Court finds, that the enacted House and Senate plans are extreme partisan outliers compared to Dr. Chen's simulations that account for political geography and any other built-in advantages Republicans may have, and thus political geography and other built-in advantages cannot explain the enacted plans' extreme partisan bias. Tr. 307:3-11, 336:11-19.

141. The Court also rejects Legislative Defendants' critiques of the way in which Dr. Chen's simulation algorithm applied the traditional districting principles of compactness and avoiding splitting municipalities and precincts.

142. Dr. Chen's interpretation and application of the traditional districting principles is fully consistent with the guidance provided by Legislative Defendants at the time of the 2017 redistricting. At the first public hearing after the draft plans were unveiled, Representative Lewis explained the Adopted Criteria meant "trying to keep towns, cities and precincts whole where possible." PX607 at 10:5-6. Representative Lewis made similar statements at the committee hearing where the Adopted Criteria were proposed and debated; he asserted, for example, that the criterion regarding municipal splits "says that the map drawer may and rightfully should consider municipality boundaries when they can." PX603 at 67:16-18. Representative Lewis added that "municipality, precinct lines are things that are all community-of-interest-type things that we're going to seek to preserve." *Id.* at 77:12-14. Representative Lewis did not qualify in these statements that the Redistricting Committees would seek only to promote these traditional principles up to a point, or would seek to intentionally split some *minimum* number of municipalities and VTDs.

143. The Court further gives weight to Dr. Chen's testimony that his application of these criteria is consistent with generally accepted redistricting principles and practice. Dr. Chen testified that no jurisdiction in the country prefers to split a *higher* number of municipalities or VTDs or wants *less* compact districts. Tr. 603:2-605:21, 774:5-21. Nor does any jurisdiction seek to split some *minimum* number of municipalities or VTDs or impose a *cap* on how compact the districts should be. *Id.*

144. Legislative Defendants did not introduce persuasive evidence of nonpartisan reasons why the enacted plans split particular municipalities or VTDs or made particular districts less compact.

145. The Court also rejects any suggestion that Dr. Chen should not have applied these traditional districting criteria in simulating county groupings that were drawn in 2011 because these principles were not expressly stated as official criteria during the 2011 redistricting process. *See* Tr. 629:19-636:12. The principles of compactness and avoiding split municipalities and VTDs were traditional districting criteria since well before 2011. Tr. 776:8-777:8; *see, e.g.*, *Stephenson v. Bartlett*, 355 N.C. 354, 371, 562 S.E.2d 377, 389 (2002). That the General Assembly did not list these traditional districting principles as official criteria in 2011 does not change the fact that Legislative Defendants subordinated these principles to partisan considerations in drawing the 2011 districts at issue in this case. *Id.* And the fact that the General Assembly reenacted these districts without change in 2017 does not mean these districts no longer subordinate traditional districting principles to partisan considerations. *Id.*

***28** 146. Dr. Chen's analysis demonstrates the current districts subordinate these nonpartisan traditional principles to partisan intent.

b. *Dr. Mattingly*

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147. Jonathan Mattingly, Ph.D., is a North Carolina native, the chairman of the Duke University Mathematics Department, and the James B. Duke Professor of Mathematics at Duke University. Tr. 1080:7-20. He also is a professor in the Duke Statistics Department. *Id.* Dr. Mattingly was accepted as an expert in applied mathematics, probability, and statistical science. Tr. 1083:1-10.

148. Dr. Mattingly developed his method of evaluating partisan gerrymandering in his academic research. Tr. 1086:20-24. He has since created a project at Duke called "Quantifying Gerrymandering." Tr. 1084:9-1085:4. In the one previous case in which Dr. Mattingly testified, a federal partisan gerrymandering case relating to North Carolina's congressional districts, the federal court credited Dr. Mattingly's testimony and concluded his analysis "provide[d] strong evidence" of partisan gerrymandering. *Rucho*, 279 F. Supp. 3d at 644. The court found his simulations "not only evidence[d] the General Assembly's discriminatory intent, but also provide[d] evidence of the 2016 Plan's discriminatory effects." *Id.* at 666.

149. For this case, Dr. Mattingly generated a collection, or "ensemble," of nonpartisan, alternative redistricting maps using the Markov chain Monte Carlo computer algorithm, which is a well-established algorithm dating back at least to the Manhattan Project. Tr. 1089:11-24; Tr. 1090:19-22. Dr. Mattingly generated approximately 1.1×10^{108} statewide maps in the House (of which 6.6×10^{86} were unique), and approximately 3.7×10^{93} statewide maps in the Senate (of which 5.3×10^{30} were unique). Tr. 1090:1-14; PX359 at 4. The number of maps that Dr. Mattingly generated is greater than the number of atoms in the known universe. Tr. 1090:12-14.

150. To generate the maps, Dr. Mattingly used all of the nonpartisan redistricting criteria identified by the General Assembly in its Adopted Criteria. The Markov chain Monte Carlo algorithm that Dr. Mattingly employed ensured that the collection of maps was a random and representative sample from the distribution of nonpartisan maps that adhere to North Carolina's political geography and nonpartisan redistricting criteria. Tr. 1094:5-1095:3. All of Dr. Mattingly's simulated maps followed North Carolina's Whole County Provision and split no counties that were kept whole under the enacted plans; he ensured population deviations were within the 5% threshold; he required contiguity; and he tuned his algorithm to ensure that the nonpartisan qualities of the simulated maps were similar to the nonpartisan qualities of the enacted map with respect to compactness and the number of counties, municipalities, and precincts split. Tr. 1091:3-1093:1; PX359 at 3-4. Dr. Mattingly did not try to optimize or maximize any particular criterion such as compactness; instead, he took a random, representative sample of the distribution of all maps that are comparable to the enacted maps in terms of compactness and municipal splits. Tr. 1091:3-23.

***29** 151. The Court finds that Dr. Mattingly's simulated maps provide a reliable and statistically accurate baseline against which to compare the 2017 Plans. Tr. 1089:11-24. Dr. Mattingly's collection of nonpartisan maps tracked all the nonpartisan criteria adopted by the Committees. By comparing Dr. Mattingly's simulated plans to the enacted plans, the Court can reliably assess whether the characteristics and partisan outcomes under the enacted plans could plausibly have resulted from a nonpartisan process or be explained by North Carolina's political geography. The Court can also reliably assess whether the enacted plans reflect extreme partisan gerrymanders. The partisan bias Dr. Mattingly identified by comparing the enacted plans to his nonpartisan ensemble of plans could not be explained by political geography or natural packing. Tr. 1095:9-1096:8. Moreover, Dr. Mattingly's analysis did not rest on any assumption about proportional representation. Tr. 1132:6-1133:5; Tr. 1103:24-1104:5.

152. After creating a representative sample of hundreds of trillions of nonpartisan maps, Dr. Mattingly used votes from 17 prior North Carolina statewide elections to compare the partisan performance and characteristics of the 2017 Plans to the simulated plans. Dr. Mattingly chose all major statewide elections from 2008-2016 that were available to him, and those 17 elections demonstrated a range of Democratic support and Republican support and a range of spatial structures and vote patterns. Tr. 1097:8-1098:8; PX487 at 5.

153. The elections Dr. Mattingly considered and their statewide Democratic vote share are listed in the table below (PX778 at 7; Tr. 1097:8-1098:8):

17 Elections	Democratic Vote Share

AG08	61.06%
USS08	54.32%
CI08	53.57%
LG08	52.64%
CI12	51.81%
GV08	51.70%
AG16	50.20%
PR08	50.11%
GV16	50.04%
LG12	49.87%
USS14	49.16%
PR12	48.91%
PR16	48.02%
USS16	46.97%
LG16	46.58%
GV12	44.13%
USS10	43.98%

154. Dr. Mattingly concluded that the 2017 Plans displayed a "systematic, persistent bias toward the Republican Party, both on the statewide level and on the county cluster level." Tr. 1087:22-25. He concluded that the enacted plans were "extreme partisan outlier[s]" when compared to maps that respect the political geography of North Carolina and are similar to the enacted plans in terms of the nonpartisan Adopted Criteria such as compactness and splitting municipalities. Tr. 1088:1-7. He concluded that the "extreme partisan bias" was durable and persisted across a broad range of possible voting patterns and election results. Tr. 1088:1-7. He concluded that the gerrymander was particularly effective at preventing Democrats from breaking the Republican supermajority in both chambers when they would expect to do so under a nonpartisan plan, and from breaking the Republican majority in both chambers when they would expect to do so under a nonpartisan plan. Tr. 1088:8-11. And Dr. Mattingly concluded that the probability that the General Assembly would have enacted the 2017 Plans without intentionally searching for such a biased plan was "astronomically small." Tr. 1088:12-14, Tr. 1158:3-8. The Court gives great weight to those conclusions.

155. With respect to the Senate, Dr. Mattingly concluded that the enacted Senate plan shows a systematic bias toward the Republican Party. Tr. 1110:22-1111:3. In 15 of the 17 elections he considered, the enacted Senate plan produces an atypical bias toward the Republican Party with respect to the number of expected Democrat and Republican seats using the results of these prior statewide elections. Tr. 1116:2-12. The probability of seeing such a consistent pro-Republican bias across so many elections was 0.005%, Tr. 1116:18-21; PX487 at 23, meaning that the chance the General Assembly would have picked such a partisan map if it were not looking for it is five in a million, Tr. 1116:22-1117:2.

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156. Dr. Mattingly concluded that the enacted Senate plan is an extreme outlier not just with respect to how consistently it favors Republicans, but with respect to the *amount* by which it favors Republicans. PX363 (Mattingly Report Figure 3). The enacted map caused Democrats to lose between 2 to 3 seats in the Senate in 13 of the 17 elections that Dr. Mattingly analyzed. *Id.* The Court finds this seat deviation to be significant. Tr. 1106:12-15.

***30** 157. Dr. Mattingly concluded that the 2017 Senate Plan's extreme partisan bias was responsible for creating firewalls protecting the Republican supermajority and majority in the Senate. He plotted the results of the statewide elections using the enacted Senate plan and his nonpartisan simulations (PX362). Tr. 1106:17-1110:4. He ordered the elections vertically from bottom (most Republican vote share) to top (most Democratic vote share), and then plotted the number of seats that Democrats would expect to receive under the nonpartisan plans using blue histograms. *Id.* Using nonpartisan maps, the Democratic seat count would be expected to fall in the tallest part of the blue histogram. Tr. 1108:7-24. Dr. Mattingly used purple dots to report how many seats Democrats would win in the Senate using the results of each statewide election under the enacted Senate plan. Tr. 1109:3-10. Dr. Mattingly then used three vertical dotted lines to represent the point at which Democrats would break the Republican supermajority, the Republican majority, or win a supermajority themselves. Tr. 1111:5-24.[4] If the enacted plan is a pro-Republican outlier, the purple dot is to the left of the blue histogram (meaning the enacted plan elects fewer Democratic seats). If a purple dot is to the left of the Republican supermajority or majority line, and the bulk of the blue histogram is to the right, that is an election in which the enacted plan protects the Republican supermajority or majority where Democrats would break the firewalls in a nonpartisan plan. Tr. 1111:5-1112:24.

4 Dr. Mattingly plotted only 13 of the 17 elections he considered in PX362 for visual clarity reasons, Tr. 1115:1-12, but he provided all the data for all 17 elections in Figure 3 (PX363) and Table 3 of his report (PX417).

158. Plaintiffs' Exhibit 362 is reproduced below:

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159. Dr. Mattingly's analysis demonstrates that the enacted Senate plan creates two "firewalls," protecting Republican supermajorities and majorities which Democrats would break under a nonpartisan plan. Dr. Mattingly testified that, in elections where Democrats win enough votes that they would typically be expected to break the Republican supermajority under nonpartisan plans, the Republicans win the supermajority in the enacted plan. Tr. 1112:8-24. This is visually demonstrated by Plaintiffs' Exhibit 362, which shows that the Democratic seat count in the enacted plan consistently stays to the left of the supermajority line even as the Democratic vote share rises and the nonpartisan plans break through the Republican supermajority line. PX362. In many cases the enacted plan is completely outside the distribution of nonpartisan plans. Tr. 1112:8-24.

160. The results of the Attorney General 2016 election illustrate Dr. Mattingly's conclusion that the enacted map is an extreme, pro-Republican partisan gerrymander. Tr. 1114:9-11. This was a relatively even election where Democrats won 50.20% of the statewide vote, and in 99.999% of the nonpartisan maps, the Democrats broke the Republican supermajority. But, using the results of this election, the enacted map preserves the Republican supermajority. Tr. 1112:25-1114:11.

161. Overall, in 5 of the 17 elections that Dr. Mattingly considered, the Democrats would have almost certainly broken the Republican supermajority in the nonpartisan plans but failed to do so under the enacted plan (the 2012 Lieutenant Governor; 2016 President, 2008 President, 2016 Governor, and 2016 Attorney General elections). PX363; PX487 at 25 (Mattingly Rebuttal Report). In two others (the 2014 U.S. Senate and 2012 President elections), the Democrats would have had a chance of breaking the Republican supermajority in the nonpartisan plans, but never do in the enacted plan. PX362; PX417. In all seven of those elections where the Democrats would be expected to break the supermajority under nonpartisan plans, the enacted plan is an "extreme outlier." *See* PX363 (fifth column).

162. In elections where the Democrats won so many votes that the enacted Senate plan's Republican supermajority firewall breaks, Dr. Mattingly showed that the enacted Senate plan creates a second firewall preventing the Democrats from breaking the Republican majority. Tr. 1114:14-25. Using the results of the 2008 Commissioner of Insurance and 2008 Lieutenant Governor elections—both elections in which the Democrats won over 52.5% of the statewide vote—the enacted plan protects a Republican majority even where the overwhelming majority of nonpartisan plans would break its majority. *Id.*; PX362.

163. Dr. Mattingly found similar results for the House. Tr. 1087:22-25. Once again, in 15 of the 17 elections he considered, the enacted House Plan produced an atypical bias toward the Republican Party with respect to the number of Democrat and Republican seats. Tr. 1121:23-1122:5. The probability of seeing such a consistent pro-Republican bias across so many elections was 1.4%, Tr. 1122:6-13; PX359 at 11 (Mattingly Report), making it extremely unlikely that the General Assembly would have picked such a partisan map if it were not looking for it, Tr. 1122:14-17.

***31** 164. Dr. Mattingly concluded that the enacted House plan is an extreme outlier not just with respect to how consistently it favors the Republicans, but with respect to the *amount* by which it favors the Republicans. PX359 at 11 ("We never see any plans that favor the Republican Party to the same extent" in terms of seats); PX366 (Mattingly Report Figure 6). The House plan becomes a greater and greater pro-Republican outlier under elections that have more Democratic votes, and becomes an "incredibly extreme outlier" in such elections. Tr. 1120:4-11; Tr. 1119:14-20. The enacted map caused Democrats to lose between 2 and 11 seats in the House in 13 of the 17 elections that Dr. Mattingly analyzed. PX366. The Court finds this seat deviation to be significant.

165. Dr. Mattingly concluded that the enacted House plan's extreme partisan bias is responsible for creating firewalls protecting the Republican supermajority and majority in the House. Tr. 1120:15-1121:18. As with the Senate, Dr. Mattingly plotted the results of various statewide elections using the enacted House plan and his nonpartisan simulations in Figure 5 of his report (PX365). Tr. 1118:5-1120:14.

166. Plaintiffs' Exhibit 365 is reproduced below:

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167. As Dr. Mattingly testified, Plaintiff's Exhibit 365 illustrates how the enacted House plan becomes a greater and greater pro-Republican outlier as Democrats win more votes statewide, and how the enacted House plan creates firewalls protecting the Republican supermajority and majority which Democrats would break under a nonpartisan plan. Tr. 1120:4-1121:18. In the elections in the lower left of the figure where the Republicans have more statewide votes and have a supermajority even in the nonpartisan plans, the enacted plan is generally within the distribution of nonpartisan plans. PX365 (see, *e.g.*, the 2016 Lieutenant Governor and 2016 U.S. Senate elections). Dr. Mattingly explained that this makes sense from the mapmaker's perspective, because the mapmaker would not design the map for environments where Republicans are assured a "commanding supermajority" no matter what. Tr. 1123:17-24.

168. Plaintiffs' Exhibit 365 shows that in elections where the Democrats begin to break the Republican supermajority in the nonpartisan plans, the enacted plan becomes an outlier and consistently protects the Republican supermajority. Tr. 1120:15-1121:8. Dr. Mattingly testified that the enacted map "has a firewall that retards the advance of the Democratic Party particularly when they're about to break through and break the Republican supermajority." Tr. 1121:6-8.

169. Overall, in 4 of the 17 elections that Dr. Mattingly considered, the Democrats would have almost certainly broken the Republican supermajority in the nonpartisan plans but failed to do so under the enacted plan (2008 President, 2012 Lieutenant Governor, 2016 Attorney General, 2016 Governor). *See* PX366 (Mattingly Report Figure 6). By contrast, the enacted map never creates a Democratic supermajority in the House when one would not be expected under the nonpartisan ensemble. PX359 at 13-14.

170. In elections where the Democrats win so many votes that the enacted House plan's Republican supermajority firewall breaks, Dr. Mattingly showed that the enacted House plan creates a second firewall preventing the Democrats from breaking the Republican majority. Tr. 1119:14-20; Tr. 1121:9-18. Using the results of the 2008 U.S. Senate, 2008 Lieutenant Governor, or 2008 Commissioner of Insurance elections, where the Democrats virtually always have a majority in the collection of hundreds of trillions of nonpartisan plans and sometimes have a supermajority, the Democrats never win a majority under the enacted plan. Tr. 1121:11-18; PX365 (Mattingly Report Figure 5); PX359 at 13.

***32** 171. In a race like the 2008 U.S. Senate election—where the Democrats won 54.32% of the statewide vote—the enacted map is a particularly extreme pro-Republican outlier. Tr. 1121:11-18. Using that election, the Republicans win 11 more seats in the enacted House plan than they would expect to win under the nonpartisan collection of plans. PX366 (Mattingly Report Figure 6). In more than 40.1% of the plans in the nonpartisan collection, Democrats actually win a supermajority, but the Democrats do not even win a majority under the enacted plan. PX359 at 14; PX418 (Mattingly Report Table 4). By contrast, there were no historical elections under which the Republicans would have been expected to receive a majority under the nonpartisan House plans but would not receive a majority in the enacted House plan. PX359 at 13.

172. Dr. Mattingly also performed a uniform swing analysis that confirmed the enacted plan's persistent, durable, and extreme bias toward the Republican party. Tr. 1123:25-1131:5. Using six different historical elections ranging from very pro-Republican (e.g., 2012 Governor, where the Democrats won 44.13% of the statewide vote) to very pro-Democratic (e.g., 2008 U.S. Senate, where the Democrats won 54.32% of the statewide vote), Dr. Mattingly showed that the House plan's gerrymandered protection of the Republican supermajority and majority was highly robust over many different electoral structures and statewide vote fractions. Tr. 1127:15-18; Tr. 1129:5-1131:5; PX488 (Mattingly Rebuttal Report Figure 1). Each of the elections end up looking "remarkably the same" as the Democratic vote share increases; in all of the elections, the enacted map creates a firewall protecting the Republican supermajority and majority. Tr. 1129:11-1130:2; Tr. 1130:23-1131:5. Dr. Mattingly concluded on the basis of his uniform swing analysis that the House plan was "designed" to "consistently protect" the Republican supermajority and majority across all of the "very different" elections he studied, which contain many different "spatial vote patterns" and "historical voting patterns from the state of North Carolina." Tr. 1130:23-1131:5.

173. In particular, under the nonpartisan maps, the Republicans do not win a supermajority when the Democratic statewide vote share rises above 50 percent, but in the enacted plan, the Republicans do. Tr. 1130:7-19. And the uniform swing analysis shows that the enacted plan becomes an especially extreme outlier whenever the Democrats would win a majority of seats under the ensemble of nonpartisan plans. Tr. 1128:12-1129:4; Tr. 1130:3-6. Dr. Mattingly's uniform swing analysis shows that the enacted map prevents Democrats from winning a majority of the seats in the House unless they have around 55% of the statewide vote. Tr. 1131:6-16. That is well more than the Democrats would need in a non-gerrymandered plan to win a majority of House seats. *See* PX488 (Mattingly Rebuttal Report Figure 1).

174. Plaintiffs' Exhibit 488 (Mattingly Rebuttal Report Figure 1) shows Dr. Mattingly's uniform swing analysis of the House plans:

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FIGURE 1. Purple dots show the enacted plan; the green dots show a plan in the ensemble. The dashed line at 60 seats shows the majority, and the dashed line at 48.5 seats shows the Republican supermajority threshold. The number of Democrats elected in the Senate which has a total of 120 seats.

175. Dr. Mattingly preferred to compare the enacted plan to nonpartisan plans election-by-election, because taking an average seat shift across a set of elections can obscure a gerrymander's effect in close elections where control of the Senate or House is at issue. Tr. 1214:8-13, 1216:16-19, 1216:22-1217:3. Even considering the average, however, Dr. Mattingly found that the enacted plan is an extreme pro-Republican outlier. Tr. 1216:4-12. Comparing the enacted Senate plan to the median Senate plan in the ensemble for each of the 17 elections, the enacted plan causes Democrats to lose on average 1.94 seats in the Senate

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across all 17 elections. PX363. Not a single one of Dr. Mattingly's 3.7 x 10^{93} statewide maps in the Senate favors the Republican Party as much as the enacted plan under this metric. PX363 (bottom right image); PX487 at 23 (Mattingly Rebuttal Report). Similarly, comparing the enacted House plan to the median House plan in the ensemble for each of the 17 elections, the enacted plan causes Democrats to lose on average 3.35 seats in the House across all 17 elections. Not a single one of Dr. Mattingly's 1.1 x 10^{108} statewide maps in the House favors the Republican Party as much as the enacted plan under this metric. PX366 (bottom right image); PX359 at 11 (Mattingly Report) (noting that the average seat difference in favor of the Republicans across all 17 elections is "greater than all plans in the ensemble").

***33** 176. Dr. Mattingly's separate analysis of the structure of the enacted House and Senate plans provided further confirmation that both plans are extreme partisan gerrymanders, even putting aside the effect on seat count in any particular election. He demonstrated that the General Assembly cracked and packed Democratic voters for partisan gain across the House and the Senate plans, with a particular focus on cracking Democratic voters out of the middle seats that determine supermajority and majority control of both Chambers.

177. Dr. Mattingly ordered the 120 districts in the House in his ensemble of nonpartisan plans from lowest to highest based on the Democratic vote fraction in each district. He did this for each of the 17 statewide elections he analyzed. Tr. 1159:4-15; PX483.

178. Below is an example of Dr. Mattingly's structural analysis of the 120 districts in the House using the votes from the 2016 Attorney General's Election. *See* PX483 at 13; PX778 at 33 (Mattingly PowerPoint presentation).

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179. The purple dots in the ranked-ordered box plots from Plaintiffs' Exhibit 483 represent the Democratic vote fraction in the enacted plan for each district ordered from least to most Democratic; the boxes represent the Democratic vote fraction across Dr. Mattingly's ensemble of nonpartisan plans. Tr. 1159:4-1162:1. The key in the top left-hand corner shows the statewide election and the Democratic statewide vote fraction in that election.

180. Dr. Mattingly explained that in the 40 seats in the middle—between the 40th most Democratic seat and the 80th most Democratic seat—the Democratic vote fraction in the enacted plan is far below the boxes representing the nonpartisan plans. Tr. 1162:7-25. Those "are the seats that determine who has a supermajority and who has the majority," and they are the "critical seats for the structure of the House." Tr. 1162:19-25. But in the most Democratic districts, beginning around the 99th least Democratic seat, the Democratic vote fraction is much higher in the enacted plan. Tr. 1162:7-12. In other words, across the map, Democrats have been cracked out of the districts that determine control of the House and packed into districts they would win anyway. Tr. 1162:7-25. In the 2016 Attorney General election, this structural gap between the Democratic vote share in the enacted plan and the nonpartisan plans in the critical districts means that the Republicans kept the supermajority even though they would have lost it under the ensemble of nonpartisan plans. Tr. 1163:3-25.

181. An examination of the dis tricts between the 40th least Democratic district and the 80th least Democratic district in the House using the 2016 Attorney General election further demonstrates the cracking of Democratic voters in these critical seats. (PX485 at 13; PX778 at 34):

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182. Dr. Mattingly testified that the large gap between the Democratic vote fraction in the enacted plan and in the ensemble at the 72-seat marker is the structural feature of the House map that is responsible for the firewall protecting the Republican supermajority. Tr. 1164:1-9.

183. Dr. Mattingly's ranked-ordered box plot using the results of the 2012 Presidential election revealed that same structural anomaly (PX485 at 11; PX778 at 35):

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184. Using the results of the 2012 Presidential election, Dr. Mattingly testified that again the enacted map shows a "huge depletion of Democratic voters" in these districts that matter for supermajority and majority control. Tr. 1164:17-1165:7; PX485 at 11. Dr. Mattingly explained that, although the Presidential 2012 election was a fairly Republican election where the Republicans would win a House majority even under the nonpartisan plans, the significant deviation in the Democratic vote fraction in the seats that matter most will have a "dramatic effect" in elections where the Democrats get more votes statewide. Tr. 1166:1-17.

***34** 185. Plaintiffs' Exhibit 484 contains Dr. Mattingly's ranked-ordered box plots for the Senate. Dr. Mattingly ordered all 50 Senate districts in his ensemble from lowest to highest based on the Democratic vote fraction in each district. He did this for each of the 17 statewide elections he analyzed. PX484. Below is an example of Dr. Mattingly's structural analysis of the 50 Senate districts using the 2016 Lieutenant Governor election. PX484 at 15; PX778 at 40.

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186. The ranked-ordered box plot using the 2016 Lieutenant Governor results demonstrates the same significant suppression of Democratic votes in the enacted plan in the districts that matter most—the 25th most Democratic district, which determines who wins the majority in the Senate, and the 29th least Democratic district, which the Democrats need to win to break the supermajority. Tr. 1175:12-24; PX484 at 15. Dr. Mattingly testified that the gap between the enacted plan and the ensemble around the 25th and 29th/30th district shows that the enacted plan is an "extreme outlier." Tr. 1176:5-9. In turn, in the most Democratic districts, the enacted plan has significantly more Democrats than in the nonpartisan ensemble, PX484 at 15—representing packing of Democrats into these districts. Tr. 1175:4-9.

187. As noted, Dr. Mattingly performed this same structural analysis of the House and Senate enacted plans using all 17 of his statewide elections. PX483, PX484. He testified that all 34 of his ranked-ordered box plots overwhelmingly show the same gaps between the enacted plan and the ensemble in the Democratic vote fraction in the seats that matter most in the Senate and the House, and overwhelmingly show the firewalls protecting the Republican supermajorities and majorities. Tr. 1176:10-23. Dr. Mattingly testified that it would "almost be impossible to build this structure" in the absence of an intentional choice to do so. Tr. 1176:24-1177:2. The Court gives great weight to this conclusion.

188. In his report, Dr. Mattingly conducted a statistical analysis to quantify the statewide cracking and packing of Democratic voters in the House and Senate plans that the ranked-ordered box plots from Plaintiffs' Exhibits 483 and 484 visually illustrate. That analysis confirms to a high degree of statistical significance that the structure of the enacted plans reflects extreme bias in favor of the Republicans that will persist in election after election.

189. Specifically, in the House, Dr. Mattingly analyzed the 48th to the 72nd least Democratic districts (again, the range that determines majority and supermajority control). PX359 at 13 (Mattingly Report). Dr. Mattingly found that in 15 of the 17 elections, there is less than a 0.0005% chance of finding a plan in the ensemble that had fewer Democratic votes across those districts than did the enacted plan. *Id.*; PX359 at 13. In the remaining 2 elections, there was less than a 0.02% and 0.3% chance of finding a plan in the ensemble with as much cracking of Democrats out of the middle districts as the enacted plan. *Id.*

190. Dr. Mattingly's statewide quantification of the Senate showed the same extreme cracking of Democrats out of the districts that determine majority and supermajority control. For the Senate, Dr. Mattingly considered the 20th to 30th least Democratic districts. PX359 at 9. He found that in 14 of the 17 statewide elections, there is less than a 0.0005% chance of finding an ensemble plan with fewer Democratic votes across those districts than the enacted plan. *Id.* In two other elections, the enacted plan was still an extreme outlier, at the 0.1% level. *Id.*

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***35** 191. Dr. Mattingly also created video animations of his uniform swing analysis using six different elections in both the House and Senate. PX772 (video animations). In the videos, the blue histograms represent the distribution of seats using Dr. Mattingly's nonpartisan plans; the "enacted" marker represents the enacted plan, and the three vertical lines represent the Republican supermajority, Republican majority, and Democratic supermajority lines. *Id.* Dr. Mattingly played two of the videos for the Court, representing uniform swing analysis in the House using the results of the 2012 Presidential election and 2016 Lieutenant Governor election. Tr. 1168:4-8, 1169:17-1172:15; PX778 at 37, 38 (PowerPoint slides); PX772 (video animations). The 2012 Presidential election video showed that the enacted plan started out looking fairly typical of the ensemble of nonpartisan plans; that is the video starts with a 45% Democratic vote share where Republicans retain the supermajority under the nonpartisan plans as well. Tr. 1169:17-25. As the Democratic vote fraction increases, the blue histograms representing the nonpartisan plans shifts to the right and the number of seats that Democrats win increase. Tr. 1169:25-1170:9. But the enacted plan begins to lag "dramatically" behind the nonpartisan plans. Tr. 1170:6-13. In particular, at the Republican supermajority and majority lines, the enacted plan "sticks" on the Republican side of the line even as the blue histogram representing the nonpartisan plans move completely past those lines. Tr. 1171:8-21. The gerrymander is sometimes so effective that it retains a Republican supermajority in the enacted plan even where the Democrats win a majority in the nonpartisan plans. Tr. 1172:6-10.

192. Dr. Mattingly's video animation of a uniform swing analysis of the 2016 Lieutenant Governor election showed the same thing, Tr. 1172:17-1174:20, as do Dr. Mattingly's four remaining videos, PX772.

193. The Court finds that these video animations provide significant evidence confirming Dr. Mattingly's conclusions that the enacted House and Senate maps exhibit extreme partisan bias and create partisan firewalls protecting the Republican supermajority and majority. The Court finds that Dr. Mattingly's uniform swing videos are also significant evidence that the gerrymanders cause the enacted House and Senate maps to be largely nonresponsive to the actual votes cast in North Carolina's elections. Moreover, as Dr. Mattingly explained, the ranked-ordered box plots that he created using all 17 statewide elections showing the systematic suppression of Democratic vote fractions in the districts that matter most for the House and Senate demonstrate—without any need to conduct uniform swing analysis—that the enacted plan will be nonresponsive to the votes actually cast in North Carolina elections. Tr. 1174:25-1176:9.

194. Dr. Mattingly's findings regarding the firewall to protect the Republican majorities in the General Assembly are significantly similar to Dr. Chen's findings. Dr. Chen, like Dr. Mattingly, found that the gap between the number of Democratic districts under the enacted plans and under his simulated plans gets wider in electoral environments that are better for Democrats, and are at their widest around the point where Democrats would win a majority of seats in the House or Senate in his simulated plans. The independent findings of Drs. Chen and Mattingly strengthen and reinforce the conclusion that Legislative Defendants drew the enacted House and Senate plans with the specific goal of making it extremely difficult, if not impossible, for Democrats to take control of either chamber of the General Assembly.

195. Dr. Mattingly's county-grouping analysis, discussed in greater detail below, also allowed him to draw statistically significant conclusions about the intent of the mapmaker in creating the statewide Senate and House plans. Tr. 1157:24-1158:8. In particular, he explained that the design of each county grouping in the House and Senate plans represented an independent choice by the mapmaker, because "how you redistrict one county cluster does not affect how you redistrict the next one since you can't cross county cluster lines." Tr. 1157:17-23. Dr. Mattingly found that numerous county groupings in the House and Senate were extreme pro-Republican partisan outliers at the 100% or 99% level. PX778 at 29-30. He testified that the probability that the extreme partisan bias in the enacted maps was unintentional was "astronomically small," because the chance of making so many independent choices "with such extreme bias" in one map was "astronomically small if you are not looking for it." Tr. 1158:3-8.

196. Dr. Mattingly conducted a secondary analysis in which he only considered plans that preserved incumbents "to the same extent, or better, than they are preserved" in the enacted plan in each grouping. PX359 at 81. Dr. Mattingly found that accounting for the effects of incumbency did not change his conclusion that the enacted plans are extreme pro-Republican gerrymanders. Tr. 1093:21-1094:3. Defendants failed to offer evidence sufficient to rebut Dr. Mattingly's conclusion that the enacted plan's extreme bias could not be explained by a nonpartisan effort to avoid pairing incumbents.

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***36** 197. Dr. Mattingly performed extensive robustness checks establishing that his results were insensitive to the choices he made and criteria he used to generate the distribution of nonpartisan plans. Among other things: Dr. Mattingly went through every district in every grouping he analyzed to confirm that the compactness and municipal splits in the ensemble tracked those qualities in the enacted plan. PX359 at 57-80 (Mattingly Report). He performed a secondary analysis considering only plans that were equal to or better than the enacted plan along the dimension of compactness and municipal splits and found that it did not affect his results. PX359 at 82; PX468, 472-473. He created different collections of nonpartisan maps using six different sets of weights for compactness and other nonpartisan criteria and confirmed that changing the weights did not change the results. PX487 at 11 (Mattingly Rebuttal Report). And when Defendants' experts raised various speculative critiques in their reports—asking whether changing one criterion or another would make a difference—Dr. Mattingly performed a follow-up analysis in his rebuttal report confirming that it did not. *Id.* at 6-11.

198. The Court finds that none of Legislative Defendants' objections to Dr. Mattingly's analysis calls into question its persuasive value. The fact that, in a few individual elections, the enacted plan is not an extreme outlier relative to the ensemble of plans in terms of seat count alone does not undermine Dr. Mattingly's conclusion that the enacted plans are extreme partisan gerrymanders designed to protect Republican supermajorities and majorities. Tr. 1117:9-11 (Senate); Tr. 1122:18-1123:24 (House). First, Dr. Mattingly explained that the underlying structure of the enacted plans reflected a trade-off. To crack Democrats out of districts where it matters, the mapmaker had to pack Democrats into other districts. Tr. 1123:5-24. Under certain circumstances—*i.e.*, in Republican wave elections—the packing of Democratic voters in the enacted plan causes Republicans to lose districts that they would have won in nonpartisan plans that did not pack Democratic voters into these districts. But such an electoral environment is one in which Republicans would already win a commanding supermajority. *Id.* As Dr. Mattingly explained, someone gerrymandering a map would happily hold the supermajority or the majority in elections where their control is at risk, even if the cost is a few less seats in elections where they will always have a commanding supermajority anyway. *Id.*

199. The 2012 Governor election—a highly Republican election where the Republicans win a supermajority in Dr. Mattingly's nonpartisan plans—provides an example. When Dr. Mattingly conducted a uniform swing analysis using the 2012 Governor election, the enacted map became an "extreme outlier in favor of the Republican Party" as the statewide vote swings to the Democrats and the Democrats approached the point where they would break the Republican supermajority and majority under his nonpartisan plans. Tr. 1126:7-1127:9; PX488. Although the 2012 Governor election may not appear to be a partisan outlier for the Republicans, Dr. Mattingly testified that in fact "it is." Tr. 1127:19-1128:11.

200. During Dr. Mattingly's cross examination, Legislative Defendants suggested that he should have included other purportedly nonpartisan criteria in his simulated plans beyond the ones listed in the adopted criteria. The Court, however, gives no weight to Legislative Defendants' suggestions that secret and undisclosed nonpartisan agreements between "representatives of different political parties" might explain the partisan bias that Dr. Mattingly identified. *E.g.*, Tr. 1204:11-14. The Court also gives no weight to the suggestion that Dr. Mattingly should have accounted for "communities of interest" in a manner other than by avoiding splitting counties, cities, and towns, *see, e.g.*, Tr. 1192:19-1193:4, considering Legislative Defendants expressly declined to include "communities of interest" as a criterion for the 2017 Plans. Tr. 1223:8-1224:1; *see* PX603 at 67:14-25 (Rep. Lewis stating that "communities of interest" is not a "criteria that we have proposed" because the Committee "couldn't find a concise definition"); *id.* at 73:16-20 (Rep. Lewis stating that he opposed listing "communities of interest" as a criteria because "municipalities are defined and understood" but the Committee couldn't "agree[]" on what a community of interest was beyond that); *id.* at 77:3-25 (Rep. Lewis again rejecting the use of "communities of interest"); *id.* at 106:10-11 (Rep. Lewis stating that "I don't believe [communities of interest] belongs in this criteria").

***37** 201. When asked by interrogatory to "identify and describe all criteria that were considered or used in drawing or revising districting boundaries for the 2017 Plans," Legislative Defendants made a binding concession that the only "criteria used to draw the 2017 plans is the criteria adopted by the Redistricting Committees." PX579 at 13. As such, the Court gives little

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credence to Legislative Defendants' critique that Plaintiffs' experts failed to include criteria not in the Adopted Criteria, or a claim that other considerations purportedly explain the contours of the 2017 Plans.

c. *Dr. Pegden*

202. Wesley Pegden, Ph.D., is an Associate Professor in the Department of Mathematical Sciences at Carnegie Mellon University, and testified as an expert in probability. Tr. 1294:19-21, 1302:6-12; PX509. Dr. Pegden has published numerous papers on discrete mathematics and probability in high-impact, peer-reviewed journals, and has been awarded multiple prestigious grants, fellowships, and awards. Tr. 1295:4-20; PX509. He has been appointed by the Governor of Pennsylvania to that state's Redistricting Reform Commission. Tr. 1301:24-1302:5.

203. Dr. Pegden's academic work on redistricting involves Markov chains. A Markov chain is "a random walk around some abstract space." Tr. 1295:23-1296:1. For example, if a person walks around a city, and whenever she reaches an intersection, she chooses which way to turn at random, her position over time "would evolve as a Markov chain." Tr. 1296:5-7. In the context of redistricting, one can imagine taking a random walk "over the space of maps." Tr. 1296:8-14.

204. In 2017, before Dr. Pegden had ever served as an expert in redistricting litigation, he published a peer-reviewed article (PX510) entitled "Assessing Significance in a Markov Chain Without Mixing" in the Proceedings of the National Academy of Sciences—a top-ranked, science-wide journal. Tr. 1295:13-17, 1296:24-1297:1. This article provides a new way to demonstrate that a given object is an outlier compared to a set of possibilities. Tr. 1297:2-7.

205. Dr. Pegden explained that there are three ways to show that a given object is an outlier. The first, most basic way is simply to examine every single member of the entire set of possibilities, and then determine whether the object in question is different than all or most of those possibilities. The second form of outlier analysis is to take a random sample from the set of possibilities, and then compare the object in question to that sample. This type of analysis is the basis of most modern statistics, and is the form of outlier analysis used by Drs. Chen and Mattingly in generating nonpartisan simulated plans and comparing the enacted plans to those random nonpartisan plans. Tr. 1297:10-1298:11, 1309:10-18.

206. The third form of outlier analysis, developed by Dr. Pegden and his co-authors, is a kind of "sensitivity analysis" that begins with the object in question, uses a Markov chain to make a series of small, random changes to the object, and then compares the objects generated by making the small changes to the original object. Tr. 1298:16-1299:4. Dr. Pegden's article illustrates this methodology using a redistricting plan. Tr. 1299:8-18. The article demonstrates that, by using an existing plan as a starting point and then making small random changes to the district boundaries, one can prove the extent to which the existing plan is an outlier compared to all possible maps meeting certain criteria. Dr. Pegden's article proves mathematical theorems showing that this approach can establish a redistricting plan's outlier status in a way that is "completely statistically rigorously grounded in mathematics." Tr. 1299:1-4.

***38** 207. In mid-2018, before this case was filed, Dr. Pegden began working on a new article entitled "Practical Tests for Significance in Markov Chains." Tr. 1300:8-1301:4; PX511. This article further develops this new, third form of outlier analysis with new, more powerful statistical tools. Tr. 1301:5-12. Though unpublished, this second article has been vetted by the mathematical community, including through detailed presentations Dr. Pegden gave at the Duke Statistical and Applied Mathematical Sciences Institute and the Harvard Center for Mathematical Sciences and Applications. Tr. 1300:13-23.

208. In this case, Dr. Pegden used this new, third form of outlier analysis to evaluate whether and to what extent the 2017 Plans were drawn with the intentional and extreme use of partisan considerations. Tr. 1302:24-1303:1. To do so, using a computer program, Dr. Pegden began with the enacted plans, made a sequence of small random changes to the maps while respecting certain nonpartisan constraints, and then evaluated the partisan characteristics of the resulting comparison maps. Tr. 1304:1-1306:21. As explained in further detail below, Dr. Pegden found that the enacted House and Senate plans are more favorable to Republicans than 99.999% of the comparison maps his algorithm generated by making small random

changes to the enacted plans. Tr. 1304:14-18, 1342:10-18, 1344:18-1345:3; PX515; PX519. And based on these results, Dr. Pegden's theorems prove that the enacted House and Senate maps are more carefully crafted to favor Republicans than at least 99.999% of all possible maps of North Carolina satisfying the nonpartisan constraints imposed in his algorithm. Tr. 1342:13-25, 1344:18-1345:7; PX515; PX519.

209. Dr. Pegden's analysis proceeded in several steps. He began with the enacted House or Senate map. His computer program then randomly selected a geographic unit on the boundary line between two districts and attempted to move or "swap" the unit from the district it is in into the neighboring district. Tr. 1309:19-24, 1311:1-5; PX508 at 9 (Pegden Report).

210. Dr. Pegden's method uses two different geographic units, VTDs and geounits. Tr. 1309:25-1310:2; PX508 at 9 (Pegden Report). His method uses VTDs when analyzing enacted maps that split few or no VTDs. Such maps include the enacted Senate map and the Senate county groupings Dr. Pegden analyzed. Tr. 1310:3-6; PX508 at 9 (Pegden Report). When analyzing enacted maps that split many VTDs—including the enacted House map and certain House county groupings Dr. Pegden analyzed—Dr. Pegden's method uses a sub-VTD geographic unit known as a "geounit." Tr. 1310:3-11; PX508 at 9 (Pegden Report). Created by a computer program, geounits are compact collections of census blocks that lie entirely within one VTD and one district, containing roughly 500-1000 people. There are roughly six or seven geounits per VTD. Tr. 1310:12-25; PX508 at 9 (Pegden Report).

211. When attempting to swap a randomly selected VTD or geounit from one district to another, Dr. Pegden allowed the swap to occur only if certain constraints were satisfied. Tr. 1311:1-8; PX508 at 7-8 (Pegden Report). These constraints were based on the 2017 Adopted Criteria, and were designed to ensure that the comparison maps generated by Dr. Pegden's algorithm are "good, reasonable comparisons to the enacted map." Tr. 1311:9-12, 1317:25-1318:25. The constraints that Dr. Pegden imposed included contiguity, population deviation, compact districts, county preservation, municipality preservation, precinct preservation, and incumbency protection. Tr. 1311:13-1317:10; PX508 at 7-8 (Pegden Report). Dr. Pegden also froze boundary lines redrawn by the Special Master in 2017. Tr. 1319:1-22.

***39** 212. Dr. Pegden applied these constraints in a conservative way, so as to "accept choices the mapmaker made." Tr. 1312:19-22. For example, with respect to population deviation, while the 2017 enacted criteria allows districts to vary between plus-or-minus 5% from the ideal district population, the actual enacted House map does not use all of that range, and instead varies between plus 5% to minus 4.97% from ideal. Dr. Pegden accepted that choice by the mapmaker and required all of his comparison maps to fall within that slightly narrower range. Tr. 1312:1-22; PX508 at 8 (Pegden Report). Similarly, with respect to county preservation, Dr. Pegden's algorithm not only respected North Carolina's county groupings, capped the number of county traversals, and preserved the same number of counties as in the enacted map—his algorithm also preserved whole the very same counties preserved whole in the enacted plan. Tr. 1314:9-1315:3. Likewise, with respect to municipality preservation, Dr. Pegden's algorithm not only preserved the same number of municipalities preserved in the enacted map, but also preserved the very same municipalities, and preserved them within the very same districts as in the enacted plan. Tr. 1315:4-19.

213. Dr. Pegden's conservative application of these constraints "ties [his] comparisons very strongly to the enacted map itself." Tr. 1315:22-24. This makes it all the more remarkable that the enacted maps are such outliers in his analysis, even against this very similar comparison set. Tr. 1315:24-1316:2, 1331:6-10.

214. Dr. Pegden also constrained the compactness of his comparison maps. In his main analysis, Dr. Pegden required that the average compactness score for each comparison map not exceed the corresponding average for the enacted plan, with an error of up to 5%. Tr. 1312:23-1313:5; PX508 at 8 (Pegden Report). Dr. Pegden also ran robustness checks using several other compactness constraints—a 10% error, a 0% error, and a completely different measure based on total district perimeter—and found that altering the compactness constraint did not affect his results. Tr. 1313:6-1314:8; PX508 at 32-34 (Pegden Report).

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215. For some county groupings, because of Dr. Pegden's conservative application of his constraints, it was impossible for his algorithm to find a swap that satisfied all of the constraints. Tr. 1319:25-1320:10. When this occurred, Dr. Pegden ran a modification of his algorithm allowing multiple swaps in one step. Tr. 1320:11-25; PX508 at 9-10 (Pegden Report).

216. For some county groupings, even with multi-move swaps, Dr. Pegden's algorithm still was unable to generate any comparison maps—or only a very small number—meeting all of his constraints. Where this occurred, Dr. Pegden was unable to draw any conclusions about the county groupings in question. Tr. 1321:1-16. Dr. Pegden, however, credibly explained that this does not mean that the maps in those groupings were *not* drawn with the intentional use of partisanship. For example, partisan considerations could have predominated in choosing which municipalities to preserve whole in which districts, a choice Dr. Pegden's comparison maps took as a given. Tr. 1321:17-25, 1349:11-1350:4; PX508 at 10-11 (Pegden Report).

217. Once Dr. Pegden's algorithm made a swap satisfying his constraints, his algorithm evaluated the partisan characteristics of the comparison map that resulted from the swap. Tr. 1322:1-6. For his main analysis, Dr. Pegden used data from the 2016 Attorney General race to analyze the whole House and Senate maps, the subset of House and Senate districts redrawn in 2017, and any House or Senate county grouping last changed in 2017. Dr. Pegden then used data from the 2008 Commissioner of Insurance race to analyze the subset of House and Senate districts last changed in 2011, as well as any House or Senate county grouping last changed in 2011. Dr. Pegden used these particular elections because they were reasonably close, statewide, down-ballot elections that were available to the General Assembly at the relevant times. Tr. 1322:7-24. Dr. Pegden explained that the "point of [his] analysis is really to get at the intent of the legislature," to "understand the decisions they made with information available to them at the time." Tr. 1322:25-1323:3.

***40** 218. Dr. Pegden also re-ran his analysis using four additional elections—the 2016 Governor election, the 2014 U.S. Senate election, the 2012 Presidential election, and the 2012 Lieutenant Governor election. Tr. 1323:4-12; PX508 at 35-36 (Pegden report). Using these different historical elections did not alter Dr. Pegden's conclusions. Tr. 1323:13-15.

219. To evaluate the partisan characteristics of each comparison map, Dr. Pegden's algorithm calculates the number of seats Republican candidates would win, on average, if a random uniform swing were repeatedly applied to the historical voting data being used. This metric captures how a given comparison map would perform over a range of electoral environments centered around the base election being used (i.e., the 2016 Attorney General's election for Dr. Pegden's primary analysis). Tr. 1324:8-1326:20.

220. Dr. Pegden also re-ran his analysis using a different partisan metric, which measures the Republican vote share in the 61st-most Republican House district, or the 26th-most Republican Senate district. This metric captures, for a given comparison map, how comfortably Republicans would win the seat that would give them the majority in the relevant chamber of the General Assembly. Put differently, this metric captures how large of a Democratic wave election the Republican House or Senate majority could withstand. Tr. 1326:21-1327:20.

221. In his rebuttal report, in response to certain criticisms by Legislative Defendants' experts, Dr. Pegden also re-ran his analysis yet again, this time using a third partisanship metric. In this analysis, Dr. Pegden's algorithm simply measured the number of seats Republicans would have won in an election precisely mirroring the 2016 Attorney General election, without any uniform swing or rank-ordering of districts by Republican vote share. Tr. 1327:21-1328:10.

222. Dr. Pegden's analysis is statistically robust across three different partisanship metrics, none of which altered his conclusions. Tr. 1326:21-1327:15.

223. Dr. Pegden's algorithm repeats the foregoing steps billions or trillions of times in sequence. The algorithm begins with the enacted map, makes a small random change complying with certain constraints, and uses historical voting data to evaluate the partisan characteristics of the resulting map. The algorithm then repeats those steps, each time using the comparison map generated by the previous change as the starting point. By repeating this process many times, Dr. Pegden's algorithm generates

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a large number of comparison maps in sequence, each map differing from the previous map only by one small random change. Tr. 1328:22-1329:12.

224. Each sequence of billions or trillions of small changes in Dr. Pegden's analysis is one "run." His algorithm performs multiple runs for each map being analyzed, with each run beginning with the enacted plan as the starting point. Dr. Pegden ran his algorithm with a sufficient number of steps and runs in order to generate results that are statistically significant but capable of being replicated within a reasonable time. Tr. 1329:3-22.

225. The comparison maps generated by Dr. Pegden's algorithm are not intended to provide a baseline for what neutral, nonpartisan maps of the North Carolina House or Senate should look like. Instead, Dr. Pegden's comparison maps are intended to be similar to the enacted map in question with respect to each map's relevant nonpartisan characteristics, in order to assess how carefully created the enacted plan is to maximize partisan advantage. Tr. 1308:4-12, 1309:10-18, 1329:23-1330:6, 1362:23-1363:6, 1369:25-1370:4.

***41** 226. Dr. Pegden performed two levels of analysis on the comparison maps generated by his algorithm. Dr. Pegden's first-level analysis simply "report[s] what happened" in each run when his algorithm made random swaps to the enacted plan's district boundaries. Tr. 1332:8-16. For the enacted House and Senate maps, Dr. Pegden reports that—in every run—the enacted map was more favorable to Republicans than 99.999% of the comparison maps generated by his algorithm making small random changes to the district boundaries. PX515; PX519.

227. Dr. Pegden's first-level analysis provides clear, intuitive evidence that the 2017 Plans were meticulously crafted for Republican partisan advantage.

228. Dr. Pegden provided a stark illustration from his first-level analysis of how precisely the enacted plans are drawn to maximize partisan advantage. Dr. Pegden explained that, in his runs for the Wake-Franklin county grouping in the Senate, after "the first fraction of a second," his algorithm "never again" encountered a "single comparison map as advantageous to the Republican Party as the enacted plan itself." Tr. 1308:15-1309:7.

229. Dr. Pegden's second-level analysis provides mathematically precise calculations of how "carefully crafted" the 2017 Plans are—that is, how precisely the district boundaries align with partisan voting patterns so as to advantage Republicans— when compared not just to the comparison maps generated in each run of his algorithm, but to *all possible maps of North Carolina* that satisfy his constraints. Tr. 1332:24-1335:20. In other words, Dr. Pegden is able to determine—to a mathematical certainty—the extent to which the enacted plan is an outlier relative to every single other possible House or Senate map of North Carolina that could exist meeting the contiguity, equal population, compactness, political subdivision, and Special Master constraints that his algorithm applies. For the enacted House and Senate maps, Dr. Pegden reports that under this second-level analysis the enacted map is more carefully crafted for Republican partisan advantage than at least 99.999% of all possible maps of North Carolina satisfying his constraints. PX515; PX519.

230. The results of Dr. Pegden's second-level analyses follow from his theorems, which have been validated by other mathematicians. Tr.1337:9-18. And the results of Dr. Pegden's second-level analyses are intuitive. In effect, Dr. Pegden's analysis shows that the 2017 Plans not only are quite advantageous to Republicans, but also are surrounded in the space of maps by a plethora of other maps that are *less* advantageous to Republicans. It is simply not possible, even in principle, for a typical map of North Carolina (or any other state) to be favorable to Republicans and be surrounded by maps that are less favorable. The only explanation is that the map drawer intentionally crafted the district boundaries to maximize partisan advantage. Tr. 1337:9-1340:8; *see* PX508 at 7 ("In other words, it is mathematically impossible for any state, with any political geography of voting preferences and any choice of districting criteria, to have the property that a significant fraction of the possible districtings of the state satisfying the chosen districting criteria appear carefully crafted.")

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231. For both the House and the Senate, Dr. Pegden performed three different analyses. First, using voting data from the 2016 Attorney General election, Dr. Pegden analyzed the entire House and Senate maps. Second, again using voting data from the 2016 Attorney General election, Dr. Pegden analyzed only the districts that were redrawn in 2017, while freezing the districts that were last changed in 2011. Third, using voting data from the 2008 Commissioner of Insurance election, Dr. Pegden analyzed only the districts that were last changed in 2011, while freezing the districts that were redrawn in 2017. Tr. 1340:14-1341:15.

***42** 232. Dr. Pegden's statewide analyses conclusively show that the pertinent districts drawn in 2011, the districts drawn in 2017, and the maps as a whole were all drawn with the intentional and extreme use of partisan considerations. The following demonstrative chart summarizes Dr. Pegden's statewide results:

Map Analyzed	**First-level Analysis (% of algorithm maps less partisan than enacted map)**	**Second-level Analysis (% of all maps less carefully crafted than enacted map)**
	House	
Whole state	99.99984%	99.9991%
2017 districts only	99.9982%	99.99%
2011 districts only	99.9999988%	99.999993%
	Senate	
Whole state	99.99999983%	99.999999%
2017 districts only	99.99999975%	99.9999985%
2011 districts only	99.9995%	99.997%

Sources: Plaintiffs' Exhibits 515-517, 519-521

PX904; *see also* PX515-517, 519-521; Tr. 1341:18-1346:16.

233. These results cannot be explained by North Carolina's political geography. Dr. Pegden's algorithm compares the enacted map to other maps of North Carolina, with the very same political geography. And Dr. Pegden's theorems do not depend on any aspect of North Carolina's political geography—the theorems are mathematically valid for any state with any political geography. Indeed, Dr. Pegden's theorems are mathematically valid not just for redistricting plans, but for any abstract space on which one could imagine taking a random walk using a Markov chain. Tr. 1333:14-24, 1401:9-1402:5.

234. The results of Dr. Pegden's statewide analyses also conclusively show that it is possible for a North Carolina map drawer to make intentional and extreme use of partisan considerations even within the Whole County Provision and the other constraints set forth in the 2017 Adopted Criteria. All of Dr. Pegden's comparison maps respect the Whole County Provision and the other constraints set forth in the 2017 Adopted Criteria. And in his algorithm, Dr. Pegden applied those constraints in a very conservative way that respects the choices made by the map drawer with respect to compactness and the divisions and preservation of particular counties and municipalities. Even within those tight constraints, there were many different maps for a map drawer to choose from, and the enacted maps demonstrate that the map drawer intentionally chose maps that were more carefully crafted for Republican partisan advantage than at least 99.999% of all possible alternatives. Tr. 1402:15-1403:8; PX515; PX519.

235. The Court gives great weight to Dr. Pegden's testimony, analysis, and conclusions.

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d. *Dr. Cooper*

236. Christopher A. Cooper, Ph.D., has resided in North Carolina for 17 years and is the Robert Lee Madison Distinguished Professor and Department Head of Political Science and Public Affairs at Western Carolina University. Tr. 848:18-849:7. Dr. Cooper was accepted as an expert in political science with a specialty in the political geography and political history of North Carolina. Tr. 861:21-862:5.

237. As Dr. Cooper explained, North Carolina is a "purple state" that, on the whole, is politically moderate. Tr. 862:21-22. In statewide elections, which are not susceptible to gerrymandering, Democratic candidates perform as well as Republican candidates. Tr. 859:14-18, 864:1-8, 865:5-18. Dr. Cooper's analysis demonstrated that North Carolina is a "two-party" state where Democrats can compete and succeed with respect to U.S. Presidential elections, Tr. 863:2-864:8; PX255; PX253 at 5-6 (Cooper Report), and elections for North Carolina's Council of State, Tr. 864:21-865:18; PX256; PX253 at 6-7 (Cooper Report).

***43** 238. Dr. Cooper also analyzed the aggregate vote share of Democratic and Republican candidates in General Assembly elections since 2012, finding that Democrats received close to or over 50% of the vote in each election. Tr. 865:23-866:16; PX257. But over the same period, Republicans controlled the North Carolina General Assembly, winning supermajorities in both chambers from 2012-2016 and majorities in 2018. Tr. 866:24-868:12; PX259. Despite winning close to or more than 50% of the statewide vote in General Assembly elections since 2012, Democrats have "never approached" a roughly corresponding percentage of seats, a sign of "gross disproportionality." Tr. 868:4-12; PX257; PX259; PX264; PX253 at 8, 11 (Cooper Report).

Percent of Republican Two-Party Vote Share in NCGA Elections 2012-2018

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Percentage of Seats Held by Democrats in the NCGA 2001-2018

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239. Dr. Cooper also used the results of the 2018 elections to show how, under the enacted House and Senate plans, Democratic votes translate to seats far less efficiently than Republican votes. Consistent with the packing and cracking of Democratic voters, when Democrats win seats in the House and Senate, they win by large margins, meaning that many votes tend to be "wasted." Republicans win by significantly narrower margins. Tr. 869:23-871:3; PX262; PX263; PX253 at 14-16 (Cooper Report).

NC State Senate Election Margins 2018

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NC State House Election Margins 2018

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240. The Court finds Dr. Cooper's analysis of the 2018 elections to be persuasive and consistent with Plaintiffs' experts' findings regarding the packing and cracking of Democratic voters within individual county groupings, described below.

C. The 2017 Plans Were Designed Intentionally and Effectively to Maximize Republican Partisan Advantage Within Specific County Groupings

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241. Each of Plaintiffs' four experts analyzed seven county groupings in the Senate and 16 county groupings in the House. Plaintiffs' experts concluded that partisan gerrymandering and bias in these groupings was responsible for the extreme partisan bias that they found in their statewide analysis of the House and Senate. Tr. 1134:1-5 (Dr. Mattingly).

1. Senate County Groupings

a. *Mecklenburg*

242. The Mecklenburg Senate county grouping contains Senate Districts 37, 38, 39, 40, and 41. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

243. For each House and Senate county grouping that Plaintiffs' experts analyzed, Dr. Cooper produced a map showing the district boundaries within the grouping and the partisanship of every VTD within the grouping using the results of the 2016 Attorney General election. In each map, darker red shading indicates a larger Republican vote share in the VTD, darker blue shading indicates a larger Democratic vote share in the VTD, and lighter colors indicate VTDs that were closer to evenly split in Democratic and Republican vote shares.

244. Plaintiffs' Exhibit 285 is Dr. Cooper's map for this county grouping:

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245. As Dr. Cooper explained, the mapmaker packed Democratic voters into Senate Districts 37, 38, and 40 to make Senate Districts 39 and 41 as favorable for Republicans as possible. Tr. 901:16-20; PX253 at 47 (Cooper Report).

246. Senate District 41 stretches from the farthest northern boundaries of Mecklenburg County all the way to the farthest south, traversing two narrow passageways. One passageway is so narrow that the district's contiguity is maintained only by the Martin Marietta Arrowood Quarry, which is less than a mile wide. Tr. 902:22-903:4; PX287; PX253 at 48 (Cooper Report). The Court is persuaded that the clear intent of this elongated district is to connect the Republican areas north of Charlotte with the Republican-leaning areas in the southern tip of Charlotte. Tr. 902:5-8.

***44** 247. Senate District 39 contains the Republican-leaning VTDs in the southern portion of Charlotte, which resemble a "pizza slice" in Dr. Cooper's maps. Tr. 901:11-15, 902:7-10; PX285; PX286. Those Republican VTDs in Charlotte are grouped with the Republican-leaning areas in the south of Mecklenburg County, outside of Charlotte, so that Senate District 39 is more favorable to Republicans. Tr. 901:18-20; PX253 at 47.

248. Dr. Cooper also illustrated the packing and cracking of Democratic voters in this grouping by focusing just on the division of Charlotte. As illustrated in Plaintiffs' Exhibit 286 below, the enacted plan places Charlotte's most Democratic VTDs in Senate Districts 37, 38, and 40, while placing all of Charlotte's Republican-leaning VTDs in Senate Districts 39 and 41. Tr. 902:1-9; PX253 at 47 (Cooper Report). As Dr. Cooper explained, with large municipalities such as Charlotte, the mapmaker's partisan intent is not apparent from the mere fact that a municipality is split, but rather from "where do those municipal splits take place and what are the partisan effects." Tr. 900:12-21; *see* Tr. 877:24-25. In the Mecklenburg Senate county grouping, the Court is persuaded the mapmaker split Charlotte strictly along partisan lines for partisan gain.

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249. Legislative Defendants' expert Dr. Johnson offered alternative explanations for the configuration of this grouping. While Dr. Johnson admitted that he had no personal knowledge as to why Dr. Hofeller or the General Assembly drew the districts this way, Tr. 1972:18-1973:6, Dr. Johnson stated that Senate District 41 was "drawn to capture as much of" the Charlotte suburbs as

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possible into a single district, Tr. 1844:11-12, and that Senate 39 similarly reflected an effort to "unite[] the southern suburbs" of Charlotte, LDTX289 at 4; Tr. 1845:4-9.

250. The Court rejects Dr. Johnson's explanations as it appears to be purely speculative, and in any event his speculation does not withstand minimal scrutiny. Rather than seeking to create a "suburban" district, Senate District 41 stretches to Mecklenburg County's southern tip in order to pick up areas of the City of Charlotte itself, and specifically Republican-leaning VTDs in Charlotte. Tr. 1972:7-1974:15. In so doing, Senate District 41 *avoids* suburban areas north of Charlotte, with those suburbs packed into Senate District 38 instead because they are Democratic-leaning. *Id.* Similarly, Senate District 39 cuts into the heart of Charlotte, taking all of Charlotte's most Republican-leaning areas, while avoiding suburbs in southeast Mecklenburg County. Tr. 1975:5-1976:14. The Court finds Dr. Johnson's speculative alternative explanations for the configuration of the Mecklenburg Senate county grouping not credible.

251. Dr. Johnson also opined at trial that the enacted plan version of this county grouping is not the most favorable possible configuration of this grouping for Republicans. Dr. Johnson created an alternative version of this grouping that he asserted would be even more favorable for Republicans. Tr. 1840:17-1841:19. However, Dr. Johnson's alternative map suffered from a critical error: it paired the two Republican incumbents who were in office at the time of the 2017 redistricting. Tr. 1977:2-1978:7. Clearly, the most favorable possible configuration of this grouping for Republicans would not pair the only two Republican incumbents together, and Dr. Johnson conceded that he did not analyze whether the enacted plan represents the most favorable possible configuration of this grouping possible that would not have paired those two Republican incumbents. *Id.*

***45** 252. The simulations of Plaintiffs' other experts confirm and independently establish that this county grouping is an extreme partisan gerrymander.

253. Dr. Chen analyzed individual county groupings by comparing the most Democratic district in the grouping under the enacted plan with the most Democratic district in the grouping under the simulated plans, comparing the second most Democratic district in the grouping under the enacted plan with the second most Democratic district in the grouping under the simulated plans, and so on.

254. Using this methodology, Dr. Chen found that the Mecklenburg Senate county grouping has four districts in the enacted plan that are extreme partisan outliers. PX098; *see* Tr. 377:8-14. Dr. Chen found that Senate Districts 39 and 41 have a lower Democratic vote share than their corresponding districts in all 1,000 of his simulated plans of this grouping, and that Senate Districts 37 and 40 have a higher Democratic vote share than 99.99% and 100% than their corresponding districts in his simulations. Dr. Chen's findings show the packing of Democratic voters into certain districts in this grouping and the cracking of Democratic voters in Senate Districts 39 and 41, in an effort to create two districts as favorable for Republicans as possible. The Court gives weight to Dr. Chen's findings for this county grouping, which are reflected in Plaintiffs' Exhibit 98 below:[5]

5 Unless otherwise noted, Dr. Chen's results for individual House and Senate county groupings were materially the same for his Simulation Set 2 as for his Simulation Set 1. Tr. 349:12-18.

Figure 78: Senate Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Mecklenburg County Grouping

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255. Dr. Mattingly analyzed individual county groupings by plotting the Democratic vote fraction in each district in the grouping, ordered from least to most Democratic. He conducted this analysis for the enacted plan (represented by a black dot in his county-grouping-level figures) and for his ensemble of nonpartisan plans (represented by the blue histograms), using six prior statewide elections. Tr. 1134:14-1138:6. If the black dot representing the enacted plan is above the dotted black line at 50%, the Democrats

win that district under the enacted plan. Tr. 1135:23-1136:6. If all or the bulk of the blue histogram representing the ensemble is above the dotted black line at 50%, the Democrats would expect to win that district under the ensemble. Tr. 1137:8-1138:6. Dr. Mattingly labeled the historical election whose statewide vote counts he was using in the upper left corner of the plots. Black dots that are at the bottom of the corresponding blue histogram represent districts that Democrats have been cracked out of, because the enacted plan has many fewer Democrats than would be expected in the nonpartisan plans; black dots that are at the top of the corresponding blue histogram represent districts that Democrats have been packed into. Tr. 1138:14-1139:4.

256. Plaintiffs' Exhibit 370 shows Dr. Mattingly's analysis of the Mecklenburg Senate county grouping:

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257. As the figure above shows, Democrats were cracked out of the two most Republican districts in this grouping, and packed into heavily Democratic districts. In the enacted plan, there is a significant jump in Democratic vote share between: (i) the two least Democratic districts (Senate Districts 39 and 41), and (ii) the three most Democratic districts (Senate Districts 40, 37, and 38). PX370; PX 359 at 16 (Mattingly Report). Dr. Mattingly testified that the jump signifies intentional gerrymandering —he called it "signature gerrymandering"—and means that elections in the grouping will be nonresponsive to the votes cast. Tr. 1139:19-21; *see* 1146:13-21; *see* PX 359 at 14-15 (Mattingly Report). As the figure above shows, the gerrymander cost Democrats one or two seats in certain electoral environments, because the black dots for Senate Districts 39 and 41 often fall below the 50% line while the blue histograms often rise above it. Tr. 1142:22-1143:1.

***46** 258. Dr. Mattingly mathematically quantified the "jump"—*i.e.*, the cracking and packing in this grouping—using all 17 statewide elections he studied. Specifically, Dr. Mattingly calculated the average Democratic vote share in the two least Democratic districts and the average Democratic vote share in the three most Democratic districts, for both the enacted plans and his ensemble plans. PX 359 at 16 (Mattingly Report). He found that the two least Democratic districts in the enacted plan had fewer Democratic voters than 100% of the comparable districts in the nonpartisan ensemble, while the three most Democratic districts in the enacted plan had more average Democratic votes than 100% of the comparable Democratic districts in the nonpartisan ensemble, meaning that *not a single plan* in his nonpartisan ensemble showed as much of a jump—*i.e.*, as much cracking and packing—as the enacted plan. Tr. 1143:2-20. Dr. Mattingly concluded that the Mecklenburg Senate grouping is an extreme pro-Republican partisan gerrymander, Tr. 1143:21-24, and the Court gives weight to his conclusion.

259. Dr. Pegden found that the Mecklenburg Senate county grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.9985% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.995% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1356:25; PX540. The Court gives weight to Dr. Pegden's analysis and conclusions.

260. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme and intentional partisan gerrymander.

b. *Franklin-Wake*

261. The Franklin and Wake Senate county grouping contains Senate Districts 14, 15, 16, 17, and 18. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

262. Plaintiffs' Exhibit 276 is Dr. Cooper's map for this county grouping:

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263. As Dr. Cooper testified and is clear from a visual inspection, this grouping packs Democratic voters into Senate Districts 14, 15, and 16 in order to make Senate Districts 17 and 18 as favorable for Republicans as possible. Tr. 892:11-13; PX253 at 36 (Cooper Report).

264. Senate District 18 includes Franklin County and the only Republican-leaning VTDs within Raleigh, near the center of the city. Tr. 892:13-23; PX278; PX253 at 37-38 (Cooper Report).

265. As with Charlotte, the fact that Raleigh is split is not itself revealing, but how and "where Raleigh is split" illustrates the partisan intent behind the districts in this grouping. Tr. 893:16-894:21; PX253 at 37-38. Plaintiffs' Exhibit 278, reproduced below, shows how the mapmaker put the most Democratic VTDs in Raleigh in Senate Districts 14, 15, and 16, and put all of Raleigh's moderate and Republican-leaning VTDs in Senate District 18. *Id.*

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266. Senate District 17 includes all of the Republican VTDs in southern Wake County while carefully avoiding heavily Democratic areas. PX276; PX253 at 36 (Cooper Report).

267. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of Senate Districts 17 and 18. At trial, Legislative Defendants focused on an amendment that Democratic Senator Daniel Blue introduced that altered this grouping, but that amendment did *not* affect the contours of Senate Districts 17 and 18. Senator Blue testified that he was told by Republican leadership that he could not change the boundaries of Senate Districts 17 and 18, but instead could only shift population between the heavily Democratic districts in this grouping. Tr. 155:20-156:15. Senator Blue's amendment did just that, as it only shifted population between Senate Districts 14 and 15, both of which had been packed with Democratic voters. Tr. 150:5-8; PX619. Senator Blue's amendment did not result in, and cannot explain, the composition of Senate Districts 17 and 18 and their extreme partisan outlier status.

***47** 268. The simulations of Plaintiffs' other experts confirm and independently establish that this county grouping is an extreme partisan gerrymander.

269. Dr. Chen found that this county grouping contains three districts that are extreme partisan outliers. Tr. 381:2-18. Senate District 14 has a higher Democratic vote share than its corresponding district in all of the simulations, while Senate Districts 17 and 18 have lower Democratic vote shares than their corresponding districts in all of the simulations. *Id.*; PX97. Dr. Chen's findings show the packing of Democratic voters into districts in this grouping in an effort to create two districts (Senate Districts 17 and 18) that are as favorable for Republicans as possible. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 97 below.

Figure 77: Senate Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Franklin-Wake County Grouping

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270. Plaintiffs' Exhibit 372 shows Dr. Mattingly's analysis of this grouping:

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271. Dr. Mattingly's analysis shows that Democrats were cracked out of the two least Democratic districts in this grouping (Districts 17 and 18), and packed into heavily Democratic districts. PX372; Tr. 1145:2-7. In the enacted plan, there is a significant jump between the Democratic vote share in the least two Democrats districts and the three most Democratic districts. PX372.

Dr. Mattingly found that not a single plan in his ensemble showed as much of a jump between these sets of districts as the enacted plan, Tr. 1145:11-14, and concluded that this grouping showed more pro-Republican advantage than 100% of the maps in his ensemble. Tr. 1153:24-1154:4. As the figure above shows, the gerrymander causes Democrats to lose two seats in this grouping in many electoral environments, because the black dots for Senate Districts 17 and 18 fall below the 50% line while the blue histograms often rise above it. *See* Tr. 1142:22-1143:1. Dr. Mattingly concluded that the Wake-Franklin Senate grouping is an extreme pro-Republican partisan gerrymander, Tr. 1153:17-23, and the Court gives weight to his conclusion.

272. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.99999995% of the maps that his algorithm encountered by making small changes to the district boundaries. Tr. 1356:23-24; PX539. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.99999985% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. *Id.* Dr. Pegden also testified that the changes made by Senator Blue to the boundaries between Senate Districts 14 and 15 cannot explain his results for this county grouping. *See* Tr. 1352:2-1354:22. The Court gives weight to Dr. Pegden's analysis and conclusions.

273. The analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

c. *Nash-Johnston-Harnett-Lee-Sampson-Duplin*

***48** 274. The Nash-Johnston-Harnett-Lee-Sampson-Duplin Senate county grouping contains Senate Districts 10, 11, and 12. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

275. Plaintiffs' Exhibit 274 is Dr. Cooper's map of this county grouping:

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276. Dr. Cooper explained how the district boundaries connect the most Republican VTDs in Johnston County with the Democratic stronghold of Rocky Mount in Senate District 11, ensuring that those Rocky Mount Democratic voters are separated from the moderate and Democratic-leaning VTDs in Johnston County, diluting the voting strength of these various Democratic voters. Tr. 890:4-891:17; PX253 at 33 (Cooper Report). Dr. Hofeller's Maptitude files further illustrate this intentional cracking of Democratic voters. Dr. Hofeller's file, below in Plaintiffs' Exhibit 332, reveals how he drew these districts with "remarkable precision" by "building a fence" around the moderate and Democratic-leaning VTDs in central Johnston County—shaded yellow and red in the image below—making sure to keep these VTDs in Senate District 10 separate from Rocky Mount's voters in Senate District 11. Tr. 968:12-969:8.

Figure 3: Partisan Targeting in Senate Districts 10, 11, and 12

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277. Dr. Hofeller's Microsoft Excel files provide evidence that Dr. Hofeller placed special attention on this country grouping and its partisan composition. In a file titled "Johnston Senate Switch," Dr. Hofeller compared two alternative drafts of this county grouping and the expected Republican performance of the three districts in this grouping under each of the two alternatives. Tr. 469:5-470:3; PX166; PX123 at 68-69 (Chen Rebuttal Report). The file analyzed no information other than partisanship considerations, demonstrating Dr. Hofeller's predominant partisan intent in constructing the districts in this grouping. *Id.*

278. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

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279. The simulations of Plaintiffs' other experts confirm and independently establish that this county grouping was gerrymandered to favor Republicans.

280. Dr. Chen found that all three districts in this county grouping are extreme partisan outliers. Tr. 375:14-25. Senate District 11 has a lower Democratic vote share than its corresponding district in all the simulations, while Senate Districts 10 and 12 have a higher Democratic vote share than their corresponding districts in all the simulations. PX96. Dr. Chen's findings demonstrate the cracking of Democratic voters across all three districts in this grouping to ensure that all three districts are safe Republican seats. The most Democratic district in this grouping would be far more competitive or even Democratic-leaning under a nonpartisan plan, particular in electoral environments that are more neutral or favorable for Democrats than the 2010-2016 statewide elections. Tr. 376:1-8. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 96 below:

Figure 76: Senate Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Duplin-Harnett-Johnston-Lee-Nash-Sampson County Grouping

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE

***49** 281. Plaintiffs' Exhibit 382 shows Dr. Mattingly's analysis of this grouping:

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282. Dr. Mattingly concluded that this grouping reflects a pro-Republican partisan bias, Tr. 1154:20-1155:1, and the Court gives weight to Dr. Mattingly's conclusion. Dr. Mattingly's analysis shows that, in this grouping, the number of Democrats in the districts was flattened or squeezed to advantage the Republicans. PX778 at 29; Tr. 1154:20-22. Squeezing represents pure cracking, Tr. 1150:22-1151:2. Here, Democrats were cracked out of the most Democratic district and placed in the two least Democratic districts where their presence would not affect the results. When Dr. Mattingly mathematically quantified the cracking in this grouping using all 17 statewide elections, he found that the least two Democratic districts in the enacted plan had more Democratic voters than 77.21% of the comparable districts in the nonpartisan ensemble. Although Dr. Mattingly did not label this grouping an “outlier” because he used a 90% threshold, he explained that the pro-Republican bias evidence in this grouping still contributed to the extreme pro-Republican bias he found statewide. Tr. 1151:21-1153:2, 1154:23-1155:1. Because the lines in each county grouping are independent of each other, if the mapmaker time after time makes choices that systematically bias each grouping to one party, that effect accumulates across the map. Tr. 1151:21-1153:2.

283. Moreover, while Dr. Mattingly's “jump” analysis evaluated the districts in this grouping using all 17 statewide elections, analyzing the most Democratic district in this grouping based on the more recent elections depicted in the figure above reveals the intent and effects of the gerrymander. Dr. Mattingly's figure shows that the most Democratic district in this grouping under the enacted plan, which is Senate District 11 in most of the elections shown, has less Democrats than the most Democratic district in almost all of his simulations under these more recent six statewide elections. PX382.

284. Dr. Pegden found evidence that this county grouping is an extreme partisan gerrymander. Due to Dr. Pegden's conservative methodology, his algorithm was only able to generate 18 comparison maps for this Senate county grouping. Tr. 1355:5-23; PX542. Of those 18 maps, Dr. Pegden found that the enacted map for this county grouping is more favorable to Republicans than every single one. Tr. 1356:3-8. The Court gives weight to Dr. Pegden's analysis and conclusions.

285. The analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

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d. *Guilford-Alamance-Randolph*

286. The Guilford-Alamance-Randolph Senate county grouping contains Senate Districts 24, 26, 27, and 28.

287. Plaintiffs' Exhibit 281 is Dr. Cooper's map for this county grouping:

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288. For this county grouping, the *Covington* court tasked the Special Master with redrawing Senate District 28 because the General Assembly's enacted version of Senate District 28 did not cure the racial gerrymander. 2017 WL 11049096, at *1-2 (M.D.N.C. Nov. 1, 2017). In redrawing Senate District 28, the Special Master also made changes to Senate District 24. *See* LDTX159 at 19; *Covington*, ECF No. 220 at 34. Plaintiffs do not challenge Senate Districts 24 and 28 in this case and do not seek relief with respect to them.

***50** 289. Unlike Senate Districts 24 and 28, the Special Master did *not* make any changes to the General Assembly's enacted version of Senate District 26. *See Covington*, ECF No. 220 at 34 ("2017 Enacted Senate District 26 remains untouched"); Tr. 378:9-16. The Special Master made certain changes to Senate District 27 in carrying out his assignment to redraw Senate District 28, but in so doing, the Special Master did not alter any part of the border between Senate Districts 27 and 26. *See* Chen Demonstrative D6 at 3; LDTX159 at 19. According to estimates presented at trial by Legislative Defendants' expert Dr. Johnson, of the current population of Senate District 27, 77% of the population was put into the district by the General Assembly under the enacted 2017 Senate plan.

290. In drawing Senate District 26, the mapmaker cracked Democratic voters in Guilford County, placing the Democratic stronghold of High Point in Senate District 26 and separating these voters from Democratic voters in the Greensboro suburbs. Tr. 895:15-896:25; PX254 at 42-43 (Cooper Report). This has the effect of "washing out" the influence of High Point's Democratic voters, who are joined with the heavily Republican Randolph County in a safe Republican district (Senate District 26), preventing them from influencing the competitive Senate District 27 and thereby making Senate District 27 more favorable for Republicans. *Id.*

291. Dr. Hofeller's Maptitude files confirm that he was using VTD-level partisanship data in constructing the districts in this and other county groupings. Tr. 971:16-18; 975:2-5. For example, Dr. Hofeller drew the boundaries of Senate District 26 to grab only the most Democratic VTDs on the border of Randolph County. Tr. 975:10-13, 974:19-975:5. The partisan implications of which are illustrated by Dr. Hofeller's draft map, which is Plaintiffs' Exhibit 334:

Figure 5: Partisan Targeting in Senate Districts 24, 26, 27, and 28

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292. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the decision to place High Point's most-Democratic VTDs in Senate District 26.

293. The simulations of Plaintiffs' other experts confirm and independently establish that Senate Districts 26 and 27 are extreme partisan gerrymanders.

294. Drs. Chen, Mattingly, and Pegden all froze Senate Districts 24 and 28 in this grouping. Tr. 378:17-379:19; PX359 at 23 (Mattingly Report); PX508 at 30 (Pegden Report).

295. Dr. Chen explained in unrebutted testimony that his simulations of the Alamance-Guilford-Randolph House county grouping did not make any changes to the portion of Senate District 27 added by the *Covington* Special Master, and instead

altered only the southwest portion of Senate District 27 that borders Senate District 26. Tr. 773:8-22; Chen Demonstrative D6 at 4, 5; PX1 at 18-19 (Chen Report). The Court finds that because Dr. Chen's simulations altered only portions of Senate District 27 drawn by the mapmaker, and did not touch the portions of the district added by the Special Master, the mapmaker necessarily is responsible for the extreme partisan bias that Dr. Chen finds for Senate District 27.

296. Dr. Chen found that both districts in this county grouping that he did not freeze are extreme partisan outliers. Senate District 26 has a higher Democratic vote shares than its corresponding district in all of the simulations, while Senate District 27 has a lower Democratic vote share that its corresponding district in all of the simulations. Tr. 380:1-18; PX94. Dr. Chen's findings show the mapmaker's intentional placing of High Point's Democratic voters into Senate District 26 to make Senate District 27 as favorable for Republicans as possible. The Court gives weight to Dr. Chen's findings and analysis for this grouping, which are reflected in Plaintiffs' Exhibit 94 below:

Figure 74: Senate Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Alamance-Guilford-Randolph County Grouping

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***51** 297. Plaintiffs' Exhibit 380 shows Dr. Mattingly's analysis of the Guilford-Alamance-Randolph Senate county grouping:

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298. Setting aside the frozen districts, Dr. Mattingly's analysis shows that Democrats were cracked between the grouping's two remaining districts—an example of what Dr. Mattingly called flattening or squeezing. PX380; PX778 at 29; PX359 at 23. Not a single plan in Dr. Mattingly's nonpartisan ensemble showed as much cracking of Democratic voters in the grouping as was present in the enacted plan, PX359 at 23, and thus the grouping has more pro-Republican advantage than 100% of the maps in his nonpartisan ensemble. Tr. 1153:24-1154:4. Dr. Mattingly concluded that this grouping is an extreme pro-Republican partisan gerrymander, Tr. 1153:17-23; PX778 at 29; PX359 at 23, and the Court gives weight to this conclusion.

299. Dr. Pegden found that this Senate county grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.95% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.85% of all possible districtings of this grouping that satisfy the criteria Dr. Pegden used. Tr. 1357:1; PX543. The Court gives weight to Dr. Pegden's analysis and conclusions.

300. The analyses of Plaintiffs' experts independently and together demonstrate that Senate Districts 26 and 27 are extreme partisan gerrymanders.

e. *Davie-Forsyth*

301. The Davie-Forsyth Senate county grouping contains Senate Districts 31 and 32. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

302. Plaintiffs' Exhibit 282 is Dr. Cooper's map for this county grouping:

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303. Dr. Cooper explained what is apparent from the above map: the mapmaker packed Democratic voters into Senate District 32, thereby ensuring that Senate District 31 would be a safe Republican district. Tr. 897:9-24; PX253 at 44 (Cooper Report).

304. This packing occurred not only at the grouping-level, but within Winston-Salem. The map packs all of Winston-Salem's most Democratic VTDs into Senate District 32, and puts almost all of the city's Republican-leaning VTDs in Senate District 31. Tr. 898:1-16; PX283; PX253 at 44 (Cooper Report). As shown in Plaintiffs' Exhibit 283 below, Senate District 31 wraps around Winston-Salem to avoid the Democratic-leaning VTDs in the city, while taking in the Republican-leaning VTDs on the western, northern, and eastern sides of the city:

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305. Dr. Hofeller's Maptitude files confirm his predominant partisan intent in drawing this grouping. The district boundaries are drawn “almost perfectly” so that the green areas on the map, which reflect Republican VTDs, are all placed in Senate District 31. Tr. 976:24-977:4; PX335; PX329 at 11 (Cooper Rebuttal Report). The “bite mark” on the west side of Winston-Salem, where Republican-leaning VTDs were carved out of Senate District 32, is evident on Dr. Hofeller's draft map of these districts, which is Plaintiffs' Exhibit 335:

Figure 6: Partisan Targeting in Senate Districts 31 and 32

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***52** 306. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

307. The simulations of Plaintiffs' other experts confirm and independently establish that the Davie-Forsyth county grouping is an extreme partisan gerrymander.

308. Dr. Chen found that both districts in this grouping are extreme partisan outliers. Tr. 373:18-374:12. Senate District 32 has a far higher Democratic vote share than its corresponding district in all of the simulations, while Senate District 31 has a far lower Democratic vote share than its corresponding district in all of the simulations. PX95. Dr. Chen's findings demonstrate the packing of Democratic voters into Senate District 32 in order to make Senate District 31 a safe Republican seat. As Dr. Chen explained, the less Democratic district in this grouping would be far more competitive for Democrats under a nonpartisan plan, particularly in electoral environment that are more neutral or favorable for Democrats than the 2010-2016 statewide elections. Tr. 374:13-23. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 95 below:

Figure 75: Senate Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Davie-Forsyth County Grouping

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
309. Plaintiffs' Exhibit 374 shows Dr. Mattingly's analysis of this county grouping:

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310. Dr. Mattingly's analysis shows that Democrats were cracked out of the most Republican district in this county grouping, and packed into the most Democratic district. PX374; PX778 at 29. Dr. Mattingly found that not a single plan in his nonpartisan ensemble showed as much packing of Democratic voters in the Davie-Forsyth Senate grouping as was present in the enacted plan, PX359 at 18, and thus the grouping has a more pro-Republican advantage than 100% of the maps in his nonpartisan

ensemble, Tr. 1153:24-1154:4. Dr. Mattingly concluded that this grouping is an extreme pro-Republican partisan gerrymander, Tr. 1153:17-23; PX778 at 29; PX359 at 18, and the Court gives weight to his conclusion.

311. Dr. Pegden found that this county grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of the grouping is more favorable to Republicans than 99.993% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that the grouping is more carefully crafted to favor Republicans than at least 99.98% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1356:25; PX538. The Court gives weight to Dr. Pegden's analysis and conclusions.

312. The analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

f. *Bladen-Pender-New Hanover-Brunswick*

313. The Bladen-Pender-New Hanover-Brunswick Senate county grouping, drawn in 2011 and left unchanged in 2017, contains Senate Districts 8 and 9. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

***53** 314. Plaintiffs' Exhibit 272 is Dr. Cooper's map of this county grouping:

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315. In this grouping, the population of New Hanover County is slightly too large to fit into one Senate district, and thus the mapmaker had to place a small portion of New Hanover in Senate District 8. Tr. 887:8-9. The mapmaker chose to take heavily Democratic VTDs in Wilmington, separating them from the rest of Wilmington (which is in Senate District 9) and grouping them instead with heavily Republican areas in Bladen, Pender, and Brunswick counties. Tr. 887:5-888:8; PX253 at 29-31 (Cooper Report). As Dr. Cooper explained, the clear intent and effect of this decision was to waste the votes of the Democratic voters in these Wilmington VTDs, placing them in a heavily Republican district (Senate District 8) and removing them from a highly competitive district (Senate District 9) where their votes could make a difference. *Id.* Plaintiffs' Exhibit 273 provides a zoomed-in view of the cracking of the Democratic voters in these two VTDs, which has come to be known as the "Wilmington Notch":

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316. Dr. Cooper credibly testified that the enacted plan is the most maximally favorable construction of the grouping possible for Republicans. Tr. 887:24-25. This grouping illustrates Dr. Cooper's conclusion about all of the groupings he analyzed: "whenever there's discretion to be exercised, that discretion tended to go in favor of one party, in this case the Republican Party, and against the other party, in this case the Democrat party." Tr. 889:22-25.

317. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts. While they noted that some portion of New Hanover County must be placed in Senate District 9 for equal population purposes, Legislative Defendants failed to rebut the fact that alternative ways to draw the grouping would not split municipalities in the manner that the enacted plan does. Over 97% of Dr. Mattingly's simulations of this county grouping do not split Wilmington. PX429.

318. The simulations of Plaintiffs' other experts confirm that the Bladen-Brunswick-New Hanover-Pender Senate county grouping is an outlier.

319. Because this county grouping was drawn in 2011 and remained unchanged in 2017, in analyzing this individual county grouping, Dr. Chen used the statewide elections from 2004 to 2010 that the General Assembly used during the 2011 redistricting

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process, rather than the 2010-2016 statewide elections. Tr. 366:8-367:1, 382:23-383:11; PX720. Dr. Chen used these 2004-2010 statewide elections because, to assess the question of partisan intent, he wanted to use the same elections data that the mapmaker had available and was considering when it drew this grouping in 2011. Tr. 367:2-23; PX1 at 21-24 (Chen Report).

320. Dr. Chen found that both districts in this county grouping are extreme partisan outliers. Tr. 384:2-386:19. Senate District 9 has a lower Democratic vote share than all of its corresponding districts in all of the simulations, while Senate District 8 has a higher Democratic vote share than all of its corresponding districts in all of the simulations. *Id.*; PX100. Dr. Chen's analysis demonstrates that the moving of Democratic voters in the Wilmington Notch into Senate District 8 made Senate District 9 as favorable for Republicans as possible. The Court gives weight to Dr. Chen's findings for this county grouping, which are reflected in Plaintiffs' Exhibit 100 below:

Figure 80: Senate Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Bladen-Brunswick-New Hanover-Pender County Grouping

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***54** 321. Dr. Mattingly similarly concluded that the Bladen-Pender-New Hanover-Brunswick Senate grouping was "certainly an outlier" but when on to state that "there were some features of [the Bladen] district that meant that the type of analysis that [he] had initially chosen was not as illuminating in that district. So [he] couldn't say something is conclusive." Tr. 1154:11-16. When he mathematically quantified cracking in the Bladen grouping across all 17 statewide elections, he found that the most Democratic district in the Bladen grouping had fewer Democrats than in 92.46% of plans in the nonpartisan ensemble. PX359 at 19-20 (Mattingly Report); PX778 at 29.[6]

6 Dr. Pegden was unable to generate any comparison districtings of this county grouping due to his conservative methodology. Tr. 1357:12-23; PX544. As Dr. Pegden testified, the fact that his algorithm does not generate any comparison districtings for a given county grouping does *not* mean that the mapmaker did not make extreme and intentional use of partisan considerations in that county grouping. *See* Tr. 1321:17-25, 1349:11-1350:4.

322. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme and intentional partisan gerrymander.

g. *Buncombe-Henderson-Transylvania*

323. The Buncombe-Henderson-Transylvania Senate county grouping, drawn in 2011 and left unchanged in 2017, contains Senate Districts 48 and 49. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

324. Plaintiffs' Exhibit 288 is Dr. Cooper's map of this county grouping:

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325. Dr. Cooper explained how these district boundaries combine the heavily Democratic VTDs in Asheville with Democratic VTDs in Black Mountain, packing those Democratic voters to create a safe Democratic district in Senate District 49, allowing Senate District 48 to comfortably favor Republicans. Tr. 903:23-904:13; PX253 at 50 (Cooper Report).

326. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

327. The simulations of Plaintiffs' other experts confirm and independently establish that this county grouping is an extreme partisan gerrymander.

328. Dr. Chen found that both districts in this county grouping are extreme partisan outliers. Tr. 383:12-19.[7] Senate District 49 has a higher Democratic vote share than its corresponding district in nearly all of the simulations, while Senate District 48 has a lower Democratic vote share than its corresponding district in nearly all of the simulations. PX99. Dr. Chen's findings demonstrate the packing of Democratic voters into Senate District 49 to make Senate District 48 a safe Republican seat. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 99 below:

7 Because this county grouping was drawn in 2011, Dr. Chen used the 2004 to 2010 statewide elections to analyze this county grouping. Tr. 383:16-22; PX99.

Figure 79: Senate Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Buncombe-Henderson-Transylvania County Grouping

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329. Plaintiffs' Exhibit 378 shows Dr. Mattingly's analysis of the Buncombe-Transylvania-Henderson Senate county grouping:

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330. Dr. Mattingly's analysis shows that Democrats were cracked out of Senate District 48 and packed into Senate District 49. PX378; PX778 at 29; Tr. 1153:7-1154:9. Dr. Mattingly found that the least Democratic district in the enacted plan has fewer Democratic votes than in 95.44% of the plans in his ensemble, meaning that the grouping showed more pro-Republican partisan advantage than 95.44% of the nonpartisan plans. PX778 at 29; PX359 at 21-22. Dr. Mattingly concluded that this grouping reflects a pro-Republican partisan gerrymander, Tr. 1154:6-10; PX778 at 29; PX359 at 21-22, and the Court gives weight to his conclusion.

***55** 331. Dr. Pegden found that this county grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of the grouping is more favorable to Republicans than 99.8% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that the grouping is more carefully crafted to favor Republicans than at least 99.4% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1357:2; PX541. The Court gives weight to Dr. Pegden's analysis and conclusions.

332. The analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

2. House County Groupings

a. *Robeson-Columbus-Pender*

333. The Robeson-Columbus-Pender House county grouping contains House Districts 16, 46, and 47. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

334. Plaintiffs' Exhibit 301 is Dr. Cooper's map of this county grouping:

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335. Dr. Cooper explained that House District 47 packs as "many … Democratic voters as possible" into that district, including in Lumberton and the area around UNC Pembroke. The packing of Democrats in House District 47 makes House Districts 16 and 46 more favorable to Republicans. Tr. 912:19-913:3; PX253 at 70 (Cooper Report).

336. Dr. Hofeller's Maptitude files confirm he "had full knowledge of the partisan effects of drawing those lines exactly where they were drawn, essentially drawing a fence between districts 47 and 46 … between Democratic and Republican voters." Tr. 985:15-19; PX342; PX329 at 18 (Cooper Rebuttal Report). In the files for his draft House plan, Dr. Hofeller shaded more Democratic VTDs darker blue, more Republican VTDs red and orange, and moderate VTDs green and yellow. Tr. 979:20-980:19. As shown in Plaintiffs' Exhibit 342, Dr. Hofeller placed all of the Republican-leaning VTD near Lumberton (shaded orange and red) on the right side of the red line, in House District 46, rather than in House District 47:

Figure 13: Partisan Targeting in House Districts 16, 46, and 47

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337. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of the districts in this county groupings.

338. The simulations of Plaintiffs' other experts independently establish that the Columbus-Pender-Robeson county grouping is an extreme partisan gerrymander.

339. Dr. Chen found that all three House districts in this county are extreme partisan outliers. Dr. Chen found that House District 47 has a higher Democratic vote share than the corresponding districts in all of Dr. Chen's simulated plans. Tr. 346:4-347:14. Dr. Chen found that House District 46 has a lower Democratic vote share than the corresponding districts across all of Dr. Chen's simulations, while House District 16 has a higher Democratic vote share than the corresponding districts in all of Dr. Chen's simulations. Tr. 347:16-348:7. Dr. Chen's findings demonstrate the packing of Democratic voters into House District 47 and the cracking of Democratic voters across House Districts 16 and 46. Dr. Chen finds that, as a result of this packing and cracking, almost all of his simulations would produce two Democratic-leaning districts in this county grouping, while the enacted House plan produces just one such district in this grouping. Tr. 348:8-23. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 47 below:

Figure 27: House Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Columbus-Pender-Robeson County Grouping

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
***56** 340. Plaintiffs' Exhibit 388 shows Dr. Mattingly's analysis of the Columbus-Pender-Robeson House county grouping:

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
341. Dr. Mattingly's analysis shows that Democrats were cracked in the two least Democratic districts in this grouping (Districts 16 and 46) and packed into the most Democratic district (District 47). PX388; PX359 at 28; PX778 at 30. There is a significant jump between the number of Democratic votes in the two least and the most Democratic districts in the enacted plan. *Id.* Dr. Mattingly found that the two least Democratic districts in the enacted plan have fewer Democratic voters than 97.98% of the comparable districts in the nonpartisan ensemble. *Id.* As the figure above shows, the gerrymander causes Democrats to lose a

seat in this grouping in certain electoral environments. Dr. Mattingly concluded that this grouping reflects a clear pro-Republican partisan gerrymander, PX778 at 30; Tr. 1155:17-21; PX359 at 28, and the Court gives weight to Dr. Mattingly's conclusion.

342. Dr. Pegden found that this county grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 98.7% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 96% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:8; PX526. The Court gives weight to Dr. Pegden's analysis and conclusions.

343. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

b. *Cumberland*

344. The Cumberland House county grouping contains House Districts 42, 43, 44, and 45. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

345. Plaintiffs' Exhibit 305 is Dr. Cooper's map of this county grouping:

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346. Dr. Cooper described how House District 45 has a "backwards C-shape" that is "a very clear attempt to connect these Republican leaning [VTDs] all together and avoid … the Democratic leaning VTDs." Tr. 917:7-14. In such a way, the district boundaries make House District 45 more favorable for Republicans, while packing the Democratic-leaning VTDs in the Fayetteville area into House Districts 42 and 43. Tr. 917:14-16; PX253 at 76 (Cooper Report).

347. The district boundaries in this grouping, shown below in Plaintiffs' Exhibit 306, divide Fayetteville between all four districts in a way that does not correspond to Fayetteville's boundaries of or any other municipality. Tr. 917:23-918:5; PX253 at 76 (Cooper Report).

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348. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

349. The simulations of Plaintiffs' other experts independently establish that the Cumberland county grouping is an extreme partisan gerrymander.

***57** 350. Dr. Chen found that this county grouping contains three districts that are extreme partisan outliers. Dr. Chen found that House Districts 42 and 43 have a higher Democratic vote shares than their corresponding districts in all or almost all of Dr. Chen's simulated plans, while House District 45 has a much lower Democratic vote share that the corresponding district in all of the simulations. Tr. 350:2-12. Dr. Chen's findings demonstrate the packing of Democratic voters into House Districts 42 and 43 in order to make House District 45 as favorable for Republicans as possible. Indeed, the least Democratic district in this grouping would be very competitive or even Democratic-leaning in Dr. Chen's simulations. The Court gives weight to Dr. Chen's findings for this county grouping, which are reflected in Plaintiffs' Exhibit 48 below:

Figure 28: House Simulation Set 1:

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Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Cumberland County Grouping

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351. Plaintiffs' Exhibit 390 shows Dr. Mattingly's analysis of the Cumberland House county grouping:

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
352. Dr. Mattingly's analysis shows that the least Democratic district (District 45) show cracking of Democrats, while the two most Democratic districts (District 43 and 42) show extreme packing of Democrats, in comparison to the nonpartisan plans. PX390; PX778 at 30; PX359 at 29. He found that the two most Democratic districts in the enacted plan have more Democratic votes than 99.79% of the comparable Democratic districts in the nonpartisan ensemble. *Id.* As the figure above shows, the gerrymander causes Democrats to lose a seat in this grouping in certain electoral environments, because the black dot in House District 45 always falls below the 50% line while the blue histogram often rises above it. Dr. Mattingly concluded that the Cumberland House grouping is an extreme pro-Republican partisan gerrymander, Tr. 1155:5-16; PX778 at 30; PX359 at 29; PX390, and the Court gives weight to Dr. Mattingly's conclusion.

353. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 98.3% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 95% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:9; PX529. The Court gives weight to Dr. Pegden's analysis and conclusions.

354. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

c. *Person-Granville-Vance-Warren*

355. The Person-Granville-Vance-Warren House county grouping contains House Districts 2 and 32.

356. Plaintiffs' Exhibit 289 is Dr. Cooper's map of this county grouping:

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357. Several of Plaintiffs' experts testified that there are only a limited number of possible ways to draw this county grouping. Tr. 359:4-360:2 (Dr. Chen), 905:17-19 (Dr. Cooper); 1156:25-1157:16 (Dr. Mattingly). Because of the Whole County Provision, the only differences between the alternative ways to draw this grouping involve which of Granville County's few VTDs are placed in each of the two districts. *See id.*

358. This county grouping is one of two drawn by Campbell Law students and ultimately adopted by Dr. Hofeller. Tr. 474:7-475:23; PX123 at 71. The evidence from Dr. Hofeller's files suggests that Dr. Hofeller intentionally chose to include this configuration because it most favored Republicans, to the detriment of Democratic voters. *See* Tr. 905:21-906:8.

359. However, because of the limited possible configurations for this county grouping, and the limited statistical evidence that could be generated by Plaintiffs' experts, the Court does not find that this grouping, or the districts contained therein, constitute an extreme partisan gerrymander. *See* PX051 (Dr. Chen Figure 31 showing Democratic vote share of each district well below his extreme partisan outlier threshold); Tr. 1156:25-1157:16 (Dr. Mattingly found very few possible unique maps for this grouping that satisfied his criteria); Tr. 1349:11-1350:4; PX536 (Dr. Pegden was unable to generate any comparison districtings of this House county grouping due to his conservative methodology).

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***58** 360. The Court, though, does find that this county grouping does reflect a clear pro-Republican partisan tilt that can contribute to the extreme pro-Republican bias statewide.

d. *Franklin-Nash*

361. The Franklin-Nash House county grouping contains House Districts 7 and 25. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

362. Plaintiffs' Exhibit 293 is Dr. Cooper's map of this county grouping:

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363. These district boundaries avoid grouping the more Democratic-leaning and competitive VTDs on Nash County's western border in House District 7, instead stretching House District 7 into the southeast corner of Nash County to grab the heavily Republican VTDs there. The placement of this district boundary made House District 7 more favorable to Republicans. As Dr. Cooper explained, if the mapmaker had included "any other VTD" in House District 7 from Nash County, House District 7 would have been less favorable to Republican candidates. Tr. 907:4-13; PX253 at 59 (Cooper Report).

364. The Court gives little weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts. They noted that the enacted version of this county grouping matches the draft drawn by the Campbell Law students, but the mapmaker adopted these districts because they were maximally favorable for Republicans, FOF § B.2.a., and as the simulations of Plaintiffs' experts Dr. Chen and Dr. Mattingly confirm and independently establish, the Nash-Franklin House county grouping is indeed an extreme partisan gerrymander.

365. Dr. Chen found that both districts in county grouping are extreme partisan outliers. Dr. Chen found that House District 25 has a higher Democratic vote share than its corresponding district in all of Dr. Chen's simulated plans, while House District 7 has a lower Democratic vote share that the corresponding district in all of the simulations. Tr. 356:8-17. Dr. Chen's findings demonstrate the packing of Democratic voters into House Districts 25 in order to make House District 7 a safe Republican seat. In Dr. Chen's simulations, the less Democratic district in this grouping would be more competitive for Democrats, particularly in a more favorable electoral environment for them than the 2010-2016 statewide elections. Tr. 356:18-357:1. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 50 below:

Figure 30: House Simulation Set 1:

**Democratic Vote Share of the Enacted and Computer-
Simulated Districts Within the Franklin-Nash County Grouping**

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366. Plaintiffs' Exhibit 402 shows Dr. Mattingly's analysis of the Nash-Franklin House county grouping:

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367. Dr. Mattingly concluded that the most Democratic district shows extreme packing of Democrats, while the most Republican district shows extreme cracking of Democrats, in comparison to the nonpartisan plans. Tr. 1149:2-9. He found that the least Democratic district in the enacted plan has fewer Democratic voters than 95.58% of the comparable districts in the nonpartisan ensemble, demonstrating packing. PX778 at 30; PX359 at 36-37. As the figure above shows, the gerrymander could cause the Democrats to lose a seat in this grouping in certain electoral environments, because the black dot for House District 7 falls

below the 50% line while the blue histogram sometimes rises above it or gets very close. Dr. Mattingly concluded that the Nash-Franklin House grouping is a pro-Republican partisan gerrymander, PX778 at 30; Tr. 1155:17-21; PX359 at 36-37, and the Court gives weight to Dr. Mattingly's conclusion.[8]

8 Dr. Pegden was unable to generate any comparison districtings of this House county grouping due to his conservative methodology. Tr. 1351:22-1352:10; PX537.

***59** 368. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

e. *Pitt-Lenoir*

369. The Pitt-Lenoir House county grouping contains House Districts 8, 9, and 12. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

370. Plaintiffs' Exhibit 294 is Dr. Cooper's map of this county grouping:

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371. The districts in this county grouping split Greenville between all three House districts and even bisect East Carolina University's campus. The district lines pack the most Democratic-leaning VTDs in Greenville into House District 8, while placing all but one of the Republican-leaning VTDs into House District 9. Tr. 908:3-8, 909:23-910:8; PX253 at 61 (Cooper Report). Plaintiffs' Exhibit 295 below shows the municipalities within this county grouping and how the districts split Greenville. Tr. 908:16-23.

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372. The Maptitude files from Dr. Hofeller's hard drive confirm he used VTD-level partisanship data with "surgical precision" to construct the districts in this grouping. Tr. 983:5-984:7; PX340; PX329 at 16 (Cooper Rebuttal Report). Dr. Hofeller's Maptitude file, reproduced below in Plaintiffs' Exhibit 340, demonstrates how Dr. Hofeller meticulously packed all of Greenville's bluest VTDs into House District 8 (on the left side of the red line), in order to make House Districts 9 and 12 favorable for Republicans.

Figure 11: Partisan Targeting in House Districts 8, 9, and 12

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373. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of the districts in this county grouping.

374. The simulations of Plaintiffs' other experts independently establish that the Lenoir-Pitt county grouping is an extreme partisan gerrymander.

375. Dr. Chen found that House District 8 has a higher Democratic vote shares than its corresponding districts in all Dr. Chen's simulated plans, while House District 9 has a lower Democratic vote share than the corresponding district in all of the simulations. PX52; Tr. 360:16-22. Dr. Chen further found that the remaining district in this grouping, House District 12, is less Democratic than over 81% of the corresponding districts across Dr. Chen's simulations. *Id.* Dr. Chen's findings demonstrate the packing of Democratic voters into House District 8 and the cracking of Democratic voters in House Districts 9 and, to some extent, 12. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 52 below:

Figure 32: House Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Lenoir-Pitt County Grouping

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376. Plaintiffs' Exhibit 408 shows Dr. Mattingly's analysis of this grouping:

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377. Dr. Mattingly concluded that the two most Republican districts show extreme cracking of Democrats, while the most Democratic shows extreme packing of Democrats, as evidence by the "jump" between these sets of districts. PX408; PX778 at 30; PX359 at 41. Dr. Mattingly found that the two least Democratic districts in the enacted plan have fewer Democratic voters than 99.98% of the comparable districts in the nonpartisan ensemble, while the most Democratic district in the enacted plan has more Democratic votes than 99.95% of the comparable Democratic districts in the ensemble. PX778 at 30; PX359 at 43. As the figure above shows, the gerrymander causes the Democrats to lose one or possibly two seats in this grouping in certain electoral environment, because the black dot in House Districts 9 and 12 often falls below the 50% line while the blue histograms rise above it. Dr. Mattingly concluded that the Pitt-Lenoir House grouping is an extreme pro-Republican partisan gerrymander, Tr. 1155:5-16; PX778 at 30; PX359 at 41; PX408, and the Court gives weight to Dr. Mattingly's conclusion.

***60** 378. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.97% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.91% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:6; PX532. The Court gives weight to Dr. Pegden's analysis and conclusions.

379. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

f. *Guilford*

380. The Guilford House county groupings contains House Districts 57, 58, 59, 60, 61, and 62. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

381. This grouping contains several districts that were altered by the *Covington* Special Master. The *Covington* court tasked the Special Master with redrawing House District 57 after the court found that the enacted House plan did not cure the racial gerrymander of the district. *Covington*, 2017 WL 11049096, at *1-2. In directing the Special Master to redraw House District 57, the court further directed that "the redrawn lines shall also ensure that the unconstitutional racial gerrymanders in 2011 Enacted House Districts 58 and 60 are cured." *Id.* at *2. The *Covington* court did *not* direct the Special Master to redraw House District 59, and did not even mention House District 59 in its order.

382. Consistent with the court's guidance, the Special Master redrew House District 57, and in so doing, also made substantial changes to House District 61 and 62. Tr. 351:14-25; *see* LDTX 159 at 27-29 (Special Master's Recommend Plan). In redrawing these three districts, the Special Master also made what he described as "minor changes" to House District 59 to equalize population. *Covington*, ECF No. 220 at 46. The Special Master explained that he altered House District 59 "only a little." LDTX 159 at 28. Specifically, the Special Master moved one precinct from the enacted District 59 into the Special Master's District 57, and added "two additional precincts" to the northwest corner of House District 59 to equalize population. *Covington*, ECF No.

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220 at 46; *see* Chen Demonstrative D5 at 3; Tr. 352:1-21. According to estimates presented at trial by Legislative Defendants' expert Dr. Johnson, of the current population of House District 59, 92% of the population was put into the district by the General Assembly under the enacted House plan. LDTX314; Tr. 1978:19-22. The Special Master did not make any changes at all to House Districts 58 and 60. Plaintiffs do not bring allegations, and do not seek relief, with respect to the three House districts that the Special Master substantially redrew, House Districts 57, 61, and 62.

383. Plaintiffs' Exhibit 310 is Dr. Cooper's map for this grouping:

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384. The mapmaker packed Democratic voters into House Districts 58 and 60 to make House District 59 favorable to Republicans. Tr. 923:3-23; PX253 at 82 (Cooper Report). House District 58 has "boot-like appendages" to grab Democratic VTDs and ensure these voters could not make House District 59 competitive or Democratic-leaning. *Id.*

385. The Maptitude files from Dr. Hofeller's hard drive confirm Dr. Hofeller drew this grouping with extreme partisan intent. Tr. 986:13-987:9. Specifically, Dr. Hofeller drew the boundaries of House Districts 58, 59, and 60 "almost like a fence" "separating [Republican voters] from the Democratic voters" in the southern portion of Guilford County. Tr. 987:20-988:5; PX344; PX329 at 20 (Cooper Rebuttal Report). Plaintiffs' Exhibit 344 depicts the Dr. Hofeller's Maptitude file showing the Guilford grouping.

Figure 15: Partisan Targeting in House Districts 58, 59, and 60

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***61** 386. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries the mapmaker drew for House Districts 58, 59, and 60.

387. The simulations of Plaintiffs' other experts independently establish that the Guilford county grouping is an extreme partisan gerrymander.

388. Drs. Chen, Mattingly, and Pegden all froze three districts in this grouping that were substantially redrawn by the *Covington* Special Master: House Districts 57, 61, and 62. Tr. 352:24-353:3; PX359 at 33 (Mattingly Report); PX508 at 19 (Pegden Report).

389. Dr. Chen explained in unrebutted testimony that his simulations of the Guilford House grouping did not make any changes to the portion of House District 59 added by the Special Master. Tr. 770:12-771:12; Chen Demonstrative D5 at 4. The Court finds that because Dr. Chen's simulations altered only portions of House District 59 drawn by the mapmaker, and did not touch the very small portions of the district added by the Special Master, the mapmaker necessarily is responsible for the extreme partisan bias that Dr. Chen finds for House District 59.

390. Dr. Chen found that all three districts in the Guilford grouping that he did not freeze are extreme partisan outliers. He found that House Districts 58 and 60 have higher Democratic vote shares than their corresponding districts in all of Dr. Chen's simulations, while House District 59 has a much lower Democratic vote share that the corresponding district in all of the simulations. Tr. 353:17-21; PX45. Dr. Chen's findings demonstrate the packing of Democratic voters into House Districts 58 and 60 to make House District 59 favorable for Republicans. Indeed, the least Democratic district in this grouping would be competitive or Democratic-leaning in Dr. Chen's simulations, whereas House District 59 under the enacted plan is much less favorable for Democrats using the 2010-2016 statewide elections. The Court gives weight to Dr. Chen's findings for this county grouping, which are reflected in Plaintiffs' Exhibit 45 below.

Figure 25: House Simulation Set 1:

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Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Guilford County Grouping

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391. Plaintiffs' Exhibit 398 shows Dr. Mattingly's analysis of the Guilford grouping:

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392. Setting aside the frozen districts, Dr. Mattingly concluded that the least Democratic district (House District 59) shows extreme cracking of Democrats, while the remaining two districts (House Districts 58 and 60) shows extreme packing of Democrats, in comparison to the nonpartisan plans. PX398; PX778 at 30; PX359 at 33-34. Dr. Mattingly found that House 59 has fewer Democratic voters than 99.89% of the comparable districts in the nonpartisan ensemble, while House Districts 58 and 60 have more average Democratic votes than 99.86% of the comparable Democratic districts in the nonpartisan ensemble. PX778 at 30; PX359 at 33-34; PX398. As the figure above shows, the gerrymander could cause the Democrats to lose a seat in this grouping in certain electoral environments, because the black dot for House District 59 falls below the 50% line while the blue histogram sometimes rises above it or gets very close. Dr. Mattingly concluded that the Guilford House grouping is an extreme pro-Republican partisan gerrymander, Tr. 1155:5-16; PX778 at 30; PX359 at 33-34; PX398, and the Court gives weigh to Dr. Mattingly's conclusion.

***62** 393. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 93.9% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 82% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:10; PX527. The Court gives weight to Dr. Pegden's analysis and conclusions.

394. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

g. *Davie-Rowan-Cabarrus-Stanly-Montgomery-Richmond*

395. The Davie-Rowan-Cabarrus-Stanly-Montgomery-Richmond House county grouping contains House Districts 66, 67, 76, 77, 82, and 83. The Court gives weight to the analysis of Plaintiffs' experts and finds that significant portions of this county grouping are an extreme partisan gerrymander.

396. Plaintiffs' Exhibit 314 is Dr. Cooper's map for this county grouping:

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397. This county grouping cracks Democratic voters across its districts. In particular, Dr. Cooper explained how the mapmaker "maximize[d] partisan advantage" by splitting municipalities in "critical ways" that crack Democratic voters. Tr. 926:18-24. The cities of Kannapolis and Concord are both split across House Districts 82 and 83, cracking the Democratic voters across these districts to dilute their voting power. Tr. 926:23-927:24; PX253 at 87-88 (Cooper Report). The Democratic voters from both of these cities are kept separate from the Democratic voters in Salisbury, which is placed in House District 76. *Id.* Plaintiffs Exhibit 315 depicts the splitting and treatment of these municipalities (Concord is shaded green, Kannapolis is pink, and Salisbury is yellow).

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398. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

399. Dr. Chen found that, in his House Simulation Set 1, one of the districts in this grouping, House District 83, is an extreme partisan outlier, as it has a lower Democratic vote than its corresponding district in nearly all of the simulations. Tr. 363:6-12; PX46. Dr. Chen further found, however, that this grouping has three districts (House Districts 76, 82, and 83) that are partisan outliers in his House Simulation Set 2 that avoided pairing the incumbents in office in 2017. Tr. 363:14-364:10; PX70. Dr. Chen's findings demonstrate the cracking of Democratic voters across the districts in this grouping, particularly given Legislative Defendants' representations that the General Assembly sought to avoid pairing incumbents in 2017. *See* Tr. 364:11-22. The Court gives weight to Dr. Chen's findings for this county grouping, which are reflected in Plaintiffs' Exhibit 70 below.

Figure 50: House Simulation Set 2:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Cabarrus-Davie-Montgomery-Richmond-Rowan-Stanly County Grouping

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
400. Plaintiffs' Exhibit 392 shows Dr. Mattingly's analysis of this grouping:

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401. When Dr. Mattingly mathematically quantified cracking in this grouping across all 17 statewide elections, he found that the four most Democratic districts in the Davie grouping had more Democrats than in 97.38% of plans in the nonpartisan ensemble. PX359 at 30; PX778 at 30; PX392.[9] Dr. Mattingly concluded that this grouping reflects an "anomalous structure," Tr. 1156:1-16, and the Court gives weight to that conclusion.

9 Dr. Pegden's conservative methodology resulted in comparison maps that are very similar to the enacted plan for this grouping. Tr. 1351:17-1352:10. In particular, Dr. Pegden's conservative choice to allow his algorithm to split the same municipalities that are split under the enacted plan results in his comparison maps frequently splitting the Democratic strongholds of Kannapolis and Concord. PX535; PX508 at 24 (Pegden Report).

***63** 402. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that significant portions of this county grouping are an extreme partisan gerrymander that was drawn to dilute the votes of Democratic voters and maximize the number of Republican districts in this grouping.

h. *Yadkin-Forsyth*

403. The Yadkin-Forsyth House County grouping contains House Districts 71, 72, 73, 74, and 75. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

404. Plaintiffs' Exhibit 316 is Dr. Cooper's map for this county grouping:

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405. Legislative Defendants packed Democratic voters into House Districts 71 and 72. Tr. 928:20-21; PX253 at 90 (Cooper Report). Legislative Defendants then cracked the remaining Democratic voters in this grouping across the remaining districts, where those Democratic voters' influence is washed out by heavily Republican VTDs. House District 73 includes all of Republican-leaning Yadkin County and just two Democratic-leaning VTDs on the west side of Winston-Salem, ensuring that

it will be a safe Republican district. House Districts 74 and 75 include Democratic-leaning VTDs on the northern and southern sides of Winston-Salem, respectively, but both of those districts wrap around the city to include Republican-dominated VTDs on either side of Forsyth County. Indeed, in order to join Republican VTDs, House District 75 traverses an extremely narrow passageway on the border of Forsyth County. Tr. 928:5-21; PX253 at 90-91 (Cooper Report).

406. The Maptitude files from Dr. Hofeller's hard drive illustrate the "anatomy of this gerrymander." Tr. 988:17-989:4; PX345; PX329 at 21 (Cooper Rebuttal Report). They show Dr. Hofeller's intentional packing of all of the most Democratic VTDs in Forsyth County into House Districts 71 and 72, while putting all of the moderate and Republican-leaning VTDs (shaded tan, yellow, light green, and red) into House Districts 73, 74, and 75. *Id.* Plaintiffs' Exhibit 345 shows Dr. Hofeller's Maptitude file containing this county grouping:

Figure 16: Partisan Targeting in House Districts 71 72, 73, 74, and 75

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407. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

408. The simulations of Plaintiffs' other experts independently establish that the Forsyth-Yadkin county grouping is an extreme partisan gerrymander.

409. Dr. Chen found that, in his House Simulation Set 1, two of the districts in this grouping (House Districts 71 and 75) are extreme partisan outliers above the 95% level, and another two districts in the grouping (House Districts 72 and 74) have higher or lower Democratic vote shares than over 80% of their corresponding districts. Tr. 354:1-20; PX49. Dr. Chen further found, however, that all four of these districts are extreme partisan outliers in his House Simulation Set 2 that avoided pairing the incumbents in office in 2017. Tr. 355:1-18. In Simulation Set 2, House Districts 71 and 72 have higher Democratic vote shares than nearly all of their corresponding districts in the simulations, while House Districts 74 and 75 have lower Democratic vote shares than nearly all of their corresponding districts in the simulations. *Id.* Dr. Chen's findings demonstrate the packing of Democratic voters into House Districts 71 and 72 and the cracking of Democratic voters in the remaining districts in this grouping, particularly given Legislative Defendants' representations that the General Assembly sought to avoid pairing incumbents in 2017. *See* Tr. 355:19-356:4. The Court gives weight to Dr. Chen's findings for this county grouping, which are reflected in Plaintiffs' Exhibit 67 below.

Figure 47: House Simulation Set 2:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Forsyth-Yadkin County Grouping

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***64** 410. Plaintiffs' Exhibit 414 shows Dr. Mattingly's analysis of this grouping:

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411. Dr. Mattingly concluded that the three least Democratic districts show extreme cracking of Democrats while the two most Democratic districts shows extreme packing of Democrats, as evidenced by the significant jump between these sets of districts. Tr. 1144:3-9. Dr. Mattingly's analysis showed that the three least Democratic districts in the enacted plan had fewer average Democratic votes than 99.46% of the comparable districts in the nonpartisan ensemble, while the two most Democratic districts in the enacted plan had more average Democratic votes than 99.84% of the comparable Democratic districts in the nonpartisan

ensemble. PX778 at 30; PX359 at 44. As the figure above shows, the gerrymander causes the Democrats to lose one, possibly two, seats in this grouping in certain electoral environments, because the black dots for House District 74 and 75 always below the 50% line while the blue histograms sometimes rise above it. Tr. 1144:6-9. Dr. Mattingly concluded that the Yadkin-Forsyth grouping is an extreme pro-Republican partisan gerrymander, Tr. 1144:13-16, and the Court gives weight to his conclusion.

412. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.7% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.1% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:7; PX530. The Court gives weight to Dr. Pegden's analysis and conclusions.

413. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

i. *Mecklenburg*

414. The Mecklenburg House County grouping contains House Districts 88, 92, 98, 99, 100, 101, 102, 103, 104, 105, 106, and 107. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

415. Plaintiffs' Exhibit 319 is Dr. Cooper's map for this county grouping:

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416. Dr. Cooper detailed how House Districts 88, 92, and 101 pack Democratic voters on the western side of Mecklenburg County while House Districts 99, 100, 102, and 106 pack Democratic voters on the eastern and central portions of the county. There is not a single Republican-leaning VTD included in any of these packed House Districts. Tr. 930:13-24; PX253 at 93 (Cooper Report).

417. House Districts 103, 104, and 105, meanwhile, include all of the Republican-leaning VTDs on the southern side of Mecklenburg County, allowing those districts to be “as competitive as possible for Republicans.” Tr. 930:25-931:7; PX253 at 93 (Cooper Report).

418. House District 98, on the northern boundary of Mecklenburg County, includes almost all Republican-leaning VTDs, avoiding the Democrat-heavy VTDs that are packed into House Districts 106 and 107. Tr. 931:7; PX253 at 93 (Cooper Report).

***65** 419. As depicted in Plaintiffs' Exhibit 320, these district boundaries split Charlotte between 11 House Districts but manage to place every Republican-leaning VTD within the city—the “red pizza” slice—into House Districts 103, 104, and 105. Tr. 932:1-17; PX320; PX253 at 93 (Cooper Report).

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420. Dr. Hofeller's Maptitude files confirm he drew the districts in this grouping to maximize partisan gain. The “pizza slice” that contains the Republican-leaning VTDs within Charlotte is evident in Dr. Hofeller's color-coded draft map, which groups those Republican-leaning VTDs into three House Districts and packs almost all of the Democratic VTDs into other districts. Tr. 990:4-21; PX329 at 22 (Cooper Rebuttal Report). Plaintiffs' Exhibit 346 shows Dr. Hofeller's Maptitude files containing this county grouping:

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Figure 17: Partisan Targeting in House Districts 88, 92, 98, 99, 101, 102, 103, 104, 105, 106, and 107.

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421. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

422. The simulations of Plaintiffs' other experts independently establish that the Mecklenburg county grouping is an extreme partisan gerrymander.

423. Dr. Chen found that this county grouping contains six districts that are extreme partisan outliers above the 95% outlier level, and another three districts that are outliers above the 90% level. Tr. 361:20-22; PX53. The enacted plan packs Democratic voters into a number of districts in order to create four districts—House Districts 98, 103, 104, and 105—that are less Democratic than all of nearly of their corresponding districts in Dr. Chen's simulations. PX53. Dr. Chen's findings demonstrate the packing and cracking of Democratic voters in this grouping. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which is reflected in Plaintiffs' Exhibit 53 below.

Figure 33: House Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Mecklenburg County Grouping

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424. As Dr. Chen explained at trial, the fact that Democrats won House Districts 98, 103, 104, and 105 by small or extremely small margins in 2018 does not contradict his findings. Tr. 362:2-363:2; *see* JSF ¶¶ 125, 132-35. Rather, Dr. Chen's simulations suggest that Democrats very likely would have won each of these districts by larger margins if not for the gerrymander. *Id.* Moreover, Dr. Hofeller's own assessment of these districts demonstrates that he believed these districts to be Republican-leaning, and that it took the Democratic wave of 2018 to squeak out wins in them. Dr. Hofeller estimated that House District 98 would have a 62.76% Republican vote share and he characterized it as a "strong Rep. district in Mecklenburg." PX246 at 3. Dr. Hofeller similarly estimated that House Districts 103, 104, and 105 would have 62% to 64% Republican vote shares. *Id.* Dr. Hofeller's spreadsheets evidence the partisan intent behind the creation of these districts and the strong possibility that Democratic could lose them in the next election under the current district lines intended to produce that result.

425. Plaintiffs' Exhibit 400 shows Dr. Mattingly's analysis of this grouping:

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426. Dr. Mattingly concluded that the four most Republican districts showed extreme cracking of Democrats while the next four districts showed extreme packing of Democrats, as evidenced by the significant jump between these sets of districts. Tr. 1138:7-1139:4. Dr. Mattingly found that the least four Democratic districts in the enacted plan had fewer average Democratic votes than 99.9% of the comparable districts in the nonpartisan ensemble, while the eight most Democratic districts in the enacted plan had more average Democratic votes than 99.5% of the comparable Democratic districts in the nonpartisan ensemble. Tr. 1141:8-25; PX778 at 30; PX359 at 34-35. As the figure above shows, the gerrymander causes the Democrats to lose up to three, possibly four, seats in this grouping in certain electoral environments, because the black dots for House Districts 98, 103, 104, and 105 often fall below the 50% line while the blue histograms rise above it. Tr. 1140:12-1140:25. Dr. Mattingly concluded that this grouping is an extreme pro-Republican partisan gerrymander, Tr. 1142:1-4, and the Court gives weight to his conclusion.

***66** 427. Like Dr. Chen, Dr. Mattingly explained that the fact that Democrats won all the seats in the Mecklenburg grouping in the 2018 election does not undermine his conclusion that the grouping is an extreme pro-Republican partisan gerrymander.

Tr. 1142:5-14. That the Democrats did well in one election and were able to prevail over the gerrymander does not change the fact that the grouping provides an extreme and atypical structural advantage to the Republicans that could cause the Democrats to lose seats in the next election. Tr. 1142:10-17.

428. Dr. Pegden found that this county grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.994% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.98% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:5-6; PX531. The Court gives weight to Dr. Pegden's analysis and conclusions.

429. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

j. *Wake*

430. The Wake House county grouping contains House Districts 11, 33, 34, 35, 36, 37, 38, 39, 40, 41, and 49.[10]

10 Plaintiffs presented evidence at trial that the enacted 2017 version of the Wake House county grouping was a partisan gerrymander, but Plaintiffs presented no evidence regarding this grouping as revised pursuant to this Court's ruling in *North Carolina State Conference of NAACP Branches, et al. v. David Lewis, et al*. Plaintiffs do not seek a remedy for the current, revised version of this grouping. However, the analysis and findings of Plaintiffs' experts with respect to the 2017 version of this county grouping is evidence of Legislative Defendants' intentional and systematic gerrymandering across the State during the 2017 redistricting.

431. Plaintiffs' Exhibit 297 is Dr. Cooper's map for this county grouping:

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432. The 2017 versions of House Districts 11, 33, 38, and 49 packed Democratic voters to allow House Districts 35, 36, 37, and 40, on the north and south sides of Wake County to be more favorable to Republicans. Tr. 911:15-912:16; PX253 at 65 (Cooper Report).

433. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these 2017 districts.

434. The simulations of Plaintiffs' other experts independently establish that the 2017 enacted House plan version of the Wake grouping was an extreme partisan gerrymander.

435. Dr. Chen found that the 2017 version of this county grouping contained three districts that were extreme partisan outliers above the 95% outlier level. Tr. 365:15-366:1; PX54. The Court gives weight to Dr. Chen's analysis and findings for this county grouping.

436. Dr. Mattingly's analysis showed that the four most Republican districts in the 2017 version of this grouping show extreme cracking of Democrats, while the next four districts show extreme packing of Democrats, in comparison to the nonpartisan plans. PX412; PX778 at 30; PX359 at 43. His analysis showed that the least Democratic districts in the enacted plan had fewer Democratic voters than 99.98% of the comparable districts in the nonpartisan ensemble, while the most Democratic districts in the enacted plan had more average Democratic votes than 99.99% of the comparable Democratic districts in the ensemble. PX778 at 30; PX359 at 43; PX412. The Court gives weight to Dr. Mattingly's analysis and conclusions for this grouping.

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***67** 437. Dr. Pegden found that the 2017 version of this grouping constituted an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.9997% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.9991% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:4; PX533. The Court gives weight to Dr. Pegden's analysis and conclusions.

438. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that the 2017 version of this county grouping was an extreme partisan gerrymander. While Plaintiffs do not challenge any individual House districts in Wake County as currently drawn, the Court gives weight to the findings and conclusions of Plaintiffs' experts in regard to the consistency of the partisan intent throughout the statewide map.

k. ***New Hanover-Brunswick***

439. The New Hanover-Brunswick House county grouping, drawn in 2011 and left unchanged in 2017, contains House Districts 17, 18, 19, and 20. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

440. Plaintiffs' Exhibit 302 is Dr. Cooper's map of this county grouping:

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441. As Dr. Cooper testified, House District 18 packs the most Democratic-leaning VTDs in this grouping into that district, thereby making House Districts 17, 19, and 20 more favorable to Republicans. Tr. 913:17-914:7; PX253 at 72 (Cooper Report).

442. Wilmington is split between House Districts 18, 19, and 20, with the most Democratic-leaning VTDs in that city packed into House District 18 and the Republican-leaning VTDs placed in the two adjacent districts. In order to accomplish the packing of voters in House District 18, the district boundaries split Wilmington and the UNC Wilmington campus. Tr. 914:13-20; PX253 at 73 (Cooper Report); PX303. By dividing the campus in this manner, the district boundaries enable House District 20 to connect to Republican-leaning VTDs in the Wilmington area, creating a boot-like appendage in the southwest portion of House District 20. PX253 at 75 (Cooper Report); Tr. 916:12-21. Plaintiffs' Exhibit 303 show which portions of Wilmington are placed into each of the three districts:

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443. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

444. The simulations of Plaintiffs' other experts independently establish that the Brunswick-New Hanover county grouping is an extreme partisan gerrymander.

445. Dr. Chen found that this county grouping contains three districts that are extreme partisan outliers. Tr. 369:3-7.[11] House District 18 has a higher Democratic vote share than its corresponding district in all the simulations, while House Districts 17 and 19 have lower Democratic vote shares than their corresponding districts in all or nearly all of the simulations. Dr. Chen's findings demonstrate the packing of Democratic voters in House District 18 and the cracking of Democratic voters across the other districts. The vast majority of Dr. Chen's simulations would produce up to two additional districts in this grouping that are competitive or even Democratic-leaning, compared to the enacted plan. PX57. The Court gives weight to Dr. Chen's analysis and findings for this grouping, which are reflected in Plaintiffs' Exhibit 57 below:

11 For all House county groupings drawn in 2011 and unchanged in 2017, Dr. Chen used the 2004 to 2010 statewide elections to analyze these county groupings.

Figure 37: House Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Brunswick-New Hanover County Grouping

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***68** 446. Plaintiffs' Exhibit 404 shows Dr. Mattingly's analysis of this grouping:

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447. Dr. Mattingly concluded that the most Democratic district shows extreme packing of Democrats, while the three least Democratic districts show extreme cracking of Democrats, as evidenced by the significant jump between these sets of districts. Tr. 1145:17-1146:12. Dr. Mattingly found that the most Democratic district in the enacted plan had more Democratic voters than 92.01% of the comparable districts in the nonpartisan ensemble. PX778 at 30; PX359 at 38. As the figure above shows, the enacted map causes the Democrats to lose one seat in this grouping in certain electoral environments, because the black dot in the second most Democratic district always falls below the 50% line while the blue histograms often rise above it. Tr. 1146:5-9. Dr. Mattingly concluded that the New Hanover-Brunswick House grouping reflected a pro-Republican partisan gerrymander, Tr. 1146:22-1147:2, and the Court gives weight to his conclusion.

448. Dr. Pegden found that this county grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.97% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.91% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:6-7; PX524. The Court gives weight to Dr. Pegden's analysis and conclusions.

449. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

l. *Duplin-Onslow*

450. The Duplin-Onslow House county grouping, drawn in 2011 and left unchanged in 2017, contains House Districts 4, 14, and 15. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

451. Plaintiffs' Exhibit 291 is Dr. Cooper's map for this county grouping:

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452. Legislative Defendants split Jacksonville across House Districts 14 and 15, pairing the Democratic-leaning “shark's tooth” in Jacksonville with heavily Republican-leaning VTDs in House District 15. Tr. 906:10-23; PX253 at 53-57 (Cooper Report). The map also ensures that none of Jacksonville's voters are joined with the Democratic-leaning and moderate VTDs in Duplin County, in House District 4. *Id.* The map cracks Democratic voters across all three districts in this grouping, ensuring that House District 14 “becomes Republican and [House District 4] also stays safely Republican.” *Id.*

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453. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

454. The simulations of Plaintiffs' other experts independently establish that the Duplin-Onslow county grouping is an extreme partisan gerrymander.

455. Dr. Chen found that all three districts in this grouping are extreme partisan outliers. Tr. 370:16-371:1. House Districts 4 and 14 have lower Democratic vote shares than their corresponding districts in nearly all the simulations, while House District 15 has a higher Democratic vote share than its corresponding district in nearly all the simulations. PX60. Dr. Chen's findings demonstrate the cracking of Democratic voters across the three districts. The vast majority of Dr. Chen's simulations would produce two districts that are more competitive using the 2004-2010 statewide elections compared to the enacted plan. PX60. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, reflected in Plaintiffs' Exhibit 60:

Figure 40: House Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Duplin-Onslow County Grouping

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***69** 456. Plaintiffs' Exhibit 394 shows Dr. Mattingly's analysis of this grouping:

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457. This grouping is another example of what Dr. Mattingly called “squeezing” or “flattening,” where Democrats are cracked across all of the districts in the grouping. *See* Tr. 1149:19-1150:2; Tr. 1150:22-1151:2. Dr. Mattingly's analysis showed that the two most Democratic districts in the enacted plan had fewer Democratic voters than 92.4% of the comparable districts in the nonpartisan ensemble, meaning that the Duplin-Onslow House grouping showed clear cracking of Democratic voters. PX778 at 30; PX359 at 31. As the figure above shows, the gerrymander could cause the Democrats to lose at least one seat in certain electoral environments. Dr. Mattingly concluded that this grouping reflects a clear pro-Republican partisan gerrymander, Tr. 1155:17-21, PX778 at 30, and the Court gives weight to Dr. Mattingly's conclusion.

458. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 98% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 94% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:9; PX528. The Court gives weight to Dr. Pegden's analysis and conclusions.

459. The Court finds that the analyses of all Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

m. *Anson-Union*

460. The Anson-Union county grouping, drawn in 2011 and left unchanged in 2017, contains House Districts 55, 68, and 69. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

461. Plaintiffs' Exhibit 307 is Dr. Cooper's map for this county grouping:

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462. Dr. Cooper detailed how this county grouping cracks the Democratic voters in Monroe between two districts (House Districts 68 and 69), and then ensures that none of these voters are joined with the Democratic voters in Anson County (in House District 55). The map thus dilutes the voting power of the Democratic voters in this grouping, ensuring that House Districts 68 and 69 are reliable Republican districts. Tr. 919:3-16; PX253 at 79-80 (Cooper Report). Plaintiffs' Exhibit 308 illustrates the cracking of Monroe (which is colored pink).

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463. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

464. Dr. Hofeller's Maptitude files confirm his intentional use of partisanship data to crack Democratic voters. The relevant Maptitude file, which was last modified in June 2011 and is depicted in Plaintiffs' Exhibit 353 below, shows Dr. Hofeller's use of the 2008 Presidential election results to separate Democratic VTDs across the three districts in this grouping. Tr. 995:20-998:7; PX329 at 31 (Cooper Rebuttal Report).

Figure 25: Partisan Targeting in House Districts 55, 68, and 69

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***70** 465. The simulations of Plaintiffs' other experts independently establish that this county grouping is an extreme partisan gerrymander.

466. Dr. Chen found that all three districts in this county grouping are extreme partisan outliers. Tr. 368:7-15. House District 55 has a lower Democratic vote share than its corresponding district in nearly all of the simulations, while House Districts 68 and 69 have higher Democratic vote shares than their corresponding districts in nearly all of the simulations. Dr. Chen's findings demonstrate the cracking of Democratic voters across the three districts in this grouping. In the vast majority of Dr. Chen's simulations, this county grouping would produce a district that is Democratic-leaning using the 2004-2010 statewide elections. PX56. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 56 below:

Figure 36: House Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Anson-Union County Grouping

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467. Plaintiffs' Exhibit 410 shows Dr. Mattingly's analysis of this grouping:

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468. This grouping is another example of what Dr. Mattingly called “squeezing” or “flattening,” where the Democrats are cracked across all of the districts in the grouping. *See* Tr. 1149:19-1150:2; Tr. 1150:22-1151:2. Dr. Mattingly's analysis showed that the two most Democratic districts in the enacted plan had fewer Democratic voters than 100% of the comparable districts in the nonpartisan ensemble, meaning that not a single plan in his nonpartisan ensemble showed as much cracking of Democratic voters in this grouping as the enacted plan. PX778 at 30; PX359 at 42. As the figure above shows, the gerrymander causes the Democrats to lose one seat in certain electoral environment, as the black dot for House District 55 is always below the dotted

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line but the blue histogram often rises above it. Dr. Mattingly concluded that the Anson-Union House grouping reflected an extreme pro-Republican partisan gerrymander, Tr. 1155:8-16, PX778 at 30, and the Court gives weight to his conclusion.

469. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 98.5% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 95.5% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:8-9; PX523. The Court gives weight to Dr. Pegden's analysis and conclusions.

470. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

n. *Alamance*

471. The Alamance House county grouping, drawn in 2011 and left unchanged in 2017, contains House Districts 63 and 64. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

***71** 472. Plaintiffs' Exhibit 311 is Dr. Cooper's map for this county grouping:

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473. Dr. Cooper described how House District 63 takes the shape of a “duck's head” in the Burlington area, cracking the Democratic voters in and around Burlington between House Districts 63 and 64 to reduce those voters' influence. Tr. 924:3-25; PX253 at 84 (Cooper Report). And the map carefully places Burlington's Republican-leaning-VTDs (in the “duck's head”) in House Districts 63, helping to ensure that House District 63 will consistently elect a Republicans. Plaintiffs' Exhibit 312 depicts the division of Burlington (shaded green):

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474. Dr. Hofeller's Maptitude files confirm the partisan intent and “partisan consequences” of cracking Democratic voters in this grouping. Tr. 998:18-19. In particular, Dr. Hofeller's draft map for House Districts 63 and 64 (which was last modified in June 2011 while this district was being drawn) demonstrates how the “duck's head” portion put Burlington's most moderate and Republican-leaning VTDs (shaded tan and light green) in House District 63, while Burlington's bluest VTDs were grouped with heavily Republican areas in northern and southern Alamance County. Tr. 998:9-25; PX354; PX329 at 32 (Cooper Rebuttal Report). Plaintiffs' Exhibit 354 shows Dr. Hofeller's Maptitude file containing the Alamance grouping.

Figure 26: Partisan Targeting in House Districts 63 and 64

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475. Election results demonstrate that the gerrymandering of this grouping has been highly effective. Although Intervenor Defendants presented testimony claiming that “candidate quality” resulted in the Democratic loss in one of the districts in 2018 (Tr. 2245:9-2246:25), in fact, Republicans have won both districts in this grouping in all four elections since the districts were drawn in 2011, across a range of candidates. JSF at Ex. 2; Tr. 2253:15-2256:10.

476. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of the districts in this county groupings.

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477. The simulations of Plaintiffs' other experts independently establish that the Alamance county grouping is an extreme partisan gerrymander.

478. In his House Simulation Set 1, Dr. Chen found that House District 63 has a lower Democratic vote than its corresponding district in over 77% of the simulations while House District 64 has a higher Democratic vote share than its corresponding district in over 74.5% of the simulations. Tr. 371:10-372:6; PX55. More importantly, Dr. Chen found that both districts in this county grouping are extreme partisan outliers in House Simulation Set 2 that avoids pairing the incumbents in office at the time this grouping was drawn. Tr. 372:8-373:5; PX76. Dr. Chen thus concluded with over 99% statistical certainty that the districts in this grouping are extreme partisan outliers if the mapmaker was trying to protect incumbents in drawing the districts in the grouping. Tr. 372:23-373:5. Indeed, across the vast majority of 2,000 simulations in House Simulation Sets 1 and 2, this county grouping would produce a Democratic-leaning district in the simulations, whereas it does not in the enacted plan. PX55; PX76. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 76 below:

Figure 56: House Simulation Set 2:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Alamance County Grouping

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***72** 479. Plaintiffs' Exhibit 384 shows Dr. Mattingly's analysis of this grouping:

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480. This grouping reflects what Dr. Mattingly called “squeezing” or “flattening,” where Democratic districts are cracked across all of the districts. Tr. 1149:19-1151:2. Dr. Mattingly found that this grouping reflected more cracking of Democratic voters than 77% of the comparable districts in the nonpartisan ensemble. Tr. 1151:10-17; PX778 at 30; PX359 at 26. Although Dr. Mattingly did not label this grouping an “outlier” because he used a 90% threshold, he testified that the pro-Republican bias in the grouping still contributed to the extreme pro-Republican bias he found statewide. Tr. 1151:21-1153:2, Tr. 1154:23-1155:1. What's more, the pro-Republican tilt has a significant effect; as the figure above shows, the gerrymander causes the Democrats to lose one seat in this grouping in many electoral environments. Tr. 1151:3-9. Dr. Mattingly concluded that the Alamance House grouping reflected a clear pro-Republican partisan tilt, Tr. 1151:24-1153:2; PX778 at 30, and the Court gives weight to his conclusion.

481. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.9998% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.996% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:5; PX522. The Court gives weight to Dr. Pegden's analysis and conclusions.

482. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

o. *Cleveland-Gaston*

483. The Cleveland-Gaston House county grouping, drawn in 2011 and left unchanged in 2017, contains House Districts 108, 109, 110, and 111. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

484. Plaintiffs' Exhibit 323 is Dr. Cooper's map for this county grouping:

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485. As Dr. Cooper testified, this grouping is a textbook example of cracking. The Democratic voters in Gastonia are cracked across House Districts 108, 109, and 110, and the Democratic voters in Shelby across House Districts 110 and 111. Tr. 932:23-934:10; PX253 at 97-98 (Cooper Report). Plaintiffs' Exhibit 325 illustrates the splitting of these municipalities:

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486. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

487. The simulations of Plaintiffs' other experts independently establish that the Cleveland-Gaston county grouping is an extreme partisan gerrymander.

488. Dr. Chen found that this county grouping contains three districts that are extreme partisan outliers. Tr. 370:5-13. House Districts 109 and 111 have lower Democratic vote shares than their corresponding district in all or nearly all of the simulations, while House District 108 has a higher Democratic vote shares than its corresponding district in all of the simulations. PX59. Dr. Chen's findings demonstrate the cracking of Democratic voters across the districts in this county grouping. The Court gives weight to Dr. Chen's analysis and findings for this county grouping, which are reflected in Plaintiffs' Exhibit 59 below.

Figure 39: House Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Cleveland-Gaston County Grouping

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
***73** 489. Plaintiffs' Exhibit 396 shows Dr. Mattingly's analysis of this grouping:

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490. This grouping reflects what Dr. Mattingly called "squeezing" or "flattening," where Democratic voters are cracked across all of the districts. *See* Tr. 1149:19-1150:2; Tr. 1150:22-1151:2. Dr. Mattingly found that this grouping reflected more cracking of Democratic voters than 82.86% of the comparable districts in the nonpartisan ensemble. PX778 at 30; PX359 at 32. Although he did not label this grouping an "outlier" because he used a 90% threshold, he testified that the pro-Republican bias in the Gaston-Cleveland still contributed to the extreme pro-Republican bias he found statewide. *See* Tr. 1151:21-1156:21. Moreover, as the figure above shows, the gerrymander could cause Democrats to lose at least one seat in certain electoral environments. Dr. Mattingly concluded that the Gaston-Cleveland grouping reflects a clear pro-Republican partisan tilt that can contribute to the extreme pro-Republican bias statewide, Tr. 1156:17-24, PX778 at 30, and the Court gives weight to his conclusion.

491. Dr. Pegden's conservative methodology resulted in comparison maps that are very similar to the enacted plan for this grouping. Tr. 1351:17-1352:10.

492. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

p. *Buncombe*

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493. The Buncombe House county grouping, drawn in 2011 and left unchanged in 2017, contains House Districts 114, 115, and 116. The Court gives weight to the analysis of Plaintiffs' experts and finds that this county grouping is an extreme partisan gerrymander.

494. Plaintiffs' Exhibit 326 is Dr. Cooper's map for this county grouping:

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
495. The mapmaker packed the most Democratic VTDs in and around Asheville into House District 114, in an effort to make House Districts 115 and 116 as competitive for Republicans as possible. Tr. 934:17-935:1; PX253 at 100 (Cooper Report).

496. The Court does not give weight to any nonpartisan explanation Legislative Defendants offered with respect to the boundaries of these districts.

497. The simulations of Plaintiffs' other experts independently establish that the Buncombe county grouping is an extreme partisan gerrymander.

498. Dr. Chen found that all three districts in this county grouping are extreme partisan outliers. Tr. 369:22-370:1. House District 114 has a higher Democratic vote share than its corresponding district in all the simulations, while House Districts 115 and 116 have lower Democratic vote shares than their corresponding districts in all the simulations. Dr. Chen's findings demonstrate the packing of Democratic voters into House District 114 to make House Districts 115 and 116 as competitive for Republicans as possible. PX58. The Court gives weight to Dr. Chen's analysis and findings for this grouping, which are reflected in Plaintiffs' Exhibit 58:

Figure 38: House Simulation Set 1:

Democratic Vote Share of the Enacted and Computer-Simulated Districts Within the Buncombe County Grouping

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
499. Plaintiffs' Exhibit 386 shows Dr. Mattingly's analysis of this grouping:

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
***74** 500. Dr. Mattingly's analysis shows that Democrats were cracked out of the two least Democratic districts in this grouping and packed into the most Democratic district. PX778 at 30; PX359 at 27; PX386. The two least Democratic districts in the enacted plan had fewer Democratic voters than 85.45% of the comparable districts in the nonpartisan ensemble. PX778 at 30; PX359 at 27; PX386. Although Dr. Mattingly did not label this grouping an "outlier" because he used a 90% threshold, he explained that the pro-Republican bias still contributed to the extreme pro-Republican bias he found statewide. *See* Tr. 1151:21-1156:24. As the figure above shows, the gerrymandering could cause Democrats to lose one or two districts in certain electoral environments. Dr. Mattingly concluded that the Buncombe House grouping reflected a pro-Republican partisan bias, Tr. 1156:17-21, and the Court gives weight to his conclusion.

501. Dr. Pegden found that this grouping constitutes an extreme partisan gerrymander. In his first level analysis, Dr. Pegden found that the enacted plan's version of this grouping is more favorable to Republicans than 99.9997% of the maps that his algorithm encountered by making small changes to the district boundaries. In his second level analysis, Dr. Pegden found that this grouping is more carefully crafted to favor Republicans than at least 99.999% of all possible districtings of this county grouping that satisfy the criteria Dr. Pegden used. Tr. 1351:4-5; PX525. The Court gives weight to Dr. Pegden's analysis and conclusions.

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502. The Court finds that the analyses of Plaintiffs' experts independently and together demonstrate that this county grouping is an extreme partisan gerrymander.

D. The 2017 Plans Protected the Republican Majorities in the 2018 Elections

503. In the 2018 House elections, Republican candidates won a minority—48.8%— of the two-party statewide vote, but still won 65 of 120 seats (54%). JSF ¶¶ 68-69. Democrats thus broke the Republican supermajority, but not the majority. *Id.*; Tr. 163:21-164:19 (Rep. Meyer).

504. In the 2018 Senate elections, Republican candidates won a minority— 49.5%—of the two-party statewide vote, but still won 29 of 50 seats (58%). JSF ¶¶ 142-43; Tr. 117:5-19 (Sen. Blue). Democrats broke the Republican supermajority by a single seat, after narrowly prevailing in Senate Districts 9 and 27 by margins of 0.1% and 0.5%. *Id.*

505. Democrats were unable to win majorities in either chamber despite strong efforts to fuel voter enthusiasm, recruit candidates, and fundraise, and despite favorable political conditions nationally and in North Carolina. Tr. 76:5-11 (Phillips); Tr. 118:19-21, 124:9-13 (Sen. Blue); Tr. 163:21-164:5 (Rep. Meyer); Tr. 1269:4-14, 1283:15-1284:1 (Goodwin). Democrats raised and spent more money than Republicans in the 2018 cycle, running the most well-funded campaign operation in the history of North Carolina. Tr. 117:20-117:25, 124:20-24 (Sen. Blue); Tr. 163:21-164:5, 171:3-6 (Rep. Meyer); Tr. 1284:11-17 (Goodwin).

506. Consistent with the findings of Drs. Chen and Mattingly, Senator Blue testified that, under the current Senate plan, Democrats would have needed to win over 55% of the statewide vote to win a majority of seats in the Senate. Tr. 119:19-120:4.

E. The 2017 Plans Harm the Organizational and Individual Plaintiffs

1. The 2017 Plans Harm the North Carolina Democratic Party

507. Elections, voting, and redistricting are central to the mission and purposes of Plaintiff the North Carolina Democratic Party (the "NCDP"). The NCDP is "an association of like-minded individuals"—"predominantly registered Democrats"—"who support and also help develop policies that they agree on." Tr. 1264:1-6 (Goodwin). As the NCDP's chair, Mr. Goodwin testified, the "basic purpose" of the NCDP is to "encourage like-minded folks to come together, to help recruit candidates and to support candidates who favor those policies and favor the development of policies that Democrats support." Tr. 1265:2-5. The NCDP "persuade[s] voters to support the nominees of the Democratic Party during the general election." Tr. 1265:7-9. The Court gives weight to Mr. Goodwin's testimony regarding the NCDP's mission and purposes.

***75** 508. The Court gives further weight to Mr. Goodwin's testimony that district lines significantly affect the NCDP's ability to fulfill its mission and purposes. To achieve its purposes, the NCDP must "have good candidates that we recruit and that we support"; it needs "enthusiasm for the party and its candidates and its message and mission"; and it needs "the appropriate financial resources to get a message [out]" and to fund all "the things that are involved with elections." Tr. 1264:15-21. All of those things are affected by district boundaries. Tr. 1265:22-24. For that reason, to "accomplish [NCDP's] mission," it is "vital" that the NCDP have "fair, nondiscriminatory district lines for the candidates that run in districts across the State." *Id.*

509. The current district lines have harmed the NCDP and will continue to do so. The lines drawn in 2011 "had a tremendously negative impact on the ability of the North Carolina Democratic Party to achieve the purposes for which it exists." Tr. 1266:9-16. Under the 2011 districts, "it was more difficult to recruit candidates, it was more difficult to raise the funds necessar[]y, [and] enthusiasm was down tremendously because of … unfair []districts." *Id.*

510. Upon enactment of the 2017 Plans, the NCDP "knew it was still going to be a difficult, difficult race because of … [the] district lines." Tr. 1267:11-13. Because of the 2017 Plans, the NCDP "had to expend extraordinary amounts of time and resources and the like in a way that, in a set of fair maps across the State, [it] wouldn't have had to do." Tr. 1270:10-14; *see* Tr.

1284:18-22. The NCDP had to spend more money than it would have under nonpartisan maps, both statewide and in individual districts. For example, in House District 103 in Mecklenburg County, "to make that election competitive," Democrats had to recruit the daughter of former Governor Jim Hunt and "her election had to be financed at a level that no previous House election had ever been financed in the history of state elections," with Democrats spending over a million dollars in support of Ms. Hunt. Tr. 189:17-190:23 (Rep. Meyer). Even then, Ms. Hunt won the election by fewer than 100 votes. *Id.* The simulations of Drs. Chen and Mattingly each establish that, under nonpartisan maps, House District 103 in Mecklenburg County would be more favorable for Democrats than it is under the current House plan, FOF § C.2.*i*., meaning that Democrats would not need to devote as many resources to this district and would be able to spend those resources in other districts across the State instead. The Court finds that the NCDP has established that the current districts have injured the NCDP as an organization by requiring it to spend and divert more financial resources than it would have under nonpartisan maps, both statewide and in individual districts

511. The Court finds that the current districts have injured the NCDP in other ways. As Mr. Goodwin testified, "notwithstanding the tremendous[,] palpable level of enthusiasm" for Democratic candidates nationwide and in North Carolina in 2018, "notwithstanding raising the most funds ever raised for a mid-term election for the [D]emocratic [P]arty," and "notwithstanding the fact that … there was a [D]emocratic [G]overnor and [a] unique partnership" with the Governor, the NCDP's "efforts and enthusiasm and … money did not translate into seats." Tr. 1268:16-1269:3. "[D]espite everyone going [the NCDP's] way, the lines were drawn in such a way that [the NCDP] could not breach that seawall that protected the [R]epublican majority." Tr. 1268:13-15.

512. The Court finds that the current districts will also continue to injure the NCDP in the 2020 elections absent judicial relief. The NCDP will continue to need to spend and divert financial resources as a result of the gerrymanders, and it will continue to be extremely unlikely that Democratic candidates will be able to win majorities in either chamber of the General Assembly under the current districts. Moreover, although the NCDP was able to recruit a candidate in every district the favorable national environment that existed for Democrats in 2018 recruitment is more difficult under partisan plans. As Mr. Goodwin explained, unfair districts make it "more difficult to recruit candidates." Tr. 1266:12-13.

***76** 513. In addition to harming the NCDP itself, the enacted plans also have harmed the NCDP's members, and continue to do so. The NCDP's members include every registered Democratic voter in North Carolina. Tr. 1269:8-17. There are "well over two million registered Democrats in North Carolina." Tr. 1269:10-11. "There are registered Democrats in every precinct in the State, every House District, [and] every Senate District." Tr. 1269:15-20. The NCDP thus has members in every House and Senate district at issue in this case, and those members are harmed by the enacted plans. The gerrymanders dilute the voting power of the NCDP's members by intentionally making it more difficult for some Democratic voters to elect candidates of their choice and making it extremely difficult for Democratic voters statewide to obtain Democratic majorities in the General Assembly. *See* FOF § E.3.

514. The NCDP's "support scores" do not undermine the harms that the 2017 Plans cause the NCDP and its members. As Democratic Representative Graig Meyer testified, "support scores" are purchased scores that are assigned to all registered voters based on "a combination of consumer data as well as geographic and other factors that give you a sense of the likelihood someone is going to support a Democratic candidate." Tr. 164:22-165:12. These scores are made available by the NCDP to Democratic candidates' campaigns, Tr. 1270:24-1271:19 (Goodwin), which then, in their discretion, may use them "to determine which voters [they] should target for paid communications, such as digital or mail, or for individual communications, such as canvassing and knocking on voters' doors," Tr. 164:23-165:2 (Rep. Meyer). Even then, Democratic campaigns "almost always use [support scores] in conjunction with other measures, such as a turnout score, which tells you how likely someone is to actually vote." Tr. 165:13-15.

515. Several of Legislative Defendants' Exhibits purportedly show—based on support scores that are aggregated on a district-by-district basis—that Democratic candidates should be competitive, and in fact could win, in a comfortable majority of House and Senate districts under the 2017 Plans. *See* LDTX 145-147, 278; *see* Tr. 2072:21-2074:22 (Dr. Hood).

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516. The Court gives little weight to Defendants' arguments related to aggregated district-level support scores. Neither the NCDP nor any Democratic campaign or candidate "ever use[s] … aggregated support scores for any purpose," Tr. 1271:20-24 (Goodwin), and they do not use them "to determine the electability of a district," Tr. 194:1-2 (Rep. Meyer). Support scores are "not reliable in the aggregate," Tr. 167:5-6 (Rep. Meyer), and "[a]ggregated support scores wouldn't be all that helpful because individual support scores can be misleading," Tr. 165:24-166:1 (Rep. Meyer). "They're imprecise measures, and then if you aggregate imprecise measures like that they tend to get less and less precise in the aggregate." Tr. 166:7-9 (Rep. Meyer). Moreover, the aggregated support scores include all *registered* voters in a district, not likely or actual voters, which tends to overstate Democratic support. Tr. 2091:6-2092:14 (Dr. Hood). Rather than use aggregated support scores, the NCDP uses other metrics to assess a district's competitiveness, such as the "Democratic Performance Index" (DPI) or the results of specific recent statewide elections. Tr. 1272:3-11 (Goodwin); Tr. 177:3-11 (Rep. Meyer).

517. Additionally, Legislative Defendants' expert Dr. Hood, who presented an analysis based on the aggregated support scores, conceded that he is not aware of anyone who has ever "used those scores to make predictions" of how a district will perform in an election. Tr. 2092:3-24. Nor did Dr. Hood present any analysis to substantiate any claim that aggregated support scores are accurate predictors of a district's competitiveness, and Representative Meyer credibly explained that they are not. Representative Meyer gave several examples where the district-level aggregated support scores differ considerably from actual election results, demonstrating why the NCDP and Democratic campaigns "don't use support scores to determine electability of a district." Tr. 194:1-2; *see* Tr. 193:17-196:12.

***77** 518. Defendants presented no persuasive evidence that Democrats have a realistic possibility of winning majorities in the General Assembly under the metrics that are used to assess a district's likely performance, such as the DPI and prior statewide elections results.

519. The total number of registered Democrats in particular districts likewise does not undermine the harm the enacted plans cause the NCDP and its members. Legislative Defendants' Exhibit 280 purportedly indicates that Democrats and unaffiliated voters, when combined together, hold a registration advantage over Republicans in all Senate districts and all House districts but one. *See* Tr. 1279:25-1281:15 (Goodwin). The Court gives little weight to Legislative Defendants' arguments based on statewide party registration numbers.

520. As Mr. Goodwin explained, Legislative Defendants' Exhibit 280 presents "an extreme hypothetical assuming that everyone who's registered for his or her respective party actually vote and vote only based on their party registration, and assuming that unaffiliateds all vote for the Democratic candidate. That is not going to happen." Tr. 1281:21:25. The notion that Democrats could win 169 of 170 total seats in the General Assembly is not credible.

521. As Dr. Chen further explained, party registration has been "studied in the academic literature[,] and it's well known that in a lot of different Southern states, including in some parts of North Carolina, party registration is not necessarily a reliable indicator of one's actual partisan voting habits." Tr. 277:22-278:1. For example, "there are conservative Democrats, or what we call blue dog democrats sometimes, who in the past used to vote Democratic and have, for the last couple of decades, switched over to voting Republican, but their party registration may still remain as Democrats." Tr. 278:3-10.

522. The Court finds that party registration is not a reliable indicator of the competitiveness of any individual district or of the enacted plans as a whole.

2. The 2017 Plans Harm Common Cause

523. Redistricting is central to the mission and purposes of Plaintiff Common Cause. Bob Phillips—Executive Director of Common Cause's local chapter, Common Cause North Carolina—testified that Common Cause advocates for "[s]trengthening democracy" and "for more open, honest and accountable government." Tr. 40:23-41:1, 41:10-16, 42:13-17. And "there is nothing … that's really more significant, consequential in a legislative session than redistricting." Tr. 42:23-25. Redistricting

"really locks in … everything" "for the next decade," including "who gets elected and what the power share will be" and "[u]ltimately what kind of laws and policies are going to be emphasized and then [] will not be, what will be ignored." Tr. 42:25-43:4. The Court gives weight to Mr. Phillips's testimony.

524. Common Cause has long advocated to end partisan gerrymandering in North Carolina. Tr. 43:10-52:20. The 2017 Plans harm Common Cause as an organization by substantially impeding this longtime goal because, as Mr. Phillips testified, majorities in the General Assembly, as the beneficiaries of gerrymandered plans, are unlikely to adopt meaningful redistricting reform. Tr. 52:1-20.

525. The enacted plans also harm Common Cause by impeding its mission and objectives in other ways. As Mr. Phillips explained, "[o]ne of the central missions to Common Cause is to help citizens understand that they do have an obligation and that they can hold their elects accountable. How do you do that when so many—90 percent of our legislative seats are preordained … ?" Tr. 48:8-12. When "we already know [on] the filing date, basically, who is going to win," it is "hard to get citizens, voters[,] to participate, to think that their vote really matters." Tr. 48:25-49:3.

***78** 526. In addition to Common Cause itself, the enacted plans also harm Common Cause's members. Common Cause has 25,000 members across North Carolina, including in the districts at issue here. *See* Tr. 41:17-42:12; PX644 (listing Common Cause members by district). The enacted plans harm Common Cause's members in the same ways they harm the NCDP's members and the individual voter-plaintiffs in this case.

3. The 2017 Plans Harm the Individual Plaintiffs

527. The Individual Plaintiffs are thirty-seven individual North Carolina voters who prefer Democratic candidates and have consistently voted for Democratic candidates running for the North Carolina General Assembly. *See* PX678-714.

528. The evidence demonstrates that the 2017 Plans disadvantage the Individual Plaintiffs and other Democratic voters across North Carolina. Two of the Individual Plaintiffs testified live at trial, and the remaining 35 testified through affidavits. PX678-714.[12]

12 *See, however,* COL § I.C., wherein the Court concludes that nine Individual Plaintiffs lack sufficient standing.

529. Plaintiff Derrick Miller testified live at trial. Dr. Miller, a professor of German at the University of North Carolina Wilmington, resides in Senate District 8 in the "Wilmington Notch." Tr. 202:11-14. Dr. Miller testified that by splitting off this small portion of Wilmington where he lives, the General Assembly has "made it impossible for [him] and [his] Democratic neighbors to elect a Democrat, a candidate of our choice, in Senate District 8." Tr. 205:9-19. In 2018, the Republican candidate won Senate District 8 with around 60% of the vote. Tr. 204:3-4. As a fifth-generation North Carolinian, Dr. Miller cares deeply about issues such as public education and preserving North Carolina's natural resources, and he believes that "Democrats much more reliably and [a] Democratic majority much more reliably would protect those resources, the educational resources and the natural resources of our state." Tr. 206:8-12.

530. Dr. Miller also lives in House District 18, Tr. 204:5-7, where the General Assembly packed Democrats in Wilmington and Leland into a single, reliably Democratic district, PX302. Dr. Miller testified that while such packing does assure him a Democratic representative in House District 18, "it does so at the expense of multiple safe districts for Republicans along the … neighboring districts," Tr. 205:9-19, making it more likely that the Republicans would gain control of the General Assembly.

531. The other Individual Plaintiff who testified at trial, Joshua Brown, is a locksmith apprentice from High Point who resides in Senate District 26. Tr. 830:7-12. As shown in Plaintiffs' Exhibit 281, the General Assembly split off the most heavily Democratic area of Guilford County where Mr. Brown lives and appended it to conservative Randolph County:

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532. Mr. Brown testified that by drawing his Senate District in this manner, the General Assembly "clearly dilute[d] the ability of Democrats to even attempt to run a fair race." Tr. 833:19-21. Like Dr. Miller, Mr. Brown cares about a number of issues before the General Assembly, including a living wage, the environment, and Medicaid expansion. Tr. 834:5-6. Mr. Brown's mother was recently hospitalized, and he believes that she would not be facing certain health issues if North Carolina had approved the Medicaid expansion. Tr. 834:15-835:3. He believes that the Republican Party in the General Assembly today has "opposing" stances on these issues that he cares about. Tr. 835:4-7.

***79** 533. Mr. Brown also lives in House District 60, where Democrats such as Mr. Brown are packed to create an overwhelmingly Democratic district. *See* Tr. 833:25-834:2; PX310. Mr. Brown testified that by packing Democrats in this manner, the General Assembly "reduced the odds of surrounding districts electing a Democrat," Tr. 833:25-834:2, making it more difficult for Democrats to gain control of the General Assembly.

534. The affidavits submitted by the remaining thirty-five Individual Plaintiffs establish that each of these Individual Plaintiffs (i) has voted for the Democratic candidate running for the North Carolina General Assembly in each year that such an election was held since at least 2011, (ii) has a preference for electing Democratic legislators and a majority-Democratic General Assembly, and (iii) believes that if the Democratic Party made up a majority of the members in the General Assembly, the policies proposed and enacted would more closely represent the Plaintiff's personal and political views. PX678-713.

535. Plaintiffs' expert Dr. Chen quantified the effects of the gerrymander on the partisan composition of the districts in which each Individual Plaintiffs resides. For each of his 4,000 simulations (2,000 in the House and 2,000 in the Senate), Dr. Chen determined the House or Senate district in which each Individual Plaintiff would live based on that Plaintiff's residential address. Tr. 387:14-388:6; PX1 at 167-68 (Chen Report). Dr. Chen then compared the Democratic vote share of the districts in which a particular Plaintiff would live under his simulations to the Democratic vote share of the Plaintiff's districts under the enacted plans. *Id.*

536. Plaintiffs' Exhibit 238 (reproduced below) shows Dr. Chen's results for his House Simulation Set 1. In each row, the red star represents the Democratic vote share in the Individual Plaintiff's House district under the enacted plan using the ten 2010-2016 statewide elections, while the gray circles represent the Democratic vote share of that Plaintiff's district under each of the 1,000 simulated plans in House Simulation Set 1. Tr. 388:14-389:12. For instance, the figure shows that Rebecca Johnson's House district in the enacted plan has a roughly 40% Democratic vote share using the 2010-2016 statewide elections, but Ms. Johnson would live in a House district with a higher Democratic vote share in 99% of the simulations, with most of the simulations putting her in a district with an over 50% Democratic vote share. Tr. 390:6-391:20.

Figure 54:

House Simulation Set 1

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537. Dr. Chen found that the following Plaintiffs live in House districts that are extreme partisan outliers compared to their districts in House Simulation Set 1: Vinod Thomas, Paula Ann Chapman, Kristin Parker, Julie Ann Frey, Jackson Thomas Dunn Jr., Rebecca Johnson, Lily Nicole Quick, Joshua Perry Brown, Dwight Jordan, David Dwight Brown, Electa E. Person, Donald Allan Rumph, Amy Claire Oseroff, Lesley Brook Wischmann, Derrick Miller, Carlton E. Campbell Sr., Rosalyn Sloan, Mark S. Peters, Joseph Thomas Gates, Stephen Douglas McGrigor, and Rebecca Harper. Tr. 393:9-17. Dr. Chen further found that Plaintiff Leon Schaller lives in a district that is a 68.1% outlier in House Simulation Set 1, but a 100% outlier in House Simulation Set 2. Tr. 394:2-10; *see* PX239.

538. Plaintiffs' Exhibit 117 shows the same analysis for the Senate, comparing the Democratic vote share in certain Individual Plaintiffs' districts under the enacted Senate plan to their districts under Dr. Chen's Senate Simulation Set 1.

Figure 97:

Senate Simulation Set 1

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE

***80** 539. Dr. Chen found that the following Plaintiffs live in Senate districts that are outliers or extreme partisan outliers compared to their districts in his Senate simulations: Vinod Thomas, Paula Anna Chapman, Pamela Morton, Kristin Parker, Jackson Tomas Dunn, Jr., Rebecca Johnson, Dwight Jordan, David Dwight Brown, Karen Sue Holbrook, James Mackin Nesbit, George David Gauck, Derrick Miller, Mark S. Peters, Joseph Thomas Gates, William Service, Stephen Douglas McGrigor, Rebecca Harper, Nancy Bradley, Aaron Wolff, and Kathleen Barnes. Tr. 395:7-22. Dr. Chen found that the same Plaintiffs lived in districts that are outliers under his Senate Simulation Set 2. Tr. 396:1-7; PX118.

540. Plaintiffs' expert Dr. Cooper further demonstrated how the 2017 Plans, as a whole, disadvantage the Individual Plaintiffs. As Dr. Cooper explained, under the 2017 Plans, Democrats cannot translate their votes into seats as efficiently as Republicans. Tr. 870:11-14.

541. One of Legislative Defendants' experts, Dr. Brunell, also testified about the ways in which partisan gerrymandering harms individual voters. Dr. Brunell testified that "the responsiveness of a legislator to the voters in the voter's district is critical to democratic representation." Tr. 23531:3-6. He testified that a change in the party representing a given district generates "a huge difference" in the policies for which the representative will vote. Tr. 2354:20-23. He also testified that partisan gerrymandering is a problem in modern redistricting because it "can distort how voter preferences get translated into public policy." Tr. 2355:7-9.

F. Defendants Offered No Meaningful Defense of the 2017 Plans

1. No Witness Denied That the Plans Are Intentional and Effective Partisan Gerrymanders

542. Defendants did not persuasively rebut Plaintiffs' extensive direct evidence that the 2017 Plans were drawn with the predominant purpose of maximizing Republican advantage.

543. Defendants presented unpersuasive evidence to rebut evidence that the Hofeller files show that Dr. Hofeller primarily focused on maximizing partisan advantage. Defendants did not identify any file showing that Dr. Hofeller was motivated by anything other than partisanship in drawing the enacted House and Senate plans. Defendants identified no file, for example, showing that Dr. Hofeller at any point during the 2011 and 2017 redistricting processes considered "communities of interest," *cf.* Tr. 1059:3-1060:5, or sought to preserve the "cores" of existing districts, *cf.* Tr. 1212:20-24, or drew or altered any district to avoid splitting a municipality or VTD or to make the district more compact, or constructed any district as a "product of the nuance of legislative negotiation," *cf.* Tr. 1204:2-1206:4.

544. Defendants' experts did not persuasively contest that the plans sought to ensure Republican control of the legislature. Defendants' experts offered no methodology to attempt to evaluate whether the enacted plans were (or were not) extreme partisan gerrymanders. None offered an opinion on that question. Rather, as explained below, Defendants' experts offered theories of why the analyses by Plaintiffs' experts was somehow incomplete or unreliable. The Court gives little weight to these criticisms.

2. Defendants' Criticisms of Plaintiffs' Experts Were Not Persuasive

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a. *Dr. Thornton*

545. Legislative Defendants offered expert testimony from Dr. Janet Thornton to criticize the analyses and conclusions of Plaintiffs' simulation experts, Drs. Chen, Mattingly, and Pegden. Tr. 1618:10-13; LDTX 286 at 4 (Thornton report). Dr. Thornton offered three main critiques of Plaintiffs' experts: (a) Dr. Pegden's and Dr. Mattingly's conclusions supposedly were skewed by the particular statewide elections they used to measure the partisan lean of their simulated plans versus the enacted plans, LDTX 286 at 6-10; (b) their simulations purportedly deviated in various ways from the 2017 Adopted Criteria, *id.* at 10-19; and (c) their simulations supposedly are not statistically significantly different from the enacted plans in terms of the number of Democratic-leaning districts, *id.* at 20-29. *See* Tr. 1622:5-1623:11. But Dr. Thornton's testimony was not persuasive, her analysis is unreliable, and her opinions are given little weight.

***81** 546. Dr. Thornton has a masters and a doctorate in economics from Florida State University. Tr. 1571:6-11. She has a bachelor's degree in economic and political science from the University of Central Florida. *Id*.

547. Dr. Thornton is currently a managing director at Berkeley Research Group and has worked as an economist and applied statistician for 35 years. Tr. 1571:15-1572:3. Dr. Thornton has prepared statistical analysis in voting cases, limited, however, to analysis of statistical differences in voter participation rates by race and minority status. Tr. 1574:3-21.

548. Dr. Thornton has taught statistics and quantitative methods for the business school at Florida State University. Tr. 1573:12-15; LDTX 286 at 39.

549. Dr. Thornton is a member of the American Economic Association and the National Association of Forensic Economists. She has published in peer-reviewed publications including the Journal of Forensic Economics and the Journal of Legal Economics. Tr. 1573:16-1574:2.

550. Dr. Thornton was accepted by the Court as an expert in the fields of economic and applied statistical analysis. Tr. 1578:7-17. She has been qualified as an expert in other cases regarding these subjects. Tr. 1576:12-1577:13. Dr. Thornton has never been excluded from testifying. *Id*.

551. Dr. Thornton has no academic experience involving gerrymandering and instead specializes in expert witness testimony and other consulting-type work in various areas, including employment, insurance, and credit decisions. Tr. 1619:19-1620:20, 1621:2-17; LDTX 286 at App'x A (Thornton CV). Dr. Thornton has no degree in mathematics, no degree in statistics, and only an undergraduate degree in political science. Tr. 1620:21-1621:1. She purported to critique the work of Plaintiffs' simulations experts, each of whom is a full-time academic with years of academic experience in using computer simulations to evaluate partisan gerrymandering. Tr. 1618:14-1619:18.

552. In her report and testimony in this case, Dr. Thornton offered no methodology for determining whether a particular redistricting plan is or is not a partisan gerrymander, or whether a particular plan is or is not the product of extreme partisan considerations. Tr. 1621:18-25. Nor did Dr. Thornton offer any opinion as to whether the enacted plans were drawn as partisan gerrymanders to benefit Republicans. When asked whether she was offering such an opinion, Dr. Thornton responded, “I have no way of knowing.” Tr. 1622:1-4.

(i) Criticisms Concerning Choice of Statewide Elections

553. Dr. Thornton's criticisms of the specific statewide elections used by Drs. Pegden and Mattingly suffered from critical flaws.

554. Dr. Thornton stated in her report that Dr. Pegden “considered” only “two elections” in his analysis. LDTX 286 at 10; *see id.* 8-11; Tr. 1626:9-16. However, Dr. Pegden used six prior election results—two discussed in the body of his report, and four more

summarized in an appendix. PX508 at 11, 34-37 (Pegden Report). Dr. Thornton corrected this mistake only after Dr. Pegden's rebuttal report pointed it out and she was confronted with it at deposition. Tr. 1627:22-1628:4. At trial, Dr. Thornton presented a revised version of a table from her report, in which she (without acknowledging the change during her direct testimony) had added asterisks showing that Dr. Pegden in fact used six prior elections. Tr. 1626:17-1627:3; *compare* LDTX 286 at 7 (tbl. 1) *with* LDTX 302 (Thornton Demonstrative 1). Dr. Thornton's apparent oversight of the number of elections used in Dr. Pegden's analysis led to her to conclude that "Dr. Pegden's choice of elections influence[d] his conclusions." Tr. 1604:21-1605:7; *see* Tr. 1591:20-1592:10 (presenting LDTX 91, a chart purported to show the average Democratic vote share of the elections "included by each expert," but using just the 2016 Attorney General and 2008 Commissioner of Insurance for Dr. Pegden).

***82** 555. On cross examination, Dr. Thornton did not dispute that, when Dr. Pegden tested his results using the four additional elections summarized in his appendix, he found that it did not change his results. Tr. 1628:17-1629:4. Dr. Thornton did not test Dr. Pegden's results using other prior elections. Tr. 1629:7-25.

556. Dr. Thornton criticized Dr. Mattingly for using a different and broader set of statewide elections than the 10 elections identified by Representative Lewis, and she specifically criticized Dr. Mattingly's use of several 2008 elections. Tr. 1686:10-22; LDTX 286 at 8. However, Dr. Hofeller likewise used 2008 elections—including many of the same ones as Dr. Mattingly—in the partisanship formula Dr. Hofeller used to draw the 2017 Plans. *Compare* PX153 (Hofeller partisanship formula) *with* PX359 at 4 (Mattingly Report). When asked whether she knew this fact, Dr. Thornton responded that she "do[es]n't know one way or the other," is "not aware of anything regarding Dr. Hofeller," and did not investigate what elections the mapmaker himself used in drawing the 2017 Plans. Tr. 1686:23-1689:5.

557. In any event, Dr. Thornton's critique of Dr. Mattingly's use of election results, and her analysis of various "averages" across the different elections he used, misses the point of his analysis. Dr. Mattingly analyzed, on an election-by-election basis, how the partisan bias of the enacted plan relative to the ensemble varies in different electoral environments.

(ii) Criticisms Concerning Use of the Adopted Criteria

558. Dr. Thornton's assertion that Plaintiffs' simulation experts deviated from the Adopted Criteria also suffers from critical flaws. Additionally, Dr. Thornton failed to show that any of her criticisms would have made any difference to Plaintiffs' experts' conclusions.

559. Dr. Thornton stated in her report that "[a] review of Dr. Pegden's simulation code suggests that in reality, he did not actually apply a compactness criterion." LDTX 286 at 33. However, Dr. Pegden did apply a compactness criterion. PX508 at 8, 34 (Pegden Report); Tr. 1358:11-24 (Dr. Pegden). As Dr. Pegden explained in his rebuttal report, if he had not applied a compactness criterion, his simulated plans would have looked completely different—dramatically less compact. PX551 at 17-19 (Pegden Rebuttal Report); Tr. 1358:25-1360:1 (Dr. Pegden). When asked about this mistake on cross examination, Dr. Thornton testified that "in retrospect" she "should have written it in a different way." Tr. 1623:12-25.

560. While Dr. Thornton criticized Dr. Pegden for not specifically applying a Reock compactness threshold, she did no work to assess whether adding such a threshold would change Dr. Pegden's simulations or results. Tr. 1624:23-1626:3. Nor did she do any work to test whether adding a Reock threshold would change Dr. Pegden's conclusion that the enacted plans are extreme outliers carefully crafted to favor Republicans. Tr. 1626:4-8. The Adopted Criteria state that the 2017 Plans should "improve the compactness" over the 2011 Plans, and when asked whether Dr. Pegden's simulated plans "are, in fact, an improvement in terms of compactness over the districting in the 2011 map," Dr. Thornton responded, "I don't know." Tr. 1625:13-18. Dr. Thornton did no work to figure it out. Tr. 1625:19-1626:3.

***83** 561. Dr. Thornton testified that Dr. Pegden did not "make any adjustment for incumbency." Tr. 1604:8-9. This is incorrect. Dr. Pegden included as a criterion in all of his simulations avoiding pairing the incumbents who were in office at the time the districts were drawn. PX508 at 8 (listing "Incumbency protection" as criterion).

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562. Dr. Thornton also suggested that Dr. Pegden could not draw valid conclusions about the 2017 Plans without reaching "equilibrium" in his Markov Chain—without comparing the 2017 Plans to the entire universe of potential House and Senate districtings. Tr. 1631:2-11. In this regard, Dr. Thornton analogized Dr. Pegden's analysis to looking for a lost key in a bedroom without considering that the key might be somewhere else in the house. But as Dr. Pegden explained, the purpose of his approach and the accompanying mathematical theorems he has proved is that they allow for drawing statistically significant conclusions about how the enacted plans compare to the universe of all possible plans meeting the relevant criteria without achieving "equilibrium," *i.e.*, without needing to generate a representative sample of the universe of possible maps. PX551 at 2 (Pegden Rebuttal Report); Tr. 1360:2-1361:21. Dr. Thornton acknowledged that she has no expertise in proving mathematical theorems, nor did she offer any opinion that Dr. Pegden's theorems are wrong. Tr. 1631:12-1632:9.

563. Dr. Thornton stated in her report that Dr. Mattingly "did not consider incumbency protection as defined in the 2017 enacted map criteria." LDTX 286 at 19. Dr. Thornton repeated this assertion in her direct testimony, stating that Dr. Mattingly did not "control, in any respect, for incumbency protection." Tr. 1610:20-22. This is false. Dr. Mattingly added incumbency protection as a criterion in checking the robustness of his results, and he concluded that it did not change his results. PX359 at 81-85; Tr. 1093:15-1094:4.

564. On cross examination, Dr. Thornton said that Dr. Mattingly may not have considered incumbency protection "simultaneously" "[w]ith respect to all the other factors, as I recall." Tr. 1633:14-24. This too is incorrect. Dr. Mattingly added incumbency protection as a criterion in conjunction with the criteria used to generate his primary ensemble, and he ran a separate analysis that "consider[ed] the joint effect of both ensuring incumbents are preserved and requiring more stringent redistricting criteria" with respect to the traditional districting criteria. PX359 at 81-82.

565. Dr. Thornton criticized Dr. Mattingly for using only Polsby-Popper compactness scores, and not Reock scores. Tr. 1633:25-1634:3. But she did no work to determine whether the Reock scores for his simulated plans were too low, or whether applying a Reock threshold would change his results. Tr. 1634:4-21. In his rebuttal report, Dr. Mattingly calculated Reock scores for all of his simulated districts, and he reported that there was not a single district in any of his simulated Senate plans with a Reock score less than or equal to 0.15—the threshold referenced in the Adopted Criteria. PX487 at 8-9. There were very few such districts in his simulated House plans—only 1 out of 550,000 simulated Wake districts, and 7 out of 486,588 Mecklenburg districts. PX487 at 8; Tr. 1634:22-161635:14. Dr. Mattingly concluded that removing those districts would not change his results, *id.*, and Dr. Thornton did no work of her own to determine whether he was wrong, Tr. 1635:15-25.

***84** 566. Dr. Thornton criticized Dr. Pegden's and Dr. Mattingly's weighting of the various criteria they applied to create their simulated plans. LDTX 286 at 17-18; Tr. 1636:13-24. But Dr. Thornton acknowledged that she did not know whether the legislature "did weighting" at all, or how it may have done so. Tr. 1636:25-1637:13. She did not suggest any better way than Dr. Mattingly's approach to weighting the various criteria. Tr. 1637:14-25. She did not rerun Dr. Mattingly's computer code using any different weighting system to determine if using a different weighting system could have affected Dr. Mattingly's conclusions. Tr. 1638:1-6. In his rebuttal report, Dr. Mattingly tried six different ways of weighting the various criteria, and he concluded that none changed his results. PX487 at 10-11. When asked about this analysis on cross examination, Dr. Thornton merely said, "I don't recall." Tr. 1638:7-14.

567. Dr. Thornton testified that Dr. Chen's use of a "T score" meant that his simulations did not follow the Adopted Criteria regarding compactness, avoiding splitting municipalities, and avoiding splitting VTDs. Tr. 1599:18-1600:3. Dr. Thornton suggested that Dr. Chen restricted his algorithm to only accept plans below a particular T Score, Tr. 1597:25-1598:19, and she asserted in her report that "[a] t-score evaluation was not among the actual criteria" in the Adopted Criteria, LDTX286 at 15. Dr. Thornton testified that, if Dr. Chen "changed the value of the T scores," used a "value other than 1.75" in the T score, or "added a random element," his results would have been entirely different. Tr. 1597:25-1598:19.

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568. Dr. Thornton's testimony misapprehends Dr. Chen's algorithm. Dr. Chen's "T score" does not impose a numerical threshold that restricts the maps the algorithm generates. Rather, the T score is just a way of equally weighting and jointly tracking the three traditional districting criteria of compactness, avoiding municipal splits, and avoiding VTD splits. For any given county grouping, the algorithm randomly draws an initial set of districts, and then proposes a random change to the border between a random pair of adjoining districts. Tr. 261:23-262:16. If the border change would, on net, improve the districting of the grouping across the three criteria of compactness, avoiding municipal splits, and avoiding VTD splits, the algorithm accepts the change. *Id.* But if the change would make the districting worse off, on net, with respect to these criteria, the algorithm rejects the change. *Id.* The T score is merely a way of giving the three criteria equal weight and then tracking whether a proposed random change improves the districting across these criteria. Tr. 263:4-8 The algorithm considers thousands of these random changes, one at a time in an iterative fashion, in drawing districts within a given grouping. Tr. 261:18-262:23.

569. Dr. Thornton is thus incorrect that Dr. Chen's algorithm lacks a "random element." Tr. 1598:7-8. She misapprehends the T score's function in suggesting that raising or lowering the "T score value" would be less "restrictive." Tr. 1598:5-10. The T score's sole purpose is to equally weight the three criteria of compactness, avoiding split municipalities, and avoiding split VTDs. Dr. Thornton does not dispute that Dr. Chen's T score accurately gives equal weight to these three criteria.

570. Moreover, while Dr. Thornton asserted that Dr. Chen may not have found the enacted plans to be statistical outliers if he had used "different T scores," Tr. 1598:20-1599:13, Dr. Thornton offered no proof or analysis to substantiate this claim, Tr. 1645:14-1647:15.

571. Dr. Thornton also criticized Dr. Chen's approach to incumbency protection in his Simulation Set 2. Tr. 1638:15-1639:8. She acknowledged that Dr. Chen's Simulation Set 2 successfully avoided pairing incumbents, but she asserted that Dr. Chen failed to comply with the second sentence of the Adopted Criteria's incumbency protection criterion, which provided that "the committees may make reasonable efforts to ensure voters have a reasonable opportunity to elect non-paired incumbents." Tr. 1610:23-1611:3. Dr. Thornton claimed that this sentence meant the Committees should make efforts "to allow for incumbents to win" by placing them in politically favorable districts, LDTX286 at 16, and that "it would have been interesting" if Dr. Chen had applied "some sort of weighting" to carry this out, Tr. 1639:12-1640:3. Dr. Thornton's interpretation is contrary to the contemporaneous explanation of this sentence by Representative Lewis, who stated at an August 10, 2017 hearing that the sentence "is simply saying that mapmakers may take reasonable efforts to not pair incumbents unduly." PX603 at 122:4-18; Tr. 1640:16-1641:12. That direction matches Dr. Chen's approach to incumbency protection.

***85** 572. Dr. Thornton did not analyze whether any of the supposed deviations made any difference to the experts' conclusions. On cross examination, Dr. Thornton was asked whether, "for every single criticism you've leveled, there's no instance in which you took any of plaintiffs' experts' code, substituted whatever you thought was an improved criteria, ran the code with the improved criteria and showed us that it made a difference to their work; isn't it true in your report there's no place that you did that?" Tr. 1647:3-13. Dr. Thornton responded that, "given the time, [she] did not have sufficient time to do so." Tr. 1647:14-15.

(iii) Criticisms Concerning Statistical Significance

573. Dr. Thornton opined that the enacted plans are "not statistically significantly different from the simulated maps with respect to the number of Democratic districts." LDTX286 at 21 (capitalization omitted). Dr. Thornton wrote in her report that she compared "the enacted plan's number of Democratic districts and the number predicted by the simulated maps," and "determined the number of standard deviations associated with the difference between the enacted plan and simulated number of Democratic districts." LDTX286 at 24. However, Dr. Thornton did not use the actual results of Plaintiffs' experts' "simulated plans," or the actual "standard deviation" of the simulated plans.

574. Instead, Dr. Thornton created her own distribution of the predicted number of Democratic seats won under a nonpartisan plan, using a "binomial distribution." She then calculated the "standard deviation" of her own distribution, and used that standard deviation to assess statistical significance. *See* PX551 at 10 (Pegden Rebuttal Report). Dr. Thornton used this binomial

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distribution methodology as the foundation for her criticisms of all three of Plaintiffs' simulation experts. LDTX286 at 22; Tr. 1685:9-22.

575. Contrary to Dr. Thornton's approach, the distribution of districting maps is not a binomial distribution, and thus it is inappropriate to use a binomial distribution in the redistricting context. When confronted with the flaws in using a binomial distribution in the redistricting context, Dr. Thornton's responses were not persuasive. The Court gives her testimony concerning statistical significance little weight.

576. It is undisputed that a binomial distribution applies only when two conditions are met: (1) each trial (in this case, each House or Senate district) is independent of one another; (2) each trial has the exact same percentage chance of producing a particular outcome (in this case, that a Democrat wins the district). Tr. 1669:4-8, 1676:1-5 (Dr. Thornton); Tr. 1378:24-1382:2 (Dr. Pegden); PX551 at 10 (Pegden Rebuttal Report); PX487 at 11-12 (Mattingly Rebuttal Report); PX123 at 171-72 (Chen Rebuttal Report). Thus, the classic example of the binomial distribution is a coin flip, because the likelihood of landing on heads on any flip of a coin is independent of the result of every other flip, and the percent chance of landing on heads is the same in each flip (50%). Tr. 1669:11-1670:5.

577. By applying a binomial-distribution methodology, Dr. Thornton assumed that district elections, like coin flips, are independent of each other, and also that Democrats have the same chance—specifically, a roughly 40% chance—of winning each and every district House or Senate district, no matter where in North Carolina the district is located. Tr. 1670:6-1671:2 (Dr. Thornton); *see* Tr. 1381:15-1382:2 (Dr. Pegden); PX551 at 10 (Pegden Rebuttal Report); PX487 at 11-12 (Mattingly Rebuttal Report); PX123 at 171-72 (Chen Rebuttal Report).

***86** 578. Both assumptions are incorrect in the redistricting context. First, unlike a coin flip, each House (or Senate) district is not independent of one another. Tr. 1379:22-1381:10 (Dr. Pegden); PX551 at 10 (Pegden Rebuttal Report). In a given county grouping, if a particular set of Democratic voters is placed in one district, then those voters cannot be put in any other district in the grouping. *Id.* The partisan makeup of the districts are thus intertwined and not independent of one another; increasing the number of Democratic voters in a particular district necessarily decreases the number of Democratic voters in neighboring districts. *Id.*

579. The second assumption underlying Dr. Thornton's binomial distribution— that Democrats have the exact same percentage chance of winning each House (or Senate) seat—is contrary to reality. Dr. Thornton assumes, for example, that Democrats have the same percentage chance of winning a House district in Wake County as in Caldwell County. Tr. 1381:15-1382:2 (Dr. Pegden); *see* PX487 at 11-12 (Mattingly Rebuttal Report); *see* PX123 at 171-72 (Chen Rebuttal Report). This is not the case.

580. The following example illustrates these flaws in Dr. Thornton's analysis. In the Alamance County House grouping, there are two districts of roughly equal population. Assuming, as a hypothetical, that Republicans will win 60% of the total vote across the County in a particular election, it is mathematically impossible for Democrats to win *both* districts in the election. Tr. 1673:14-19. But under Dr. Thornton's binomial-distribution methodology, Democrats will win both districts 16% of the time—because she assumes that Democrats have an equal and independent 40% of winning each of the two districts. Tr. 1671:10-17; *see also* Tr. 1379:1-1381:10 (Dr. Pegden). When asked about this on cross examination, Dr. Thornton repeatedly asserted that she did not "understand" the illustration. Tr. 1671:3-1673:13.

581. Dr. Thornton's binomial-distribution methodology was recently rejected by a federal court in a partisan gerrymandering case in Ohio. There, as here, Dr. Thornton used a binomial distribution in her expert analysis on behalf of the Republican legislative defendants, and the three-judge federal district court rejected her analysis. The court stated: "Dr. Thornton also performed her own analysis using a binomial distribution, but we do not give any weight to that analysis." *Ohio A. Philip Randolph Inst. v. Householder*, 373 F. Supp. 3d 978, 1056 (S.D. Ohio 2019); *see* Tr. 1673:20-1674:20. The court explained that Dr. Thornton's binomial-distribution analysis "incorporates yet another faulty assumption that each district has a 51% chance of being won by a Republican because Republicans won 51% of the congressional vote across the State; this assumption does

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not comport with basic understandings of congressional elections, i.e., that although some districts may be competitive (a 51% Republican to 49% Democrat district), other districts lean heavily in favor of one party or the other." *Ohio A. Philip Randolph Inst.*, 373 F. Supp. 3d at 1056; *see* Tr. 1677:23-1678:15.

582. While Dr. Thornton claimed that her use of a binomial distribution here is different from the Ohio case, Tr. 1677:19-22, the Court disagrees and finds that Dr. Thornton's methodology here suffers from the same flaws identified by the federal court in the Ohio case. Assuming that districts are independent, and that Democrats have a roughly 40% chance of winning every House and Senate district, does not comport with basic understandings and reality of North Carolina House and Senate elections. Dr. Thornton could not identify literature or precedent supporting the use of a binomial distribution in a redistricting context. Tr. 1680:6-14.

***87** 583. Dr. Thornton's use of a binomial distribution skewed her statistical significance analysis. Due to the independence and equal probability assumptions, the binomial produces a much wider distribution of the number of possible districts Democrats could win in the House or the Senate than the actual distribution produced by each expert's simulations. That wider distribution in turn results in Dr. Thornton estimating much larger standard deviations than the actual standard deviations of each expert's simulated plans, allowing Dr. Thornton to claim that the enacted plan is less than two standard deviations from each expert's average simulation and therefore purportedly not a statistically significant outlier. LDTX286 at 9-13. For instance, in Dr. Chen's House Simulation Set 1, his simulated maps produce a range of results from 43 Democratic districts to 51 Democratic districts, with 90 percent of those results between 45 and 48 Democratic districts, whereas the enacted 2017 House plan produces only 42 Democratic districts—an extreme outlier, completely off the distribution. PX234; Tr. 1647:16-1648:16. The actual standard deviation of Dr. Chen's House Simulation Set 1 is 1.36 seats, and the enacted plan is more than three standard deviations from the average simulated plan. *Id.* But Dr. Thornton's unsubstantiated binomial distribution suggests that Democrats could win as few as 30 districts and as many as 63, and has a standard deviation of 5.34 seats. PX123 at 170-76.

584. Similarly, Dr. Thornton's binomial distribution is completely different from the actual distribution of simulated plans she created using a modification of Dr. Pegden's computer code. For the House, while the simulations generated between 46 and 50 Democratic seats, Dr. Thornton's binomial distribution generated between 35 and 60 Democratic seats and a much larger standard deviation. Plaintiffs' Exhibit 554, a figure from Dr. Pegden's rebuttal report, depicts these dramatic differences:

Figure 1.3: The binomial distribution is not a reasonable approximation of the map distribution (House)

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE
The gray bars again show the distribution of Dr. Thorton's simulated House plans, with respect to seat counts using the 2016 AG race. Dr. Thornton's statistical significance analysis based on the binomial test would require random House maps to be distributed instead as the blue bars, which plot the binomial distribution used by Dr. Thornton's test.

585. Dr. Thornton's binomial distribution likewise is completely different from the actual distribution of simulated plans created by Dr. Mattingly. PX495. When Dr. Mattingly used the "actual distribution" of his results to calculate statistical significance as opposed to Dr. Thornton's "grossly inaccurate seat distribution," he found that the enacted maps are "well outside two or three standard deviations" and are "extreme outliers." PX487 at 11-12.

586. Dr. Thornton made other significant methodological errors in her analysis of statistical significance. For instance, in modifying Dr. Pegden's computer code to generate simulated plans of her own, Dr. Thornton used the wrong command and froze every single district drawn in 2011 and left unchanged in 2017. Tr. 1363:7-1364:8 (Dr. Pegden); PX551 at 6 (Pegden Rebuttal Report). Dr. Thornton's suggestion that she intended to freeze the 2011 districts, Tr. 1666:16-21, is not credible, given that her report nowhere mentions this decision and in fact claims that it is analyzing the entire enacted map—all 120 House districts and all 50 Senate districts. LDTX286 at 75 (tbl. 3).

587. Dr. Thornton's freezing errors ran in both directions. In her report, Dr. Thornton presented a graph purporting to show differences in Democratic vote share between the enacted plans' districts and the districts she drew using her modified version of Dr. Pegden's code. The evident goal of these charts—titled "Comparison of the Enacted Plan and the Average Across Dr. Pegden's Simulations for Each *Non-Frozen* House [and Senate] District"—was to suggest that the vote shares in the enacted districts were not markedly different from those in the nonpartisan simulations. LDTX286 at 28-29 (emphasis added). But Dr. Thornton's charts included many districts that *were* frozen on account of the Whole County Provision, which misleadingly suggested a high degree of similarity between the enacted plan and the simulations. Tr. 1680:24-1684:9. Dr. Pegden pointed out a number of other problems with this chart—*e.g.*, using thick lines, stretching the data out over an unnecessarily long vertical axis, and needlessly connecting the data points using lines, all which served to obscure the significant gaps in vote share between the enacted and simulated districts. Tr. 1391:6-1395:19.

***88** 588. Setting aside the flaws in her analysis, Dr. Thornton's results show a statistically significant difference between the enacted 2017 Plans and the simulated plans she created using a modification of Dr. Pegden's code. As shown in Dr. Pegden's rebuttal report, only 0.001% of Dr. Thornton's simulated plans are as Republican-favorable as the enacted House plan, and only 0.182% of Dr. Thornton's simulated plans are as Republican-favorable as the enacted Senate plan. PX551 at 8-9 (Pegden Rebuttal Report); Tr. 1369:4-1371:18.

589. Thus, even including errors, Dr. Thornton's results were still consistent with the conclusions of Plaintiffs' experts. Tr. 1400:10-21 (Dr. Pegden).

b. *Dr. Brunell*

590. Legislative Defendants offered expert testimony from Dr. Thomas Brunell, who was asked to read and respond to the reports of Drs. Pegden, Cooper, Mattingly and Chen. Tr. 2276:19-20. Dr. Brunell is a tenured political science professor at the University of Texas, Dallas. For over 20 years, Dr. Brunell has taught, lectured and published on representational and redistricting issues. LDTX292. Dr. Brunell was accepted by the Court as an expert on redistricting and political science. Tr. 2275:4-12. Dr. Brunell offered no opinion on whether the 2017 Plans are partisan gerrymanders. Tr. 2316:10-12.

591. The Court finds Dr. Brunell's opinions were unpersuasive, sometimes inconsistent with prior testimony he has given, and gives them little weight.

592. Dr. Brunell testified that Plaintiffs' experts have not shown "what is too much politics in this political process." Tr. 2306:24-2307:2. However, this critique contradicts Dr. Brunell's own expert analysis and conclusions in a prior case. In 2011, Dr. Brunell opined as an expert witness for the Nevada Republican Party that state legislative maps were excessive partisan gerrymanders—based on an analysis less robust than the analyses of Plaintiffs' experts here. Tr. 2337:5-2338:23. Using two statewide elections, Dr. Brunell conducted a uniform swing analysis and concluded that the maps at issue gave Democrats 60% of the seats when Democrats won only 50% of the votes statewide. Tr. 2340:16-2345:5. Dr. Brunell concluded exclusively on the basis of that analysis that the maps were "unfair" and showed "heavy pro-Democratic bias"—"clearly a pattern of partisan bias, i.e., gerrymandering." Tr. 2342:4-2345:11. Dr. Brunell further opined, based solely on his uniform swing analysis and the disconnect between Democrats winning 60% of the seats with only 50% of the statewide vote, that he could be "absolutely conclusive" that the maps were not just partisan gerrymanders, but a "leading candidate for gerrymander of the decade." Tr. 2345:12-2346:15.

593. In this case, Dr. Brunell conceded that Plaintiffs' experts' analyses—using both uniform swing analysis and actual results of prior statewide elections—demonstrated that when Republicans get 50% of the votes in either chamber of the General Assembly, they win at least 60% of the seats. Tr. 2346:16-2350:2. Thus, under Dr. Brunell's own approach, the Court could find, in his own words, a "heavy pro-[Republican] bias" and "clearly a pattern of partisan bias *i.e.*, gerrymandering." Tr. 2350:3-8.

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594. The Court also rejects Dr. Brunell's testimony that simulation methods for evaluating partisan gerrymandering have not been sufficiently vetted by academics and courts. Tr. 2292:15-2293:23. Dr. Brunell testified on direct examination that he was unaware of any peer-reviewed political science papers that provide a "basis" for "using [simulations] as an evaluation for partisanship." Tr. 2293:11-17. He testified that a 2013 paper by Dr. Chen and Dr. Jonathan Rodden "uses simulations, I think," "[b]ut in terms of using it as an evaluation for partisanship, I don't think there have been any such publications yet." Tr. 2293:11-17. Dr. Brunell later acknowledged that the 2013 Chen and Rodden paper was in fact a peer-reviewed political science paper that "uses simulation techniques to measure partisanship." Tr. 2307:19-2308:5; *see* PX1 at 179. He also acknowledged that he was unfamiliar with three other peer-reviewed political science papers by Dr. Chen published between 2015 and 2017 that use computer simulations to evaluate partisan gerrymandering. Tr. 2308:10-2309:9; PX1 at 180. Dr. Brunell was also unaware that Dr. Pegden's paper on using simulations to measure gerrymandering, published in the Proceedings of the National Academy of Sciences, was peer reviewed by a political scientist. Tr. 2309:12-22; *see* Tr. 1413:7-16.

***89** 595. Dr. Brunell was also unfamiliar with court decisions approving the use of simulations to measure partisanship. He testified on direct that "we've only just started to see [simulations] used in law suits," Tr. 2292:24-2293:1, that simulations therefore "may not be ready for prime time yet," Tr. 2292:22-24, and that he himself did not learn about the simulation method until 2017 or 2018, Tr. 2293:7-10. However, as he acknowledged, multiple courts have credited simulations by Drs. Chen, Mattingly, and Pegden as a method of establishing whether a particular map is a partisan gerrymander. Tr. 2310:8-2312:1. Dr. Brunell was "unaware" that the Fourth Circuit credited Dr. Chen's simulations in a 2016 decision, in a gerrymandering case filed in 2013. Tr. 2311:4-2312:1; *see Raleigh Wake Citizens Ass'n v. Wake Cty. Bd. of Elections*, 827 F.3d 333 (4th Cir. 2016). The court rejected the criticism Dr. Brunell makes here, namely that Dr. Chen's simulations "ignor[ed] partisanship." Tr. 2311:17-20; *see Raleigh Wake*, 827 F.3d at 344.

596. The Court rejects Dr. Brunell's testimony that simulated maps are only useful if the algorithm draws "partisan districts" as opposed to "nonpartisan districts." Tr. 2277:13-20; 2280:4-16. Dr. Brunell acknowledged that the 2017 Plans were drawn for partisan gain, but argued that simulations can tell if an enacted map is an "extreme partisan outlier" only if the simulations include some level of partisanship. LDTX291 at 3; Tr. 2277:13-20; 2280:4-16. Dr. Brunell's criticisms miss the point. Dr. Mattingly's and Dr. Chen's simulations quantify the effects of the gerrymandering and how extreme it is. Both find that the enacted plans are outside the entire distribution of their simulated plans— sometimes by many seats. For instance, Dr. Chen found in his uniform swing analysis that, in electoral environments corresponding to a 52.42% statewide Democratic vote share, Democrats win 11 to 12 fewer seats in the House and 3 to 4 fewer seats in the Senate than they would typically win under the simulated plans. *See* PX1 at 34, 65 (Chen Report). Dr. Mattingly found similar results. *See* PX359 at 12 (Mattingly Report); PX487 at 25 (Mattingly Rebuttal Report).

597. Additionally, Dr. Pegden's analysis demonstrates that the 2017 Plans are extreme partisan outliers even in comparison to other *partisan* maps. Although Dr. Brunell criticized "all three of" Plaintiffs' simulation experts for using "nonpartisan districts" as the point of comparison, Tr. 2277:13-20, this misunderstands Dr. Pegden's methodology. Dr. Pegden started with the enacted plan and made a sequence of small random changes, observing how those changes affected the partisan characteristics of the plan. Tr. 1304:3-1305:7; PX515; PX519. Dr. Pegden's comparison maps thus "are not supposed to be neutral comparison maps drawn from scratch of North Carolina," and "even against a set of extremely similar maps which were generated from the enacted map and which share all sorts of qualities with the enacted map, the enacted map is still an extreme outlier." Tr. 1304:14-1305:7. Dr. Pegden's comparison maps are "tied strongly to the enacted map" and "baked in" intentional partisan choices by the mapmaker. Tr. 1405:1-13, 1406:2-19. This makes it all the more remarkable that the enacted plans are such outliers in his analysis, even against this very similar comparison set. Tr. 1315:22-1316:2.

598. The Court gives no weight to Dr. Brunell's criticisms of uniform swing analysis. Dr. Brunell stated in his report that uniform swing analysis is "not reliable," LDTX291 at 4, and he testified that the assumption of uniform swing analysis was "clearly wrong," Tr. 2289:14-22. But again, when Dr. Brunell was evaluating partisan bias in the Nevada case in 2011, he testified that uniform swing analysis allowed him to be "absolutely conclusive" in finding legislative maps to be heavily biased and gerrymandered. Tr. 2351:19-2352:7.

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***90** 599. Dr. Brunell's report and testimony contained numerous statements that were erroneous and reflect a failure to understand the work of Plaintiffs' experts. Dr. Brunell's report asserts that Dr. Pegden "use[d] the results of just two elections for his simulations" and that "both of them have Democratic winners." LDTX291 at 15. In fact, Dr. Pegden used six elections, two of which—2012 Lieutenant Governor and 2014 U.S. Senate—had Republican winners. PX508 at 34-37 (Pegden Report). On the stand, Dr. Brunell explained his assertion by stating that Dr. Pegden "does some quick checks with other elections in his appendix, but he only uses [] two elections for his full simulation," that he "uses one particular metric … but not all of it," and that he did not use "the four additional elections in his appendix to perform his entire statewide analysis." Tr. 2323:1-15. In fact, Dr. Pegden re-ran his entire statewide analysis using all six elections. PX508 at 34-37 (Pegden Report).

600. Dr. Brunell wrote in his report that he was "confused" by aspects of Dr. Pegden's analysis, Tr. 2318:19-22, that were clearly explained in Dr. Pegden's initial report. Tr. 2318:23-2319:24. Dr. Brunell criticized Dr. Pegden for failing to explain how many changes he made to the enacted map before comparing the simulated maps to the enacted map, LDTX291 at 13, but Dr. Pegden's report made clear that he evaluated the partisanship of the new map after every step, meaning every swap, PX508 at 5. Dr. Brunell also criticized Dr. Pegden for purportedly failing to explain terms like "fragility" and "carefully crafted," Tr. 2320:8-18, but Dr. Pegden's report specifically defined those terms. Tr. 2321:15-2322:2.

601. In criticizing Dr. Chen's application of the Adopted Criteria, Dr. Brunell testified that Dr. Chen's "programmatic algorithm … maximizes geographic compactness," Tr. 2295:10-16, but Dr. Brunell had not reviewed Dr. Chen's code, Tr. 2333:23-25, and he got it wrong, Tr. 262:24-263:12. When confronted with his error at trial, Dr. Brunell testified that whether Dr. Chen maximized compactness did not matter because Dr. Chen's "algorithm" was "different from the legislative criteria" in unspecified other ways relating to splitting VTDs. Tr. 2334:6-13. However, Dr. Brunell "didn't know" how Dr. Chen's algorithm "worked" with respect to other issues, Tr. 2297:9-14, and he did no work to determine whether a different weighting would have affected Dr. Chen's conclusions, Tr. 2334:18-21.

602. Dr. Brunell's report inaccurately criticized Dr. Mattingly and Dr. Pegden for failing to preserve incumbents, when both ran simulations that avoided pairing incumbents. LDTX291 at 3; Tr. 2326:13-25; Tr. 2329:2-5.

603. The Court rejects Dr. Brunell's testimony that the simulated maps are not proper comparisons to the enacted map to the extent they do not preserve the "core" of an incumbent's district. Tr. 2283:21-2284:19. Dr. Brunell acknowledged that he had "no idea if and to what extent core preservation was used" in the enacted map, Tr. 2329:21-2330:1, and no other witness testified that the 2017 Plans preserved district cores. Neither Dr. Brunell nor any other witness for Legislative Defendants analyzed whether a hypothetical effort to preserve district cores could explain the extreme partisan bias in the 2017 Plans. As Representative Lewis explained, the Adopted Criteria's incumbency protection provision referred only to "not pair[ing] incumbents unduly"—not core preservation. PX603 at 122. As Dr. Brunell acknowledged, core preservation also can be a partisan criterion, Tr. 2332:12-25, and that, when, as here, the prior plan was an unlawful racial gerrymander, preserving cores might also preserve racial gerrymanders, Tr. 2333:1-12.

604. Additionally, Plaintiffs proved that a hypothetical effort to preserve the "cores" of an incumbent's district could not explain the enacted plans' extreme partisan bias. Dr. Pegden's simulations preserved the "cores" of each incumbent's prior district. Tr. 1316:24-1317:10 (Dr. Pegden); *see* Tr. 2330:16-19.

***91** 605. The Court gives little weight to Dr. Brunell's testimony that Figure 8 and Figure 20 of Dr. Chen's report do not show that the enacted plan is an "outlier." Tr. 2302:12-2303:15. Figure 8 of Dr. Chen's report shows at least a five-seat difference between the bulk of his House simulations and the enacted plan, and shows that the enacted plan is off the distribution entirely—it elects fewer Democrats than 100% of his simulated plans. PX1 at 48 (Chen Report). The Court rejects Dr. Brunell's testimony that a five-seat difference is only a "slight[]" difference. Tr. 2302:24-2303:2. Likewise, Figure 20 of Dr. Chen's report shows a two-seat difference between the typical result of his Senate simulations and the enacted plan, and again shows that the enacted plan is off the distribution entirely—it elects fewer Democrats than 100% of his simulated plans. PX1 at 48 (Chen Report). Dr.

Brunell also speculated that changing Dr. Chen's criteria "could shift this over and then this wouldn't be an outlier at all," Tr. 2303:4-9, but the Court gives no weight to Dr. Brunell's untested conjecture. The Court likewise rejects Dr. Brunell's testimony about Plaintiffs' Exhibit 48, which is Figure 28 of Dr. Chen's report and shows cracking and packing in the Cumberland House grouping. PX1 at 93. Dr. Brunell testified that this figure did not show the enacted plan to be an "outlier" because "the enacted districts are in the gray clouds," Tr. 2303:16-21, but in fact the figure demonstrates that two districts (HD-45 and HD-43) are entirely outside the "gray clouds" and show more cracking (HD-45) and packing (HD-43) of Democrats that 100% of the districts in Dr. Chen's simulations. PX1 at 93.

c. *Dr. Hood*

606. Legislative Defendants offered the testimony of Dr. M.V. (Trey) Hood III to respond to Plaintiffs' experts Dr. Cooper and Dr. Chen. LDTX 284; Tr. 2037:21-2038:3.

607. Dr. Hood is a tenured professor of political science at the University of Georgia, a position he has held for 20 years. Tr. 2032:19-2033:5. He holds three degrees in political science: a Ph.D. from Texas Tech University; a Master of Arts degree from Baylor University, and a Bachelor of Science degree from Texas A&M University. Tr. 2032:14-18.

608. Dr. Hood is also the director of the School of Public and International Affairs' Survey Research Center which performs public opinion research and polling for entities including the Atlanta Journal-Constitution. Tr. 2033:6-19.

609. Dr. Hood teaches courses in American politics and policy, Southern politics, research methods and election administration, including redistricting. Tr. 2033:20-2034:9.

610. Dr. Hood also conducts research on redistricting and has published articles in peer-reviewed journals on topics that include redistricting. Tr. 2034:10-18. Dr. Hood's work has appeared in peer-reviewed journals approximately 50 times. Tr. 2034:13-21. He currently serves on the editorial boards of Social Science Quarterly and Election Law Journal, with the latter journal dealing with issues of election administration, including redistricting. Tr. 2034:22-2035:2.

611. Dr. Hood was accepted by the Court as an expert in American politics and policy, Southern politics, quantitative political analysis, and election administration, including redistricting. Tr. 2037:13-20.

612. Dr. Hood testified about the role of the Whole County Provision and 2017 Adopted Criteria in limiting the mapmaker's discretion in drawing the 2017 Plans, the results of the 2018 elections, and North Carolina's political geography.

613. Dr. Hood's testimony was not persuasive, and the Court gives it little weight.

614. Dr. Hood's expert testimony has been rejected by courts in numerous prior redistricting and other voting rights cases. *See, e.g.*, Tr. 2095:6-2096:9 (in recent Ohio partisan gerrymandering case, stating that Dr. Hood drew "some inapt comparisons"); Tr. 2096:14-24 (in Texas voter ID case, stating that Dr. Hood's testimony and analysis was "unconvincing" and given "little weight"); Tr. 2096:25-2097:19 (in Arizona voting rights case, "afford[ing] little weight to Dr. Hood's opinions" "[f]or a number of reasons"); Tr. 2097:22-2098:6 (in Georgia voter ID case, finding that "Dr. Hood's absentee voting analysis is unreliable or not relevant to the questions the court must resolve"); Tr. 2098:9-16 (in Ohio case involving absentee ballots, affording Dr. Hood's opinions "little weight"); Tr. 2098:22-2099:6 (in recent Virginia racial gerrymandering case, stating: "We do not credit Dr. Hood's testimony for several reasons."); Tr. 2099:9-2100:1 (in Ohio voting rights case, finding Dr. Hood's views "of little value," and explaining that "Dr. Hood's testimony and report are in large part irrelevant to the issues before the court and also reflected methodological errors that undermine his conclusions").

***92** 615. Dr. Hood did not offer—and does not have—any methodology for determining whether or not a map was drawn to create a partisan lean or bias. Tr. 2078:1-2079:3.

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616. Dr. Hood's testimony supports the view that the enacted plans were drawn intentionally to favor Republicans. Dr. Hood generally agreed that "the party that controls the legislative process is going to make the maps in their favor," and that the enacted plans "were drawn to favor Republicans" using prior election results. Tr. 2079:4-2081:2.

(i) Dr. Hood's testimony about the redistricting process in North Carolina was unpersuasive

617. Dr. Hood testified that the 2017 redistricting was a "fairly formulaic process" because the Whole County Provision and 2017 Adopted Criteria "really limits the discretion, to a large extent, of the map drawers." Tr. 2038:4-2039:12; LDTX284 at 9-10 ("[T]he process is quite constrained, which greatly limits the ability of map drawers to create districts where partisan motives predominate."). However, Dr. Hood did no work to determine whether any of those criteria actually prevented the mapmaker from gerrymandering the enacted plans to advantage Republicans. Tr. 2077:10-15.

618. Dr. Hood's assertion that the Adopted Criteria "constrained" the "map drawer" is incorrect. The Adopted Criteria were not passed by the House and Senate Redistricting Committees until August 10, 2017. As discussed below, Dr. Hofeller had completed much of the General Assembly's eventually enacted House and Senate districts by June 2017, a month and a half before the Adopted Criteria were passed. FOF § F.7. Logically, Dr. Hofeller could not have been following the Adopted Criteria when he was drafting these districts by June 2017.

619. Dr. Hofeller's files further refute Dr. Hood's assertions that the 2017 redistricting process was "quite constrained" and that it is difficult to prove the partisan intent behind the 2017 Plans. PX123 at 48-49 (Chen Response Report). Those files show Dr. Hofeller's continuous efforts and exercise of his discretion to draw the district lines to maximize Republican advantage within the confines of the Whole County Provision, including various drafts that considered alternative possible districtings. FOF § B.2.b.

(ii) Dr. Hood's testimony about the 2018 elections was unpersuasive

620. For his analysis of the 2018 election results, Dr. Hood compared the number of seats Democrats actually won in 2018 to the number districts in Dr. Chen's simulated plans that lean Democratic using the 2010-2016 composite statewide election results. Tr. 2083:14-25. But that is an apples-to-oranges comparison, because the 2018 elections were different than the 2010-2016 composite statewide election results. Tr. 2084:1-5. In the 2010-2016 composite statewide election results, the Democratic vote share is 47.9%, whereas 2018 was a far more favorable environment for Democrats. Tr. 2084:12-24.

621. Dr. Hood made no attempt to perform an apples-to-apples comparison by comparing the actual 2018 election results under the enacted 2017 Plans to the performance of alternative nonpartisan plans under the 2018 election results. Tr. 2084:25-2087:19.

(iii) Dr. Hood's testimony about North Carolina's political geography was unpersuasive

***93** 622. Dr. Hood's analysis of North Carolina's political geography is unpersuasive because Dr. Hood did not attempt to determine whether the Republican lean in the enacted 2017 Plans can be explained by political geography. Tr. 2094:18-21. By contrast, Dr. Hood agreed that the work of Drs. Chen, Mattingly, and Pegden does address whether political geography could explain the extreme partisan lean of the 2017 Plans. Tr. 2094:22-2095:2.

623. For his analysis of political geography, Dr. Hood analyzed how the partisan makeup of the State of North Carolina would change if its six largest counties were removed. Tr. 2089:14-17; LDTX140. But it is not possible to remove any counties from North Carolina, much less the six largest counties. Of course, hypothetically removing North Carolina's six largest counties would make the state "[m]uch more rural," Tr. 2089:18-22, and much more Republican-leaning, just as would removing New York City from the State of New York.

d. *Dr. Barber*

624. Intervenor Defendants' expert, Dr. Michael Barber, received his Bachelor of Arts degree in International Relations with an emphasis in Political Economy from Brigham Young University in 2008, his Masters in Political Science from Princeton University in 2011, and his Ph.D. in 2014. Tr. 2106:7–22, 2107:4–13, ID Ex. 98 p. 1.

625. Dr. Barber is currently an Assistant Professor at Brigham Young University and an affiliated faculty member with the Center for the Study of Elections and Democracy. Tr. 2109:9–18.

626. Dr. Barber teaches classes on Congress and the legislative process (which includes state-level legislative research), statistical analysis, and a seminar course on contemporary research in American politics. Tr. 2110:14–2111:13.

627. Dr. Barber recently testified as an expert witness in an election law case involving a dispute over ballot order in Federal Court in Florida. Tr. 2113:10–2114:6.

628. Dr. Barber has published 11 peer-reviewed articles involving American Politics, and an additional 5 articles that have been accepted for upcoming publication. Tr. 2111:22–2112:4, 2113:6–9; ID Ex. 98 pp.1–2. Many of these articles involve political ideology, issues of campaign finance, electoral politics, survey research methodologies, [and] political polarization. Tr. 2111:24–2112:4.

629. Dr. Barber was admitted by the Court as an expert in American politics, specifically on the topics of ideology and partisanship, geography of voters, and the analysis of elections results. Tr. 2118:2–13.

630. Dr. Barber offered no opinion as to whether North Carolina's state legislative district maps were gerrymandered.

631. The Court finds that Dr. Barber's criticisms of Dr. Cooper's analysis unpersuasive and gives them little weight.

632. At the outset, the Court notes that none of Dr. Barber's academic research or published articles concern redistricting or North Carolina, nor was redistricting in North Carolina “something [he] had given a lot of thought to” before being retained by Intervenor Defendants in this case. Tr. 2169:19-2170:19. Dr. Barber admitted that he was not an expert on North Carolina's political geography, nor had he spent time in North Carolina other than two vacations in the Outer Banks and one visit to Duke's campus. Tr. 2168:12-2169:13, 2216:4-8. Most importantly, Dr. Barber did not analyze the specific district boundaries or county groupings the Court is reviewing and he could not comment on any of Dr. Cooper's extended analysis of the packing and cracking of Democratic voters in those districts and county groupings. Tr. 2117:24-2118:12, 2213:25-2214:15

***94** 633. The majority of Dr. Barber's testimony concerned the opinions Dr. Cooper offered regarding the aggregate political ideology of the North Carolina electorate and that of the General Assembly, including Dr. Cooper's comparison between the two. The Court finds it unnecessary to determine whether the General Assembly is “out of step” with the electorate and therefore, makes no findings regarding Dr. Cooper's testimony, or Dr. Barber's criticism of that testimony, relating thereto.

634. Dr. Barber also sought to rebut opinions Dr. Cooper offered regarding the disproportionality between Democratic seat share and the Democrats' statewide vote share in the General Assembly after the 2011 redistricting. Dr. Barber observed that “it's actually not as rare as you might think” that a party wins a majority of votes for the North Carolina House or Senate statewide, but only a minority of seats. Tr. 2149:21-2150:2. But since Dr. Barber did not analyze the extent to which any of these instances of disproportionality between votes and seats were attributable to gerrymandered district boundaries, his analysis is less useful to the Court. Dr. Barber admitted that it was “very possible” that those instances from 2002-2006 where the Democrats won a minority of the statewide vote and yet a majority of seats in a chamber of the General Assembly “could have been because the Democrats did a good job of gerrymandering the maps that were in place during those elections.” Tr. 2203:12-16.

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635. In support of his opinion regarding the translation of seats from votes, Dr. Barber created a chart providing the "absolute difference" in percentage between the vote share and seat share for each party in House and Senate elections since 1994. IDTX23. But as Dr. Barber acknowledged, the greatest difference between the percentage of Republican vote share and seat share in the House occurred in the 2012 election, just after the 2011 redistricting. Tr. 2207:3-12. The difference in the Senate between the percentage of Republican votes received and seats won was also relatively large in 2012, and represented a significant increase from the 2010 election, just before redistricting. Tr. 2207:13-22. If anything, Dr. Barber's analysis suggests that the 2011 redistricting led to more disproportionality between votes cast and seats won, as Dr. Cooper observed. *See* Tr. 2207:23-2212:16.

636. Finally, Dr. Barber noted that there is "academic research that points to political party geography as an important factor in representation and legislatures," suggesting that the geographic distribution of voters "is something that should be investigated" in this case. Tr. 2152:10-14. Specifically, Dr. Barber referenced a 2013 article co-authored by Plaintiffs' expert, Dr. Chen, focused on the political geography of Florida and Florida's congressional districts, an article in which Dr. Chen used simulations to measure whether political geography created a natural advantage for Republicans in redistricting in Florida. Tr. 2153:2-24. Despite acknowledging that Dr. Chen's co-authored 2013 article did not include any analysis of North Carolina, Tr. 2153:25-2154:2, Dr. Barber testified that the article "invites the question as to what it would look like if we looked to see if this relationship also existed in North Carolina," Tr. 2154:5-7.

637. Dr. Chen performed that analysis in this case and concluded that North Carolina's political geography does not account for the extreme partisan bias of the enacted plans. Tr. 2216:11-2220:21. Similarly, at the time he conducted his analysis and arrived at the opinions he offered regarding the potential partisan bias of North Carolina's political geography, Dr. Barber was unaware that Dr. Chen's co-author in the same 2013 paper, Dr. Jonathan Rodden, had come to the conclusion that North Carolina's Democratic voters were relatively efficiently distributed throughout the State. Tr. 2222:9-2223:4, 2224:6-2225:8.

***95** 638. Dr. Barber did not engage in the type of analysis that Dr. Chen performed to account for and measure the extent to which "natural" partisan bias in North Carolina's political geography could account for electoral outcomes favoring Republicans, but the analysis that Dr. Barber did conduct of the distribution of North Carolina's Democratic voters actually supports Plaintiffs' claims. Dr. Barber observed a positive correlation between the population density of North Carolina's VTDs and their support for Democratic candidates, but he acknowledged that there were "a lot of other Democratic-leaning VTDs" spread across the state, even outside the urban centers of Raleigh and Charlotte. Tr. 2216:11-16. Dr. Barber's analysis fails to offer the Court any information about how the many Democratic-leaning VTDs across North Carolina fit into specific county groupings and specific districts and therefore, his analysis is not directly relevant to the questions the Court faces. Unlike Dr. Cooper, who performed an extensive analysis of North Carolina's House and Senate Districts at the county grouping level, Dr. Barber admitted that he could not offer any opinion to rebut Plaintiffs' evidence regarding gerrymandering within those county groupings. Tr. 2217:8-2218:12.

639. In light of the above shortcomings in Dr. Barber's analysis, the Court gives little weight to his testimony.

e. *Dr. Johnson*

640. Legislative Defendants' expert Dr. Douglas Johnson has a Bachelor of Arts in Government from Claremont McKenna College, a Master of Business Administration from the Anderson School at UCLA, and a Ph.D. in Political Science from Claremont Graduate University. Tr. 1812:15-21; LDTX288. The focus of Dr. Johnson's graduate studies in Political Science was American politics, and he wrote his dissertation on redistricting. Tr. 1812:22-25.

641. Dr. Johnson is a fellow at the Rose Institute of State and Local Government at Claremont McKenna College. Tr. 1813:1-6. In that role, he leads the Institute's research into census and redistricting issues. Tr. 1813:1-6.

642. Dr. Johnson is also the President of National Demographics Corporation ("NDC"), where he has been employed full-time since 2001. Tr. 1814:7-19. NDC is engaged in redistricting work, including liability analyses, polarized voting studies, and other related redistricting issues. Tr. 1814:20-25.

643. Dr. Johnson has used Maptitude for Redistricting software ("Maptitude") for his work for 20 to 30 hours a week since 2001. Tr. 1816:16-23.

644. Dr. Johnson has served as an expert witness in redistricting litigation numerous times; specifically, he has been involved in hundreds of challenges to at-large elections for city councils, school boards, counties, etc. Tr. 1817:5-7; 1817:14-21. Dr. Johnson has also served as an expert witness in challenges to state redistricting plans. Tr. 1817:22-24. Dr. Johnson has never been excluded as an expert witness by any court. Tr. 1817:8-10.

645. Dr. Johnson was accepted by the Court as an expert in the fields of political science, political geography, redistricting, and Maptitude for Redistricting software. Tr. 1818:11-20.

646. Dr. Johnson offered primarily two sets of opinions in this case. First, Dr. Johnson purported to show that one could draw a Senate map even more favorable to Republicans if one ignored the North Carolina Constitution's Whole County Provision. Second, Dr. Johnson attempted to critique Dr. Chen's analysis of Dr. Hofeller's files.

647. The Court finds Dr. Johnson's analysis unpersuasive and gives his opinions little weight.

648. Dr. Johnson has testified as a live expert witness in four cases previously, and the courts in all four cases have rejected his analysis. Tr. 1886:21-1891:14; *see Covington*, 283 F. Supp. 3d at 450 (finding "Dr. Johnson's analysis and opinion … unreliable and not persuasive"); *Luna v. Cnty. of Kern*, 291 F. Supp. 3d 1088, 1137 (E.D. Cal. 2018) (holding that defendants' argument based on Dr. Johnson's analysis "lacks merits"); *Garrett v City of Highland*, 2016 WL 3693498, at *2 (Cal. Super. Apr. 06, 2016) (finding Dr. Johnson's methodology "inappropriate"); *Jauregui v City of Palmdale*, No. BC483039, 2013 WL 7018375, at *2 (Cal. Super. Dec. 23, 2013) (describing Dr. Johnson's work in the case was "unsuitable" and "troubling"). This Court joins these other courts in rejecting Dr. Johnson's methodologies, analyses, and conclusions.

***96** 649. Dr. Johnson created a "test map" for the North Carolina Senate that ignored the Whole County Provision entirely. Tr. 1892:21-1893:4. Based on this test map, Dr. Johnson purported to find that one could draw a Senate map even more favorable for Republicans than the enacted Senate plan if one were to ignore the county groupings and traversal rules. Tr. 1893:17-22. The Court finds Dr. Johnson's analysis using his test map to be of little probative value to the legal and factual issues in this case.

650. Dr. Johnson performed no statewide analysis of the House or the Senate to determine the extent to which, *within* the confines of the Whole County Provision, the enacted House and Senate plans constitute the most favorable maps for Republicans possible. Tr. 1894:13-1896:7. The only individual county groupings for which Dr. Johnson performed partisanship analysis within the confines of the Whole County Provision were Mecklenburg County in the Senate, *id.,* and Wake County in the House, and Dr. Johnson's partisanship analysis of the Mecklenburg Senate districts was erroneous and not credible for the reasons already explained. *See supra,* para 251. Dr. Johnson did not analyze any other individual House or Senate county grouping to determine whether the enacted plans' version of that grouping is the most favorable configuration of the grouping possible for Republicans. *Id.* Dr. Johnson thus offered no rebuttal to the testimony of Plaintiffs' experts demonstrating that the enacted plans constitute extreme partisan gerrymanders of specific county groupings.

651. Dr. Johnson instead ignored the Whole County Provision in creating his Senate test map, but as he acknowledged, the Whole County Provision is a state constitutional requirement. Tr. 1896:8-10. The General Assembly lacks authority to ignore the state constitutional county groupings and traversals requirements in creating redistricting plans. Dr. Johnson's test map analysis is thus no more relevant or helpful than would be a test map that ignores other constitutional requirements, such as the equal population requirement for districts. One could draw a map ignoring the equal population requirement that is even more favorable for Republicans than Dr. Johnson's test map, and certainly more favorable for Republicans than the enacted plan. Tr. 1896:11-1900:21. But the fact that one could draw such a hypothetical map in no way sheds light on whether the enacted plan is an extreme partisan gerrymander. *See id.* It provides no information as to whether the General Assembly acted within

extreme partisan intent in drawing districts within the confines of the accepted constitutional requirements, and it provides no information as to the effects of the gerrymander on the number of Republican and Democratic-leaning districts relative to a nonpartisan plan. *See id.* Dr. Johnson's test map analysis is of little probative value to the legal or factual issues in this case.

652. With respect to Dr. Johnson's testimony regarding Dr. Hofeller's files, as described above, the Court struck all of Dr. Johnson's affirmative analysis of Dr. Hofeller's 2017 draft House and Senate plans and the extent to which they overlap with other plans including the final enacted plans. Tr. 1988:11-1990:4. The Court struck this testimony and all related portions of Dr. Johnson's rebuttal report under Rule 702 and Rule 403 after it was uncovered on cross-examination that Dr. Johnson had made a series of significant errors. *Id.*

3. Dr. Karen Owen's Testimony on "Representation" and "Competitive Elections" and Representative John Bell's Testimony on Competitive Districts Was Unpersuasive

a. *Dr. Karen Owen*

***97** 653. Legislative Defendants offered expert testimony of Dr. Karen Owen on the issues of "representation" and "competitive elections" in North Carolina. Tr. 1488:6-22; LDTX 293 (Owen report).

654. Dr. Owen is an assistant professor of political science at West Georgia University, and focuses on southern politics, political representation, legislative politics, campaigns and elections and research methodology, and developed her expertise through both academic and professional work. Tr. 1481:18-22, 1483:16-24, 1484:2-1485:24, 1486:4-11; LDTX293 at 1-2, 28-34.

655. Dr. Owen has particular expertise in the area of southern politics; she has presented papers and been a lead discussant at the Citadel's Symposium on Southern Politics for over 10 years, she has taught and studied courses in southern politics. Tr. 1480:15-1481:4.

656. Dr. Owen's work in southern politics has included writing and presenting a paper in 2016 titled "Growth and Geography in the South: Representation in the North Carolina and Texas State Legislatures." Tr. 1481:5-11; LDTX293 at 31.

657. The Court admitted Dr. Owen as an expert. Tr. 1487:24-1488:1.

658. Dr. Owen has very little experience or expertise with politics, elections, or representation in North Carolina specifically. Dr. Owen has never lived or worked in North Carolina. LDTX 293 at 28-29. With the exception of the aforementioned paper, she has never written or published about North Carolina politics, elections, or representation. Tr. 1555:19-1557:25. She has never participated in or spoken at any conference about North Carolina politics, elections, or representation. Tr. 1558:1-1559:16. She has never been interviewed by any media outlet about North Carolina politics, elections, or representation. Tr. 1559:17-25. She has never taught a class focused on North Carolina politics, elections, or representation—the closest she came was teaching a single course in "Southern Politics" three years ago. LDTX 293 at 32; Tr. 1560:11-24.

659. The methodologies Dr. Owen employed to evaluate "representation" and "competitive elections" in North Carolina were unpersuasive. In conducting her research and analysis for this case, Dr. Owen did not speak to any current or former North Carolina legislator, or any winning or losing North Carolina candidate, or any North Carolina voter. Tr. 1561:7-1564:14. Nor did she consult any North Carolina polling data or survey data. Tr. 1564:15-19. Instead, Dr. Owen's analysis of representation in North Carolina was based on her conversations with several staff members in the General Assembly's Legislative Services Commission. Tr. 1561:7-1562:1. Her analysis of competitive elections in North Carolina was based on her reading of newspaper articles and a website called "Real Facts North Carolina." Tr. 1566:5-13.

660. Based on her lack of relevant expertise and the inadequate methodologies she employed in this case, the Court gives little weight to Dr. Owen's opinions about "representation" and "competitive elections" in North Carolina.

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661. In addition, as described below, Dr. Owen's analysis and opinions are unhelpful in resolving the issues in this case.

i. Dr. Owen's analysis of "representation" was unpersuasive

***98** 662. In support of her opinion that Republican members of the General Assembly meaningfully "represent" their Democratic constituents, Dr. Owen emphasized that the members "are noticeably involved in more than producing and passing laws," LDTX 293 at 22, and that they provide "constituent services" to Republican and Democratic voters alike, regardless of their political beliefs, party affiliation, or past votes. Tr. 1567:15-1568:18; *see also* Tr. 1801:17-1803:2 (similar testimony by Rep. Bell); Tr. 2000:21-2001:6 (Sen. Brown).

663. The Court finds, however, that the mere provision of constituent services does not mean that voters of one particularly party are meaningfully "represented" by a member of the other party political and does not mean the voter receives the same "representation" that the voter would if he or she could elect the candidate of that voter's choice. Constituent services are only one part of a legislator's responsibilities. In addition to providing constituent services, members of the North Carolina House and Senate participate in enacting the State's laws and policies. Tr. 1803:3-9 (Rep. Bell). Legislative Defendants' own expert, Dr. Brunell, testified that, among the ways in which a legislator "represents" his or her constituents, providing constituent services may be "an important part, but if you are sort of, you know, worried about the hierarchy of the things that they do, I think that how they vote on the major issues of the day is more important." Tr. 2353:11-2354:4. Dr. Brunell agreed that "policy responsiveness" is a "higher form of representation" and "more critical to the notion of representing someone." Tr. 2354:5-10; *see* Tr. 2353:3-6 (agreeing that "the responsiveness of a legislator to the voters on questions on policy in particular is critical to Democratic representation"). As "just one example of the many issues from which policy responsiveness is the more central form of representing the people in the legislature," Dr. Brunell agreed that if a legislator casts a vote for gun control, the legislator is "not giving good representation to the voters in [his or her] district who don't want gun control." Tr. 2354:11-19. Thus, as Dr. Brunell agreed, "a change in the party that represents a given district generates a huge difference in the policies for which the representative of that district will vote." Tr. 2354:20-23. Another witness for Legislative Defendants, Senator Harry Brown, also testified that "in order to push legislation that we thought was important to this state," a political party must "be in the majority." Tr. 2023:20-22.

664. Other purported indicia of "representation" discussed by Dr. Owen likewise were unhelpful. For example. Dr. Owen pointed to a form "welcome letter" that members of the General Assembly can send to new voters in their districts. LDTX 293 at 22; Tr. 1514:4-1516:23. But sending a form letter does not signify meaningful representation.

ii. Dr. Owen's analysis of "competitive elections" was unpersuasive

665. In her analysis of "competitive elections," Dr. Owen suggested that Democrats' failure to win certain House and Senate races in 2018 was the result of poor "candidate quality," rather than the district boundaries. Tr. 1540:13-1542:9; LDTX 293 at 6-7. Dr. Owen's methodology was unreliable, and her conclusions were unpersuasive.

666. The sole criterion that Dr. Owen applied for assessing candidate quality turns on whether the candidate "had held prior elected office." Tr. 1533:5-21. Under this "dichotomous measure," any person who has previously held elective office is a "quality" candidate, and any person without prior experience holding elective office is not "quality." LDTX 293 at 10. This approach ignores other important factors and is an unreliable measure of whether a person is a quality candidate.

***99** 667. For instance, Dr. Owen classified a Democratic candidate who is a U.S. Army Colonel as a "nonquality" candidate. Tr. 1566:18-25; LDTX 293 at 12. She classified another Democratic candidate who is a "small business owner" and "community leader" as a "nonquality" candidate. Tr. 1567:1-7; LDTX 293 at 12. And she classified a "young Air Force veteran and attorney" as a non-quality candidate. LDTX 293 at 16. These examples illustrate the shortcomings in Dr. Owen's methodologies.

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b. *Representative John Bell*

668. Legislative Defendants also offered the testimony of Representative John Bell, IV, who testified about the competitiveness of various House districts.

669. Representative Bell is the majority leader for the North Carolina House of Representatives and represents House District 10. Tr. 1739:16-22.

670. As Majority Leader, Representative Bell assists the Conference chair to achieve two goals: 1) recruit candidates and 2) win elections. Tr. 1740:5-6.

671. Representative Bell also pointed to candidate quality as a purported factor in House districts he claimed might be "competitive" in 2020. Tr. 1752:13-1754:18. But Representative Bell's claim that certain House districts could be "competitive" in 2020, and only were not close in 2018 due to purported candidate quality issues is not persuasive. Representative Bell included on his list of purportedly competitive districts numerous districts that were not only extremely lopsided in the 2018 state House elections, but that feature similarly lopsided vote shares under the results of prior statewide elections, including the 2012 Presidential election, the 2016 Presidential election, and the 2016 Governor election. Tr. 1788:5-1801:16. Representative Bell included on his list of purportedly competitive districts a handful of districts in which the Republican candidate won over 60% of the vote share in the district across all of these various elections. *Id.* Moreover, for many of the districts he identified, Representative Bell testified that the race could be competitive only if it was an "open seat"—that is, if the incumbent Republican member either retires or does not run again in 2020. Tr. 1767:3-23, 1772:16-20, 1773:24-1774:2. However, there is no evidence that any of those Republicans members will not run in 2020. Tr. 1786:4-10. The Court finds that Representative Bell's testimony does not provide a reliable basis for assessing the competitiveness of current House districts.

4. The Whole County Provision Did Not Prevent Systematic Gerrymandering of the Plans for Partisan Gain

672. Throughout trial, Legislative Defendants and their experts emphasized the existence of the North Carolina Constitution's Whole County Provision, which the North Carolina Supreme Court has held requires dividing the State into discrete county groupings and restricting the traversal of county lines for districts within a county grouping. Tr. 252:17-257:10. The Court finds that Legislative Defendants overstate the constraints imposed by the Whole County Provision, and that Legislative Defendants intentionally and effectively gerrymandered the enacted plans for partisan gain within the confines of the Whole County Provision.

673. Legislative Defendants overstate the impact of the Whole County Provision. Dr. Chen explained in unrebutted testimony that the Whole County Provision dictates the contours of only 13 of 120 House districts and 17 of 50 Senate districts. Tr. 782:2-783:1. Legislative Defendants thus had discretion in drawing 107 of 120 House districts and 33 of 50 Senate districts—constituting over 82% of all districts across both enacted plans. *Id.*

***100** 674. As detailed above, the evidence establishes that Legislative Defendants engaged in systematic gerrymandering for partisan gain in the districts in which they did have discretion. All four of Plaintiffs' experts concluded that Legislative Defendants acted with extreme partisan intent within the confines of the Whole County Provision. Plaintiffs' simulations experts—Drs. Chen, Mattingly, and Pegden—simulated plans that adhered to the existing House and Senate county groupings, and all three experts found that the enacted plans are extreme outliers compared to nonpartisan plans that follow the same county groupings. And all three experts found that specific county groupings are extreme outliers compared to other, simulated versions of the same county grouping that contain the same number of traversals as the enacted plan in that grouping. Dr. Cooper independently established—in unrebutted testimony—that the enacted plans pack and crack Democratic voters within specific county groupings.

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5. Plaintiffs Do Not Seek Proportional Representation

675. Contrary to Legislative Defendants' claim, Plaintiffs do not seek proportional representation. As described in more detail below, Plaintiffs assert that the General Assembly may not intentionally discriminate against voters and may not attempt to predetermine election outcomes and control of the General Assembly. Dr. Chen and Dr. Mattingly established through their simulations that nonpartisan plans that do not intentionally discriminate against Democratic voters may well *not* provide for proportional representation. Under Dr. Chen's and Dr. Mattingly's simulations, there are scenarios where Democrats would win 50% of the statewide vote but less than 50% of the seats in either chamber. Tr. 306:16-307:2 (Dr. Chen); Tr. 1103:24-1104:5, 1132:6-1133:13 (Dr. Mattingly). Dr. Pegden's simulations also did not rely on any notion of proportional representation. Tr. 1306:22-24.

676. Legislative Defendants' presentation regarding the proportionality of seats to votes in specific county groupings like Wake and Mecklenburg Counties, Tr. 2068:10-2069:13, was not persuasive. As Dr. Pegden explained, analyzing proportionality at the local level of a county grouping is "completely useless" and can be misleading in the context of a gerrymandered map. Tr. 1452:17-1454:18. In a county grouping that contains a small number of districts and in which one party wins an overwhelming share of the vote across the grouping, one would expect that party to win a disproportionate share of the seats under a nonpartisan map, and likely all of the seats. Tr. 1452:23-1453:12. Under a Republican gerrymander, however, Republican mapmakers will allow that natural outcome to occur in county groupings that strongly favor Republicans but will gerrymander the more Democratic county groupings in a way that may result in proportional outcomes just in those Democratic county groupings —*e.g.*, by gerrymandering the grouping to elect one or two Republican seats. Tr. 1452:17:22-1454:18. Thus, the fact that the enacted plans may have resulted in proportional seats-to-votes outcomes in individual county groupings that are heavily Democratic is not evidence of a lack of gerrymandering.

6. Legislative Defendants Did Not Seek to Comply with the VRA and Did Not Show Nonpartisan Plans Would Violate the VRA

677. Defendants did not present persuasive evidence at trial to substantiate any federal defense under the Voting Rights Act or Fourteenth or Fifteenth Amendments. Defendants did not introduce persuasive evidence at trial to establish any of the prerequisites to application of the Voting Rights Act under *Thornburg v. Gingles*, 478 U.S. 30 (1986). For example, Defendants presented no expert testimony or any other evidence to establish the existence of legally sufficient racially polarized voting in any area of North Carolina, or any particular state House or state Senate district. Nor did Defendants introduce any evidence to establish the minimum African-American percentage of the voting age population ("BVAP") needed in any particular area of the State for the African American community to be able to elect the candidate of its choice.

***101** 678. Notably, Legislative Defendants retained Dr. Jeffrey Lewis, a political scientist from UCLA, who analyzed and provided estimates of the minimum BVAP needed in certain county groupings for African-American-preferred candidates to win. *See* PX773 (Amended Table 4 from Lewis Report). But Legislative Defendants chose not to have Dr. Lewis testify at trial. At the conclusion of trial, Legislative Defendants attempted to introduce expert reports that a different political scientist (Dr. Alan Lichtman) had prepared on behalf of different parties in previous lawsuits in North Carolina years ago, but the Court sustained Plaintiffs' objections to the admission of these reports. Tr. 2376:2-3. The Court excluded these reports as inadmissible hearsay and undisclosed expert work, particularly given that Plaintiffs dispute Legislative Defendants' characterization of those reports. Tr. 2363:16-2364:25.

679. Defendants did not demonstrate that the relief Plaintiffs seek would violate the VRA or federal equal protection requirements. Plaintiffs established that it would not. Using Dr. Lewis's estimates of the minimum BVAP needed in certain county groupings for an African-American-preferred candidate to win a state House or Senate election, Dr. Chen determined how many of his simulations of those county groupings contained districts exceeding Dr. Lewis's BVAP-threshold estimates.

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Tr. 512:15-517:6. Dr. Chen determined that for every county grouping that Dr. Lewis analyzed except one in the House and one in the Senate, all of Dr. Chen's simulations produce at least as many districts above Dr. Lewis's BVAP-threshold estimate as does the enacted House or Senate plan. *Id.*; *see* PX775; PX776. For the two remaining county groupings, which are Forsyth-Yadkin in the House and Davie-Forsyth in the Senate, a majority of Dr. Chen's simulations of each grouping produce at least as many districts above Dr. Lewis's BVAP-threshold estimate as the enacted plan. *Id.*; *see* PX775; PX776. The evidence at trial thus demonstrated that, based on the BVAP-threshold estimates of Legislative Defendants' own expert, adopting nonpartisan House and Senate plans would not diminish the ability of African Americans to elect the candidate of their choice.

680. While Defendants' failure to introduce any evidence at trial necessary to the legal elements of a racial vote dilution defense is dispositive of any such defense, the Court further finds that—as a factual matter—Legislative Defendants did not draw or adopt any district under the 2017 Plans in an effort to comply with the VRA.

681. One of the Adopted Criteria, titled "No Consideration of Racial Data," stated that "[d]ata identifying the race of individuals or voters shall not be used in the drawing of legislative districts in the 2017 House and Senate plans." LDTX155. When submitting the plans to the *Covington* court for approval, Legislative Defendants stated that "[d]ata regarding race was not used in the drawing of districts for the 2017 House and Senate redistricting plans." PX629 at 10.

682. Legislative Defendants have claimed in this case that, even though they did not use racial data in drawing the districts, they purportedly checked the racial demographics of the districts on the "back end" to ensure that "the VRA was satisfied." *See, e.g.*, Leg. Defs.' Pre-Trial Brief at 44. Legislative Defendants presented no testimony at trial to substantiate this assertion, and the Court finds the assertion not credible for multiple reasons.

683. Throughout the 2017 redistricting process, Legislative Defendants asserted that the reason they were ignoring racial considerations entirely in drawing the new districts was because they had concluded that the "third *Gingles* factor" was not "present" anywhere in the State of North Carolina. PX593 at 52 (statement of Sen. Berger); *see also id.* ("we cannot prove the third *Gingles* factor") (statement of Sen. Berger). Legislative Defendants repeatedly told the *Covington* court that they could not "justify the use of race in drawing districts" in the 2017 Plans—and thus could not seek to hit a "racial numerical quota" for any district—because they had insufficient evidence of "legally sufficient racially polarized voting." *Covington*, No. 15-cv-399, ECF No. 184 at 10; ECF No. 192 at 12; *see also* ECF No. 184-17 at 12.

***102** 684. The existence of legally sufficient racially polarized voting is a "prerequisite[]" to VRA liability; if any *Gingles* factor is not met, "§ 2 simply does not apply." *Cooper v. Harris*, 137 S. Ct. 1455, 1472 (2017). Hence, when Legislative Defendants concluded that the third *Gingles* factor was not met, they necessarily concluded that the VRA did not impose requirements for the racial composition of any state House or state Senate district. Any assertion by Legislative Defendants now that they sought to "satisfy" the VRA in adopting the 2017 Plans does not make sense as a legal or factual matter given their assertions at the time.

685. Moreover, the mere timing of when Legislative Defendants learned of the racial composition of the new districts belies their claim that they reviewed the data to ensure VRA compliance. The Stat Packs that Legislative Defendants produced when they released the initial drafts of the House and Senate plans did not include racial data on any of the draft districts.[13] At the August 24, 2017 hearing at which the Senate Redistricting Committee passed the Senate plan out of committee, Senator Hise insisted, "I have not seen any racial data for these districts." PX606 at 46:2-3. Representative Lewis said the same the next day at the hearing at which the House plan was passed out of the House Redistricting Committee. PX605 at 20:11-21:18. Only after this point did legislative staff produce racial data on the districts—at the request of Democratic legislators over Legislative Defendants' objections. PX600 at 11. Even then, Legislative Defendants claimed to have remained unaware of the racial composition of the districts. Representative Lewis asserted that he did not "see" any data on the racial composition of the House districts until *after* the House plan was passed by the full House chamber. *Id.* at 12. Legislative Defendants clearly did not have assure themselves that the plans satisfied the VRA by meeting particular racial thresholds when they purportedly had no knowledge of the racial composition of the districts.

13 *See* https://bit.ly/2YJnaRP (Stat Pack for Senate draft plan released on August 21, 2017); https://bit.ly/2YPch0L (Stat Pack for House draft plan released on August 20, 2017).

686. Legislative Defendants have pointed to a single floor statement by Senator Berger near the end of the legislative process that mentioned the VRA, but that statement does not establish that Senator Berger, let alone any other Legislative Defendant, actually undertook efforts to comply with the VRA. Senator Berger made that statement immediately after declaring that the third *Gingles* factor was not met, which if true would preclude VRA application as a matter of law. PX593 at 52-54. And neither Senator Berger nor anyone else has pointed to any change that was made to any House or Senate district to ensure VRA compliance.

687. The Court finds that the General Assembly did not enact any House or Senate district under the 2017 Plans with the specific intent of complying with the VRA, and that Defendants have not established that the VRA requires maintaining any of the districts that Plaintiffs challenge in its current form.

688. Indeed, the Court finds that Legislative Defendants' stated concern that "unpacking" heavily-Democratic districts could dilute the voting power of African-Americans to be a pretext for partisan gerrymandering. Unrebutted evidence presented at trial established that Legislative Defendants themselves created districts with artificially low BVAPs when it was politically advantageous. In particular, while Legislative Defendants now accuse Plaintiffs of seeking to "crack" African American voters, the unrebutted evidence established that Legislative Defendants cracked African American voters in rural and semi-rural parts of the state where cracking Democratic voters would maximize Republican victories.

***103** 689. Dr. Chen demonstrated that, for several rural and semi-rural House county groupings, all or nearly all of his simulated plans (which ignored racial data in drawing the districts) produced a district in the grouping with a higher or much higher BVAP than any districts in that grouping under the enacted plan. Tr. 519:6-523:9. These county groupings include the Anson-Union, Cleveland-Gaston, Columbus-Pender-Robeson, and Duplin-Onslow county groupings, all of which are county groupings in which Legislative Defendants cracked Democratic voters to dilute their political power. *Id.*; *see* PX225; PX226; PX227; PX228. Dr. Chen's findings significantly undermine Legislative Defendants' claims that they seek to create higher-BVAP districts to promote the political power of African-American communities. *Id.*

7. Legislative Defendants, through Dr. Hofeller, substantially completed drafting the Enacted Maps in June 2017

690. Based on an analysis of draft maps from June 2017 found on Dr. Hofeller's storage devices, see FOF § B.2., Plaintiffs' expert Dr. Jowei Chen demonstrated that Dr. Hofeller had begun drawing the 2017 Plans prior to July 2017, and that he had already substantially completed them by that point. Dr. Chen's analysis compared the draft maps found on Dr. Hofeller's hard drive, each of which is dated by the metadata, with the Enacted 2017 House and Senate maps to determine the degree of similarity between the drafts and the Enacted Plans.

691. For the Senate, Dr. Chen analyzed a draft map that Dr. Hofeller last modified on June 24, 2017. Tr. 400:7-10, 402:5-403:8; *see also* PX572 (showing "last modified" date); PX123 at 25 (Chen Rebuttal Report). Dr. Chen found that Dr. Hofeller had already finished assigning 97.6% of the State's census blocks and 95.6% of the State's population to their final Senate districts in this June 24, 2017, draft map. Tr. 400:6-25.

692. To show the extent to which Dr. Hofeller had already completed drawing the new Senate plan, Dr. Chen compared individual Senate county groupings in the June 24, 2017, draft map to the final version of the same grouping in the enacted Senate plan. The figure below, PX142 [Chen rebuttal report, Figure 19], shows one such comparison for a Senate county grouping containing multiple districts that was redrawn in 2017. Tr. 416:15-20; PX123 at 27-38 (Chen Rebuttal Report). Dr. Chen repeated this analysis for every Senate county grouping containing multiple districts that was redrawn in 2017, and the Court adopts, by reference to Dr. Chen's trial testimony and as illustrated in his Rebuttal Report, each of those illustrations as if fully set forth

herein. Tr. 404:19-417:13; PX140; PX141; PX142; PX143; PX144; PX145; PX146; PX147 [Chen rebuttal report, Figures 17-24].

693. In Dr. Chen's illustrations, as shown by the example below, the map on the bottom left is Dr. Hofeller's June 24, 2017, draft, the map on the bottom right is the final enacted plan, and the top half of the figure reports the percentage of the population in each district in Dr. Hofeller's draft (on the vertical axis) that were assigned to the corresponding district in the final enacted plan (on the horizontal axis). Tr. 405:5-407:18. For instance, the figure included below shows that 99.42% of the population assigned to Senate District 19 in Dr. Hofeller's June 24, 2017 draft was also assigned to Senate District 19 in the enacted Senate plan, while 100% of the population in Dr. Hofeller's draft Senate District 21 was assigned to Senate District 21 in the enacted plan. *Id.*

Figure 19

Cumberland-Hoke County Grouping

(Numbers indicate the percentage of population in each of Dr. Hotelier's draft 'J_24' districts that was also assigned to its most similar, corresponding district in the final Senate Bill 691 map)

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694. Based on Dr. Chen's analysis of each Senate county grouping containing multiple districts that was redrawn in 2017, the Court finds that by June 24, 2017—nearly seven weeks before the Adopted Criteria were passed on August 10, 2017—Dr. Hofeller had fully or at least substantially completed drawing every Senate county grouping redrawn in 2017. Tr. 404:23-417:13. The only Senate districts that were not an over-90% match to their final corresponding districts were a few heavily Democratic districts in Wake and Mecklenburg Counties. Tr. 412:5-414:12; *see* PX146; PX147.

***104** 695. Contrary to Legislative Defendants' contention, the North Carolina Constitution's Whole County Provision is not responsible for the high degree of overlap between Dr. Hofeller's draft Senate plan and the final enacted plan. As Dr. Chen testified, the Whole County Provision did not dictate the contours of Senate districts in counties such as Cumberland, Forsyth, Johnston, Durham, Wake, Mecklenburg, and Guilford Counties, and Dr. Hofeller's June 24, 2017 draft districts in these counties distinctly match the final versions. Tr. 408:13-416:1.

696. As with the Senate, Dr. Chen found that Dr. Hofeller had substantially completed drawing the new House plan by June 2017. Analyzing a draft House plan that Dr. Hofeller last modified on June 28, 2017, *see* PX569, Dr. Chen found that Dr. Hofeller had already finished assigning 90.9% of North Carolina's census blocks and 88.2% of the State's population into their final House districts in the June 28, 2017 draft plan. Tr. 401:15-23, 417:14-418:2, PX123 at 2-3 (Chen Rebuttal Report).

697. The figure below, PX124 [Chen rebuttal report, Figure 1], shows Dr. Chen's analysis comparing Dr. Hofeller's June 28, 2017, draft House map to the final enacted House map for a single House county grouping, in this instance, Mecklenburg County. Dr. Chen repeated this analysis for every House county grouping containing multiple districts that was redrawn in 2017, and the Court adopts, by reference to Dr. Chen's trial testimony and as illustrated in his Rebuttal Report, each of those illustrations as if fully set forth herein. Tr. 417:14-427:15; PX124; PX125; PX126; PX127; PX128; PX129; PX131; PX132; PX133 [Chen rebuttal report, Figures 1 – 6, 8-10]

Figure 1:

Mecklenburg County Grouping

(Numbers indicate the percentage of population in each of Dr. Hofeller's draft 'J_25' districts that was also assigned to its most similar, corresponding district in the final House Bill 927 map)

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698. Based on Dr. Chen's analysis, the Court finds that by June 28, 2017—over six weeks before the Adopted Criteria were passed—Dr. Hofeller had fully or at least substantially completed drawing numerous House county groupings redrawn in 2017. Tr. 419:12-427:1.

699. Contrary to Legislative Defendants' contention, the Whole County Provision is not responsible for the high degree of overlap between Dr. Hofeller's June 28, 2017 draft House plan and the final enacted House plan. Tr. 419:12-427:1. The Whole County Provision does not dictate the contours of House districts in counties such as Mecklenburg, Harnett, Wayne, Sampson, Orange, Durham, Pitt, Robeson, Granville, Forsyth, and Rockingham Counties, and Dr. Hofeller's June 28, 2017, draft House districts in these counties were near-exact matches to the final districts. *Id.*

700. The Court finds Dr. Chen's comparisons of Dr. Hofeller's June 2017 draft plans to the enacted plans to be highly credible and persuasive. Notably, Dr. Chen's analysis stands unrebutted. Legislative Defendants presented testimony from Dr. Douglas Johnson in an attempt to rebut Dr. Chen's analysis. However, the Court struck all of Dr. Johnson's analysis comparing Dr. Hofeller's draft districts and the final enacted districts after Plaintiffs' cross-examination exposed a series of significant errors and unreliable methodology. Tr. 1988:11-1990:4.

701. As for Dr. Johnson's remaining criticisms of Dr. Chen's methodology for calculating the overlap between Dr. Hofeller's June 2017 draft plans and the final enacted plans, the Court assigns them no weight. The Court finds that Dr. Chen employed a reasonable methodology to estimate the degree of similarity between the draft and final plans, by simply calculating the percentage of census blocks and population in each draft district that was also assigned to the most closely corresponding district in the final enacted House or Senate plan. *See* Tr. 398:3-399:15. Dr. Chen's methodology and findings also accord with a visual comparison of the draft House and Senate districts to the corresponding final versions. No party has disputed that the maps presented in Plaintiffs' Exhibits 124-129, 131-133, and 140-147 accurately reflect the district boundaries in Dr. Hofeller's June 2017 draft plans and the final enacted plans.

***105** 702. The Court concludes from this showing, and therefore finds, that Dr. Hofeller, and consequently the Legislative Defendants who retained him, by having largely completed the drafting of House and Senate maps by June, 2017, did so with little regard for the Adopted Criteria, or the neutral, non-partisan criteria contained therein, which were not adopted by the Senate Redistricting Committee and House Select Committee on Redistricting until August 10, 2017, and provided to Dr. Hofeller on August 11, 2017. PX 603 at 4:23-5:5; PX629. The Court finds that this is further compelling evidence of the intent of Legislative Defendants to create legislative districts by subordinating Democratic voters for partisan gain and to entrench the power of the Republican majority.

703. Since Dr. Hofeller's files came to light, Legislative Defendants have asserted that they did not know at the time that Dr. Hofeller was developing draft maps prior to August 2017 or that Plaintiffs cannot "connect" Dr. Hofeller's draft maps to the General Assembly. *See, e.g.,* Leg. Defs'. Pre-trial Brief, p. 36. The Court finds this argument unpersuasive. Dr. Hofeller was retained by the General Assembly on June 27, 2017, for the purposes of drawing the 2017 House and Senate maps. PX641. The Court finds it highly improbable that in the days leading up to his engagement, or in the nearly six weeks following, Dr. Hofeller never mentioned his draft maps to anyone connected with Legislative Defendants until after he received the Adopted Criteria on August 11, 2017— especially since, merely eight or nine days later, Legislative Defendants were able to reveal final drafts of his House and Senate maps. PX605 at 16:2-17:16; PX629 at 7.

704. The Court is troubled by representations made by Legislative Defendants, or attorneys working on their behalf, in briefs and arguments to the *Covington* Court and to General Assembly colleagues at committee meetings that affirmatively stated that no draft maps had been prepared even as late as August 4, 2017. *See, e.g., Covington*, ECF No. 161 at 2, 4, 13, and 28-29; PX601 at 11-12; PX602 at 72-73; and PX629 at 3, 4, 6 and 10 (*Covington*, ECF No. 184). For the purposes of determining liability for the claims asserted in this litigation,[14] the Court finds it unnecessary to delve further into these concerns, other

than to note that the Court, as previously stated, is persuaded, and specifically finds, that Dr. Hofeller's intent and actions, as evidenced throughout his map-drawing process from at least early June 2017, are attributable in full to Legislative Defendants.

14 In considering the appropriate remedy, the Court does take this finding into account, among others, when mandating that the remedial process be more transparent to the Court, the public, and the entire General Assembly.

CONCLUSIONS OF LAW

I. THE STANDING OF PLAINTIFFS

1. The North Carolina Constitution provides: "All courts shall be open; every person for an injury done him in his lands, goods, person, or reputation shall have remedy by due course of law; and right and justice shall be administered without favor, denial, or delay." N.C. Const. art. I, § 18.

2. "[B]ecause North Carolina courts are not constrained by the 'case or controversy' requirement of Article III of the United States Constitution, our State's standing jurisprudence is broader than federal law." *Davis v. New Zion Baptist Church*, 811 S.E.2d 725, 727 (N.C. Ct. App. 2018) (quotation marks omitted); *accord Goldston v. State*, 361 N.C. 26, 35, 637 S.E.2d 876, 882 (2006) ("While federal standing doctrine can be instructive as to general principles … and for comparative analysis, the nuts and bolts of North Carolina standing doctrine are not coincident with federal standing doctrine."). At a minimum, a plaintiff in a North Carolina court has standing to sue when it would have standing to sue in federal court.

***106** 3. The North Carolina Supreme Court has broadly interpreted Article I, § 18 to mean that "[a]s a general matter, the North Carolina Constitution confers standing on those who suffer harm." *Mangum v. Raleigh Bd. of Adjustment*, 362 N.C. 640, 642, 669 S.E.2d 279, 281 (2008). The "gist of the question of standing" under North Carolina law is whether the party seeking relief has "alleged such a personal stake in the outcome of the controversy as to assure that concrete adverseness which sharpens the presentation of issues upon which the court so largely depends for illumination of difficult constitutional questions." *Goldston*, 361 N.C. at 30, 637 S.E.2d at 879 (quoting *Stanley v. Dep't of Conservation & Dev.*, 284 N.C. 15, 28, 199 S.E.2d 641, 650 (1973)). Although the North Carolina Supreme Court "has declined to set out specific criteria necessary to show standing in every case, [it] has emphasized two factors in its cases examining standing: (1) the presence of a legally cognizable injury; and (2) a means by which the courts can remedy that injury." *Davis*, 811 S.E.2d at 727-28.

A. The North Carolina Democratic Party Has Standing

4. The Court determines that the North Carolina Democratic Party (NCDP) has standing, both to sue on its own behalf as an organization and to sue on behalf of its members.

5. "An association may have standing in its own right to seek judicial relief from injury to itself and to vindicate whatever rights and immunities the association itself may enjoy." *River Birch Assoc. v. Raleigh*, 326 N.C. 100, 129, 388 S.E.2d 538, 555 (1990) (quoting *Warth v. Seldin*, 422 U.S. 490, 511, 95 S. Ct. 2197, 2211 (1975)). The Court finds instructive the United States Supreme Court holdings under federal standing principles that state political parties and organizations similar to the NCDP have standing to bring voting-rights challenges on their own behalf. *See, e.g., Crawford v. Marion County Election Bd.*, 553 U.S. 181, 189 n.7 (2008); *id.* at 204-09 (Scalia, J., concurring); *id.* at 209 n.2 (Souter, J., dissenting); *Gill v. Whitford*, 138 S. Ct. 1916, 1938 (2018) (Kagan, J., concurring) (explaining how these standards can apply to political parties and similar organizations in a partisan gerrymandering case); *Ohio A. Philip Randolph Inst. v. Householder*, 373 F. Supp. 3d 978, 1076 (S.D. Ohio 2019); *League of Women Voters of Mich. v. Johnson*, 352 F. Supp. 3d 777, 801 (E.D. Mich. 2018). Indeed, the federal court in *Common Cause v. Rucho* held that the NCDP had standing to bring a partisan gerrymandering challenge on its own behalf—based in part on the testimony of Mr. Goodwin. *See*, *Common Cause v. Rucho*, 318 F. Supp. 3d 777, 830 (M.D.N.C. 2018), *vacated on other grounds*, 139 S. Ct. 2484 (2019).

6. The NCDP has standing in its own right to seek judicial relief in this case because the NCDP has sufficiently demonstrated the presence of a legally cognizable injury to NCDP and a means by which the courts of our State can remedy that injury.[15]

15 Furthermore, even under the federal standing requirements of (1) injury, (2) causation, and (3) redressability, *see Gill v. Whitford*, 138 S. Ct. 1916, 1929 (2018), the NCDP has such a personal stake in the outcome of the controversy that it has standing under this more stringent standard.

7. An association also "has standing to bring suit on behalf of its members when: (a) its members would otherwise have standing to sue in their own right; (b) the interests it seeks to protect are germane to the organization's purpose; and (c) neither the claim asserted nor the relief requested requires the participation of individual members in the lawsuit." *River Birch Assoc.*, 326 N.C. at 130, 388 S.E.2d at 555 (quoting *Hunt v. Wash. State Apple Adver. Comm'n*, 432 U.S. 333, 343, 97 S. Ct. 2434, 2441 (1977)). An associational plaintiff need not show that *all* of its members would have standing to sue in their own right when seeking declaratory or injunctive relief; rather, it is sufficient if any "one" member would have individual standing. *Id.*; *see also State Employees Ass'n of N.C., Inc. v. State*, 357 N.C. 239, 580 S.E.2d 693 (2003) (reversing lower court decision that had required every member of association or organization to have standing). The Court finds instructive federal court holdings that organizations similar to the NCDP have standing to bring partisan gerrymandering challenges on behalf of their members. *See, e.g., League of Women Voters of Mich.*, 373 F. Supp. 3d at 933, 937-38; *Ohio A. Philip Randolph Inst.*, 373 F. Supp. 3d at 1072-73; *Rucho,* 318 F. Supp. 3d at 827, 835-36 (holding that the NCDP had standing to bring a partisan gerrymandering claim on behalf of its members).

***107** 8. The NCDP has standing to sue on behalf of its members in this case because its members—registered Democratic voters located in every state House and state Senate District across our State—otherwise have standing to sue in their own right, the interests that the NCDP seeks to protect are germane to the NCDP's purpose, and neither the claims asserted nor the declaratory and injunctive relief requested requires the participation of individual NCDP members in this lawsuit.

B. Common Cause Has Standing

9. The Court further holds that Common Cause has standing, both to sue on its own behalf as an organization and to sue on behalf of its members.

10. The Court finds instructive federal court holdings that organizations similar to Common Cause have standing to bring partisan gerrymandering challenges on their own behalves and on behalf of their members. *See, e.g., League of Women Voters of Mich.*, 373 F. Supp. 3d at 933, 937-38; *Ohio A. Philip Randolph Inst.*, 373 F. Supp. 3d at 1072-75; *Rucho* 318 F. Supp. 3d at 830-31 (holding that Common Cause had standing to bring a partisan gerrymandering challenge).

11. Like the NCDP, Common Cause has standing in its own right to seek judicial relief in this case because Common Cause has sufficiently demonstrated the presence of a legally cognizable injury to Common Cause and a means by which the courts of our State can remedy that injury.[16]

16 Furthermore, even under the federal standing requirements of (1) injury, (2) causation, and (3) redressability, *see Gill*, 138 S. Ct. at 1929, Common Cause has such a personal stake in the outcome of the controversy that it has standing under this more stringent standard.

12. Common Cause also has standing to sue on behalf of its members in this case because at least one of its individual members has standing to sue in his or her own right, the interests Common Cause seeks to protect in this case are germane to Common Cause's purposes, and neither the claims asserted nor the declaratory and injunctive relief requested requires the participation of individual Common Cause members in this lawsuit.

C. The Standing of Individual Plaintiffs

13. Individual Plaintiffs also have standing to challenge each of their individual districts as well as their county groupings. All of the Individual Plaintiffs detailed below have shown "a personal stake in the outcome of the controversy," *Goldston*, 361 N.C. at 30, 637 S.E.2d at 879, and that the 2017 Plans cause them to "suffer harm," *Mangum*, 362 N.C. at 642, 669 S.E.2d at 281.

14. Certain Individual Plaintiffs have standing to challenge their own districts. Plaintiffs introduced extensive district-specific evidence demonstrating how, through cracking and packing, the 2017 Plans dilute the voting power of Individual Plaintiffs and other Democratic voters. Plaintiffs also introduced unrebutted, district-specific evidence demonstrating that twenty-two Individual Plaintiffs live in House districts that are outliers in partisan composition relative to the districts in which they live under Dr. Chen's nonpartisan simulated plans and that twenty Individual Plaintiffs live in Senate districts that are outliers in the same manner. FOF § E.3. Each of these Individual Plaintiffs thus established a personal stake in the outcome of the controversy and a specific harm directly attributable to the partisan gerrymandering of the district in which they reside. *Goldston*, 361 N.C. at 30, 637 S.E.2d at 879; *Mangum*, 362 N.C. at 642, 669 S.E.2d at 281; *see, e.g.*, *Rucho*, 318 F. Supp. 3d at 817; *Ohio A. Philip Randolph Inst.*, 373 F. Supp. 3d at 1063; *League of Women Voters of Mich.*, 373 F. Supp. 3d at 916; *Benisek*, 348 F. Supp. 3d 493, 517 (D. Md. 2018), *vacated on other grounds*, 139 S. Ct. 2484 (2019). Moreover, these Individual Plaintiffs have demonstrated, through extensive district-specific evidence, the presence of a legally cognizable injury and, as discussed in great detail below, a means by which the courts of our State can remedy that injury.

***108** 15. These Individual Plaintiffs challenge not only the individual districts in which they reside, but also the county groupings as a whole in which they reside. The United States Supreme Court has held that individual voters have standing under the federal Constitution to challenge only their own districts on partisan gerrymandering grounds, *Gill*, 138 S. Ct. at 1930-31; however, in light of the less stringent standing requirements in our State, and because the manner in which one district is drawn in a county grouping necessarily is tied to the drawing of some, and possibly all, of the other districts within that same grouping, a challenge to the entire county grouping by these Individual Plaintiffs constitutes the necessary "personal stake in the outcome of the controversy" for a plaintiff to have standing in this case. *Goldston*, 361 N.C. at 30, 637 S.E.2d at 879; *see Erfer v. Commonwealth*, 794 A.2d 325, 330 (Pa. 2002) (recognizing that a "reapportionment plan acts as an interlocking jigsaw puzzle, each piece reliant upon its neighbors to establish a picture of the whole" and that an "allegation that a litigant's district was improperly gerrymandered necessarily involves a critique of the plan beyond the borders of his district"), *abrogated on other grounds by League of Women Voters of Pa. v. Commonwealth*, 178 A.3d 737 (Pa. 2018).

16. On the other hand, several named Individual Plaintiffs do not have standing to challenge either the individual House or Senate District in which they reside because, under Dr. Chen's analysis, the district in which they would reside is not an outlier —based upon the location of that Individual Plaintiff's residence—when compared to all of Dr. Chen's nonpartisan simulated House or Senate maps.[17] Therefore, these Individual Plaintiffs have not demonstrated a cognizable injury and a means by which the Court could remedy that injury; however, with respect to the challenged districts in which these Individual Plaintiffs reside, because the NCDP has standing to bring partisan gerrymandering claims on behalf of its members, the Court concludes that Plaintiffs' challenges to these districts do not fail for lack of standing.

17 These Individual Plaintiffs without standing to challenge either their individual House or Senate district are: Virginia Walters Brien, Leon Charles Schaller, Howard Du Bose, Jr., Deborah Anderson Smith, Alyce Machak, John Balla, John Mark Turner, Ann McCracken, and Mary Ann Peden-Coviello. FOF § E.3.; PX238; PX117. The Court notes that although some Individual Plaintiffs may not have standing to challenge *both* of their House and Senate districts, they do have standing to challenge at least *a* district in which they reside.

II. THE 2017 PLANS VIOLATE THE NORTH CAROLINA CONSTITUTION'S FREE ELECTIONS CLAUSE

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17. Two months ago, in *Rucho v. Common Cause*, 139 S. Ct. 2484 (2019), the United States Supreme Court considered constitutional challenges to political gerrymandering of Congressional districts in North Carolina and Maryland.

18. The North Carolina Congressional map under consideration by the Supreme Court, adopted by the General Assembly on February 19, 2016, arose in remarkably similar circumstances as the maps under consideration by this trial court, which were adopted August 31, 2017: both the 2016 Congressional map and the 2017 legislative maps were required after a federal court declared existing maps unconstitutional; both were drawn under the direction of many of the same actors working on behalf of the Republican-controlled General Assembly; both were drawn by Dr. Thomas Hofeller; both were drawn in large part before the General Assembly's redistricting committee met and approved redistricting criteria; and both, as has been found above with respect to the 2017 legislative maps, were drawn with the intent to maximize partisan advantage and, in fact, achieved their intended partisan effects.

19. In the majority opinion of the *Rucho* Court, the Justices found the Congressional maps before them to be "highly partisan, by any measure," *id.* at 2491, and "blatant examples of partisanship driving districting decisions," *id.* at 2505. The majority further reaffirmed that "partisan gerrymanders are incompatible with democratic principles." *Id.* at 2506 (citing *Ariz. State Legislature v. Ariz. Indep. Redistricting Comm'n*, 135 S. Ct. 2652, 2658 (U.S. 2016)).

***109** 20. Nonetheless, the Supreme Court concluded, in the majority opinion, that "partisan gerrymandering claims present political questions beyond the reach of the *federal* courts." *Rucho*, 139 S. Ct. at 2506-07 (emphasis added). The Court held that the *federal* courts "have no commission to allocate political power and influence in the absence of a constitutional directive or legal standards to guide us in the exercise of such authority," *id*. at 2508, and that the United States Constitution "confines the *federal* courts to a properly judicial role," because there is no "no plausible grant of authority in the [United States] Constitution, and no legal standards to limit and direct their decisions," *id.* at 2507 (emphasis added).

21. The Supreme Court hastened to add, however, that "our conclusion does not condone excessive partisan gerrymandering" and nor does its conclusion "condemn complaints about districting to echo into a void." *Id.*

22. Rather, the Supreme Court held, "[t]he States … are actively addressing the issue on a number of fronts," and "[p]rovisions in state statutes and *state constitutions* can provide standards and guidance for state courts to apply." *Id.* (emphasis added).

23. The North Carolina Constitution, in the Declaration of Rights, Article I, § 10, declares that "[a]ll elections shall be free."

24. The Free Elections Clause, Article I, § 10, is one of the clauses that makes the North Carolina Constitution more detailed and specific than the federal Constitution in the protection of the rights of its citizens. *Corum v. Univ. of N.C. ex rel. Bd. of Gov'rs*, 330 N.C. 761, 783, 413 S.E.2d 276, 290 (1992). The federal Constitution contains no similar counterpart to this declaration, although several other states' constitutions do.

25. The broad language of the Free Elections Clause has not heretofore been extensively interpreted by our appellate courts. However, "it is emphatically the province and duty of the judicial department to say what the law is." *Marbury v. Madison*, 5 U.S. (1 Cranch) 137, 177 (1803).

26. The North Carolina Supreme Court has long recognized the fundamental role of the will of the people in our democratic government. "Our government is founded on the will of the people. Their will is expressed by the ballot." *People ex rel. Van Bokkelen v. Canaday*, 73 N.C. 198, 220 (1875).

27. In particular, the North Carolina Supreme Court has directed that in construing provisions of the Constitution, "we should keep in mind that this is a government of the people, in which the will of the people--the majority--legally expressed, must govern." *State ex rel. Quinn v. Lattimore*, 120 N.C. 426, 428, 26 S.E. 638, 638 (1897) (citing N.C. Const. art. I, § 2).

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28. Therefore, our Supreme Court continued, because elections should express the will of the people, it follows that "all acts providing for elections, should be liberally construed, that tend to promote a fair election or expression of this popular will." *Id.* "[F]air and honest elections are to prevail in this state." *McDonald v. Morrow*, 119 N.C. 666, 673, 26 S.E. 132, 134 (1896).

29. Our Supreme Court has elevated this principle to the highest legal standard, noting that it is a "compelling interest" of the State "in having fair, honest elections." *State v. Petersilie*, 334 N.C. 169, 184, 432 S.E.2d 832, 840 (1993). As to this there is little room for debate; the Court has recognized that "there is also agreement as to the compelling government interest in ensuring honest and fair elections." *Id.* (citing *Burson v. Freeman*, 504 U.S. 191, 198-99, 112 S. Ct. 1846, 1851-52 (1992)).

30. In giving meaning to the Free Elections Clause, this Court's construction of the words contained therein must therefore be broad to comport with the following Supreme Court mandate: "We think the object of all elections is to ascertain, fairly and truthfully, the will of the people--the qualified voters." *Hill v. Skinner*, 169 N.C. 405, 415, 86 S.E. 351, 356 (1915) (quoting *R. R. v. Comrs.,* 116 N.C. 563, 568, 21 S.E. 205, 207 (1895)).

***110** 31. As such, the Court concludes that the meaning of the Free Elections Clause is that elections must be conducted freely and honestly to ascertain, fairly and truthfully, the will of the people. This, the Court concludes, is a fundamental right of the citizens enshrined in our Constitution's Declaration of Rights, a compelling governmental interest, and a cornerstone of our democratic form of government.

32. The Court now turns to the issue of whether extreme partisan gerrymandering of legislative districts run afoul of the mandate of the Free Elections Clause by depriving citizens of elections that are conducted freely and honestly to ascertain, fairly and truthfully, the will of the people.

33. At its most basic level, partisan gerrymandering is defined as: "the drawing of legislative district lines to subordinate adherents of one political party and entrench a rival party in power." *Ariz. State Legislature,* 135 S. Ct. at 2658.

34. The danger of partisan gerrymandering is that it has the potential to violate "the core principle of republican government … that the voters should choose their representatives, not the other way around." *Id.* at 2677; *see* also *Powell v. McCormack*, 395 U.S. 486, 540-41, 89 S. Ct. 1944, 1974 (1969) ("[T]he true principle of a republic is, that the people should choose whom they please to govern them." (quoting Alexander Hamilton in 2 Debates of the Federal Constitution 257 (J. Elliott ed. 1876))). Moreover, it can represent "an abuse of power that, at its core, evinces a fundamental distrust of voters, serving the self-interest of the political parties at the expense of the public good." *LULAC v. Perry,* 548 U.S. 399, 456, 126 S. Ct. 2594, 2631 (2006) (Steven, J., concurring in part and dissenting in part) (quotation and citation omitted).

35. Partisan gerrymandering operates through vote dilution—the devaluation of one citizen's vote as compared to others. A mapmaker draws district lines to "pack" and "crack" voters likely to support the disfavored party. *See generally Gill*, 138 S. Ct. 1916. The mapmaker packs supermajorities of those voters into a relatively few districts, in numbers far greater than needed for their preferred candidates to prevail. Then the mapmaker cracks the rest across many more districts, spreading them so thin that their candidates will not be able to win. Whether the person is packed or cracked, his vote carries less weight—has less consequence—than it would under a neutrally drawn (non-partisan) map. *See id.,* 138 S. Ct. at 1935-36 (Kagan, J., concurring). In short, the mapmaker has made some votes count for less, because they are likely to go for the other party. *Rucho*, 2513-14 (Kagan, J., dissenting).

36. Seen in this light, it is clear to the Court that extreme partisan gerrymandering—namely redistricting plans that entrench politicians in power, that evince a fundamental distrust of voters by serving the self-interest of political parties over the public good, and that dilute and devalue votes of some citizens compared to others—is contrary to the fundamental right of North Carolina citizens to have elections conducted freely and honestly to ascertain, fairly and truthfully, the will of the people.

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37. Extreme partisan gerrymandering does not fairly and truthfully ascertain the will of the people. Voters are not freely choosing their representatives. Rather, representatives are choosing their voters. It is not the will of the people that is fairly ascertained through extreme partisan gerrymandering. Rather, it is the will of the map drawers that prevails.

***111** 38. The Court is further persuaded that the history of the Free Elections Clause comports with the interpretation applied in this case.

39. The Free Elections Clause dates back to the North Carolina Declaration of Rights of 1776. The framers of the North Carolina Declaration of Rights based the Free Elections Clause on a provision of the 1689 English Bill of Rights providing that "election of members of parliament ought to be free." Bill of Rights 1689, 1 W. & M. c. 2 (Eng.); *see* John V. Orth, *North Carolina Constitutional History*, 70 N.C. L. Rev. 1759, 1797-98 (1992).

40. This provision of the 1689 English Bill of Rights grew out of the king's efforts to manipulate parliamentary elections, including by changing the electorate in different areas to achieve "electoral advantage." J.R. Jones, *The Revolution of 1688 in England* 148 (1972). The king's attempt to maintain control of parliament by manipulating elections led to a revolution, and after dethroning the king, the revolutionaries called for a "free and lawful parliament" as a critical reform. Grey S. De Krey, *Restoration and Revolution in Britain: A Political History of the Era of Charles II and the Glorious Revolution* 241, 247-48, 250 (2007).

41. A number of states included versions of a free election clause in their early Declarations of Rights, all drawing inspiration from the 1689 English Bill of Rights. The Framers of North Carolina's Declaration of Rights in turn drew inspiration for North Carolina's Free Elections Clause from these other states, which included Pennsylvania, Maryland, and Virginia. *See* Orth, 70 N.C. L. Rev. at 1797-98.

42. Like the 1689 English Bill of Rights, North Carolina's Free Elections Clause, in conjunction with the companion provision of the State Constitution now found in Article I, § 9 concerning redress of grievances, mandates that elections in North Carolina must be "free from interference or intimidation" by the government, so that all North Carolinians are freely able, through the electoral process, to pursue a "redress of grievances and for amending and strengthening the laws." John V. Orth & Paul M. Newby, *The North Carolina State Constitution* 55-57 (2d ed. 2013) (hereinafter "Orth & Newby"). "[T]his pair of sections concerns the application of the principle of popular sovereignty." *Id.* at 55. As the North Carolina Supreme Court explained nearly a century ago, the Free Elections Clause reflects that "[o]ur government is founded on the consent of the governed," and the right to free elections "must be held inviolable to preserve our democracy." *Swaringen v. Poplin*, 211 N.C. 700, 191 S.E. 746, 747 (1937).

43. North Carolina has broadened and strengthened the Free Elections Clause since its adoption in 1776 to make these purposes clear. The original clause stated that "elections of members, to serve as Representatives in the General Assembly, ought to be free." N.C. Declaration of Rights, VI (1776). The next version of the State's Constitution, adopted in 1868, declared that "[a]ll elections ought to be free," expanding the principle to include all elections in North Carolina. N.C. Const. art. I, § 10 (1868). In the current State Constitution, adopted in 1971, the Free Elections Clause now mandates that "[a]ll elections *shall* be free." N.C. Const. art. I, § 10 (emphasis added). This change was intended to "make [it] clear" that the Free Elections Clause and the other rights secured to the people by the Declaration of Rights "are commands and not mere admonitions" to proper conduct on the part of the government. *N.C. State Bar v. DuMont*, 304 N.C. 627, 635, 639, 286 S.E.2d 89, 94, 97 (1982) (quoting Report of the N.C. State Constitution Study Comm'n to the N.C. State Bar and the N.C. Bar Ass'n, 75 (1968)).

***112** 44. The North Carolina Supreme Court has enforced the Free Elections Clause to invalidate laws that interfere with voters' ability to freely choose their representatives. In *Clark v. Meyland*, the North Carolina Supreme Court struck down a law that required voters seeking to change their party affiliation to take an oath supporting the party's nominees "in the next election and … thereafter." 261 N.C. 140, 141, 134 S.E.2d 168, 169 (1964). The Court held that this attempt to manipulate the outcome of future elections "violate[d] the constitutional provision that elections shall be free." *Id.* at 143, 134 S.E.2d at 170.

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45. The partisan gerrymandering of the 2017 Plans strikes at the heart of the Free Elections Clause. Using their control of the General Assembly, Legislative Defendants manipulated district boundaries, to the greatest extent possible, to control the outcomes of individual races so as to best ensure their continued control of the legislature.

46. Plaintiffs' experts demonstrated that the 2017 Plans were designed, specifically and systematically, to maintain Republican majorities in the state House and Senate. Drs. Chen and Mattingly each independently established that the 2017 Plans were gerrymandered to be most resilient in electoral environments where Democrats could win majorities in either chamber under nonpartisan plans. FOF § B.3.a, b. Their analyses establish that it is nearly impossible for Democrats to win majorities in either chamber in any reasonably foreseeable electoral environment. *Id.* Elections are not free when partisan actors have tainted future elections by specifically and systematically designing the contours of the election districts for partisan purposes and a desire to preserve power. In doing so, partisan actors ensure from the outset that it is nearly impossible for the will of the people—should that will be contrary to the will of the partisan actors drawing the maps—to be expressed through their votes for State legislators.

47. The 2017 Plans also unlawfully seek to predetermine election outcomes in specific districts and county groupings. Drs. Chen and Mattingly each found numerous districts and county groupings that result in safe or relatively safe Republican seats under the enacted plans but would be far more competitive or even Democratic-leaning under nonpartisan plans. In the remaining county groupings, Drs. Chen and Mattingly similarly found that Legislative Defendants placed their thumbs heavily on the scale to favor Republicans. *See* FOF § C.

48. The harm caused by this manipulation of election outcomes subverts another key purpose of the Free Elections Clause, which, in conjunction with Article I, § 9, is to facilitate the ability of North Carolina citizens to seek a "redress of grievances and for amending and strengthening the law." Orth & Newby, at 56. Democratic voters in North Carolina cannot meaningfully seek to redress their grievances or amend the laws consistent with their policy preferences when they cannot obtain a majority of the General Assembly.

49. For the foregoing reasons, the Court concludes that Plaintiffs have met their burden of showing, plainly and clearly without any reasonable doubt, that the enacted plans violate the North Carolina Constitution's guarantee of free elections in Article I, Section 10 of the North Carolina Constitution by demonstrating that Legislative Defendants, with the predominant intent to control and predetermine the outcome of legislative elections for the purpose of retaining partisan power in the General Assembly, manipulated the current district boundaries. And Plaintiffs have met their burden to establish that the manipulation of district boundaries by Legislative Defendants resulted in extreme partisan gerrymandering, subordinating traditional redistricting criteria, so that the resulting maps cracked and packed voters to achieve these partisan objectives. The 2017 Plans, individually and collectively, deprive North Carolina citizens of the right to vote for General Assembly members in elections that are conducted freely and honestly to ascertain, fairly and truthfully, the will of the people.

III. THE 2017 PLANS VIOLATE THE NORTH CAROLINA CONSTITUTION'S EQUAL PROTECTION CLAUSE

***113** 50. The Equal Protection Clause of the North Carolina Constitution guarantees to all North Carolinians that "[n]o person shall be denied the equal protection of the laws." N.C. Const., art. I, § 19.

51. Generally, partisan gerrymandering runs afoul of the State's obligation to provide all persons with equal protection of law because, by seeking to diminish the electoral power of supporters of a disfavored party, a partisan gerrymander treats individuals who support candidates of one political party less favorably than individuals who support candidates of another party. *Cf. Lehr v. Robertson*, 463 U.S. 248, 265, 103 S. Ct. 2985 (1983) ("The concept of equal justice under law requires the State to govern impartially.")

A. North Carolina's Equal Protection Clause Provides Greater Protection for Voting Rights Than its Federal Counterpart

52. North Carolina's Equal Protection Clause provides greater protection for voting rights than federal equal protection provisions. *Stephenson v. Bartlett*, 355 N.C. 354, 377-81 & n.6, 562 S.E.2d 377, 393-96 & n.6 (2002); *Blankenship v. Bartlett*, 363 N.C. 518, 522-28, 681 S.E.2d 759, 763-66 (2009). "It is beyond dispute that [North Carolina courts] ha[ve] the authority to construe [the North Carolina Constitution] differently from the construction by the United States Supreme Court of the Federal Constitution, as long as our citizens are thereby accorded no lesser rights than they are guaranteed by the parallel federal provision." *Stephenson*, 355 N.C. at 381 n.6, 562 S.E.2d at 395 n.6. North Carolina courts can and do interpret even "identical term[s]" in the State's Constitution more broadly than their federal counterparts. *Northampton Cnty. Drainage Dist. No. One v. Bailey*, 326 N.C. 742, 749, 392 S.E.2d 352, 357 (1990).

53. The North Carolina Supreme Court has held that North Carolina's Equal Protection Clause protects "the fundamental right of each North Carolinian to *substantially equal voting power*." *Stephenson*, 355 N.C. at 379, 562 S.E.2d at 394 (emphasis added). "It is well settled in this State that 'the right to vote *on equal terms* is a fundamental right.'" *Id.* at 378, 562 S.E.2d at 393 (quoting *Northampton Cnty.*, 326 N.C. at 747, 392 S.E.2d at 356) (emphasis added). These principles apply with full force in the redistricting context, and because a fundamental right is implicated, strict scrutiny applies. *See id.* at 377-78, 562 S.E.2d at 393-94.

54. The North Carolina Supreme Court has applied this broader state constitutional protection to invalidate redistricting schemes and other elections laws under Article I, § 19, irrespective of whether they violated federal equal protection guarantees. In *Stephenson*, the Court held that use of single-member and multi-member districts in a redistricting plan violated Article I, § 19. *Id.* at 377-81 & n.6, 562 S.E.2d at 393-95 & n.6. The Court explained that, although such a redistricting scheme did not violate the United States Constitution, it restricted the "fundamental right under the State Constitution" to "substantially equal voting power and substantially equal legislative representation." *Id.* at 382, 562 S.E.2d at 396. Because the "classification of voters" between single-member and multi-member districts created an "impermissible distinction among similarly situated citizens," it "necessarily implicate[d] the fundamental right to vote on equal terms," triggering "strict scrutiny." *Id.* at 377-78, 562 S.E.2d at 393-94.

***114** 55. In *Blankenship*, the Court held that Article I, § 19 mandates one-person, one-vote in judicial elections, even though the United States Constitution does not. 363 N.C. at 522-24, 681 S.E.2d at 762-64. The Court stressed that "[t]he right to vote on equal terms in representative elections … is a fundamental right" and therefore "triggers heightened scrutiny." *Id*.

56. And in *Northampton County*, the Court applied strict scrutiny to invalidate certain rules related to voting for drainage districts, holding that the rules at issue deprived one county's residents of the "fundamental right" to "vote on equal terms" with residents of a neighboring county. 326 N.C. at 747, 392 S.E.2d at 356.

57. Although the North Carolina Constitution provides greater protection for voting rights than the federal Equal Protection Clause, our courts use the same test as federal courts in evaluating the constitutionality of challenged classifications under an equal protection analysis. *Duggins v. N.C. State Bd. of Certified Pub. Accountant Exam'rs*, 294 N.C. 120, 131, 240 S.E.2d 406, 413 (1978); *Richardson v. N.C. Dep't of Corr.,* 345 N.C. 128, 134, 478 S.E.2d 501, 505 (1996).

58. Generally, this test has three parts: (1) intent, (2) effects, and (3) causation. First, the plaintiffs challenging a districting plan must prove that state officials' "predominant purpose" in drawing district lines was to "entrench [their party] in power" by diluting the votes of citizens favoring their rival. *Ariz. State Legis.*, 135 S. Ct. at 2658. Second, the plaintiffs must establish that the lines drawn in fact have the intended effect by "substantially" diluting their votes. *Rucho*, 318 F. Supp. 3d at 861. Finally, if the plaintiffs make those showings, the State must provide a legitimate, non-partisan justification (*i.e.*, that the impermissible intent did not cause the effect) to preserve its map. *Rucho,* 139 S. Ct. at 2516 (Kagan, J., dissenting).

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B. The 2017 Plans Were Created with the Intent to Discriminate Against Plaintiffs and Other Democratic Voters

59. To establish a discriminatory purpose or intent, a plaintiff need not show that the discriminatory purpose is "express or appear[s] on the face of the statute." *Washington v. Davis*, 426 U.S. 229, 241, 96 S. Ct. 2040, 2048 (1976). Rather, "an invidious discriminatory purpose may often be inferred from the totality of the relevant facts." *Id.* at 242, 96 S. Ct. at 2048.

60. The United States Supreme Court has recognized that there are certain purposes for which a state redistricting body may take into account political data or partisan considerations in drawing district lines. For example, a legislature may, under appropriate circumstances, draw district lines to avoid the pairing of incumbents. *Karcher v. Daggett*, 462 U.S. 725, 740, 103 S. Ct. 2653, 2663 (1983). Likewise, a state redistricting body does not violate the United States Constitution by seeking "to create a districting plan that would achieve a rough approximation of the statewide political strengths of the Democratic and Republican Parties." *Gaffney v. Cummings*, 412 U.S. 735, 752, 93 S. Ct. 2321, 2331 (1973). And a redistricting body may draw district lines to respect municipal boundaries or maintain communities of interest. *Abrams v. Johnson*, 521 U.S. 74, 100, 117 S. Ct. 1925, 1940 (1997). Accordingly, a plaintiff in a partisan gerrymandering case cannot satisfy the discriminatory intent requirement simply by proving that the redistricting body intended to rely on political data or to take into account political or partisan considerations. Rather, the plaintiff must show that the redistricting body intended to apply partisan classifications or deprive citizens of the right to vote on equal terms "in an invidious manner or in a way unrelated to any legitimate legislative objective." *Vieth*, 541 U.S. at 307, 124 S. Ct. at 1793 (Kennedy, J., concurring in the judgment).

***115** 61. "Blatant examples of partisanship driving districting decisions," *Rucho*, 139 S. Ct. at 2505, are unrelated to any legitimate legislative objective. Indeed, partisan gerrymanders are incompatible with democratic principles. *Vieth*, 541 U.S. at 292, 124 S. Ct. at 1785 (plurality opinion); *id.*, at 316, 124 S. Ct. at 1798 (Kennedy, J., concurring in judgment); *Ariz. State Legislature*, 135 S. Ct. at 2658.

62. Partisan gerrymanders are also contrary to the compelling governmental interests established by the North Carolina Constitution "in having fair, honest elections," *see Petersilie*, 334 N.C. at 182, 432 S.E.2d at 840, where the "will of the people" is ascertained "fairly and truthfully," *Skinner*, 169 N.C. at 415, 86 S.E. at 356. Partisan gerrymandering contravenes the legitimate purposes of redistricting because it is intended to hamper, rather than to "achiev[e,] … fair and effective representation for all citizens." *Reynolds v. Sims*, 377 U.S. 533, 565-66, 84 S. Ct. 1362, 1383 (1964).

63. Moreover, the intentional "classification of voters" based on partisanship in order to pack and crack them into districts is an "impermissible distinction among similarly situated citizens" aimed at denying equal voting power. *See Stephenson*, 355 N.C. at 377-78, 562 S.E.2d at 393-94 ("The classification of voters into both single-member and multi-member districts within plaintiffs' proposed remedial plans necessarily implicates the fundamental right to vote on equal terms … These classifications, as used within plaintiffs' proposed remedial plans, create an impermissible distinction among similarly situated citizens based upon the population density of the area in which they reside."). "A state may not dilute the strength of a person's vote to give weight to other interests." *Texfi Indus., Inc. v. Fayetteville*, 301 N.C. 1, 13, 269 S.E.2d 142, 150 (1980) (citing *Evans v. Cornman*, 398 U.S. 419, 90 S. Ct. 1752 (1970)).

64. Legislative Defendants openly admitted that they used prior election results to draw districts to benefit Republicans in both 2011 and 2017. FOF § B.1. Dr. Hofeller's own files provide even more direct evidence that the predominant goal of the 2017 Plans was to maximize Republicans' political advantage by drawing Democratic voters into districts where their votes would be diluted, and in many cases where their votes would not matter. FOF § B.2.

65. The analysis and conclusions of Plaintiffs' experts confirm the point. Dr. Chen's analysis confirms that the General Assembly intentionally subordinated traditional districting principles to maximize Republican advantage. FOF § B.3.a. Dr. Mattingly's analysis confirms that the enacted plans' extreme partisan bias could only have been intentional. FOF § B.3.b. Dr. Pegden's sensitivity analysis shows that the enacted plans are more carefully crafted to favor Republicans than 99.999% of all possible plans of North Carolina meeting the same nonpartisan criteria laid out in the Adopted Criteria. FOF § B.3.c. And Dr. Cooper

demonstrated, by analyzing the district boundaries within each relevant county grouping, that the enacted plans intentionally and systematically pack and crack Democratic voters. FOF § C.

66. As such, the Court concludes that, in drawing the 2017 House and Senate Maps, Legislative Defendants acted with the intent, unrelated to any legitimate legislative objective, to classify voters and deprive citizens of the right to vote on equal terms. Legislative Defendants did so by subordinating Democratic voters to Legislative Defendants' partisan goals—in other words, by devaluing their vote as compared to the votes of Republican voters with the aim of entrenching the Republican Party in power—and the Court concludes that this intent was the predominant purpose of drawing the district lines in individual districts and statewide.

C. The 2017 Plans Deprive Plaintiffs and Other Democratic Voters of Substantially Equal Voting Power and the Right to Vote on Equal Terms

***116** 67. The United States Supreme Court has recognized that the injury associated with partisan gerrymandering "arises from the particular composition of the voter's own district, which causes his vote – having been packed or cracked – to carry less weight than it would carry in another hypothetical district." *Gill*, 138 S. Ct. at 1931. It is the "voter's placement in a 'cracked' or 'packed' district" that causes injury. *Id.*

68. Therefore, to prevail, Plaintiffs must also establish that the enacted legislative districts actually had the effect of discriminating against—or subordinating— voters who support candidates of the Democratic Party by virtue of district lines that crack or pack those voters, thereby depriving them of substantially equal voting power in an effort to entrench the Republican Party in power, in violation of Article I, § 19.

69. The manipulation of district boundaries in the enacted plans prevents Democratic voters from obtaining a majority in the House or the Senate even in election environments where Democrats would obtain a majority under virtually any nonpartisan map. Dr. Chen and Dr. Mattingly each independently found that the effects of the gerrymanders are most extreme in circumstances where Democrats could win majorities in one or both chambers under nonpartisan plans. FOF § B.3.a, b. There is nothing "equal" about the "voting power" of Democratic voters when they have a vastly less realistic chance of winning a majority in either chamber under the enacted plans. "The right to vote is the right to participate in the decision-making process of government." *Texfi Indus.,* 301 N.C. at 13, 269 S.E.2d at 150. Democratic voters are significantly hindered from meaningfully participating in the decision-making process of government when the maps are drawn to systematically prevent Democrats from obtaining a majority in either chamber of the General Assembly.

70. Beyond the issue of majority control, Dr. Chen and Dr. Mattingly also concluded that the gerrymanders deprive Democratic voters of multiple seats in the House and the Senate across a variety of electoral environments. FOF § B.3.a, b. The 2017 Plans achieve these effects by cracking and packing Democratic voters in districts contained within county grouping after county grouping. FOF § C. This packing and cracking diminishes the "voting power" of Democratic voters in these districts and groupings; packing dilutes the votes of Democratic voters such that their votes, when compared to the votes of Republican voters, are substantially less likely to ultimately matter in deciding the election results, and the entire purpose of cracking likeminded voters across multiple districts is so they do not have sufficient "voting power" to join together and elect a candidate of their choice.

71. Moreover, although not necessary to establish Plaintiffs' equal protection claim, the Court similarly concludes that the 2017 Plans not only deprive Democratic voters of equal voting power in terms of electoral outcomes, but also deprive them of substantially equal legislative representation. *See Stephenson*, 355 N.C. at 379, 562 S.E.2d at 394. Partisan gerrymandering insulates legislators from popular will and renders them unresponsive to portions of their constituencies. *See Reynolds*, 377 U.S. at 565 ("Since legislatures are responsible for enacting laws by which all citizens are to be governed, they should be bodies which are collectively responsible to the popular will."). When a district is created solely to effectuate the interests of one group,

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the elected official from that district is "more likely to believe that their primary obligation is to represent only the members of that group, rather than their constituency as a whole." *See Shaw I*, 509 U.S. at 648 (in the context of racial gerrymandering).

***117** 72. Just as the "political reality" is that "legislators are much more inclined to listen to and support a constituent than an outsider," *Stephenson*, 355 N.C. at 380, 562 S.E.2d at 395, the reality is that legislators are far more likely to represent the interests and policy preferences of voters of the same party. Legislative Defendants' own expert, Dr. Brunell, agreed that "a voter whose candidate of choice loses will on average be less well-represented than a voter who voted for the winning candidate." Tr. 2370:22-2371:2.

D. The 2017 Plans Cannot be Justified by any Legitimate Governmental Interest

73. Once a plaintiff establishes a *prima facia* case that boundaries of legislative districts violate the Equal Protection Clause of the North Carolina Constitution, which Plaintiffs have done in this case by establishing a discriminatory intent and a discriminatory effect, the burden shifts to Legislative Defendants to prove that a legitimate state interest or other neutral factor justified such discrimination.

74. Legislative Defendants offer limited neutral justifications for the enacted maps. They contend that the plans "satisfy the equal-population rule and the strict county-grouping and transversal rules of Article II of the State Constitution" and that "[t]he districts were far more compact than in 2011 or prior years; they split fewer VTDs than in 2011 or prior years; they … minimized incumbency pairings; and they preserved core constituency-incumbent relations." Leg. Defs.' Post-Trial Brief at p. 28.

75. While all of this may be true, these neutral justifications do not provide a sufficient justification for the substantial evidence, proffered by Plaintiffs and given substantial weight by this Court, showing that Legislative Defendants' predominant intent was to classify voters and deprive citizens of the right to vote on equal terms and substantially equally voting power. Legislative Defendants did so by subordinating Democratic voters to Legislative Defendants' partisan goals—in other words, by devaluing their vote as compared to the votes of Republican voters with the aim of entrenching the Republican Party in power—and the Court concludes that this intent was the predominant purpose of drawing the district lines in individual districts and statewide.

76. Nor do these justifications address the substantial evidence that the neutral criteria offered by Legislative Defendants, and indeed all other neutral objectives of the Adopted Criteria, were subordinated by Legislative Defendants in the map drawing process in order to attain the discriminatory effects of the resulting extreme partisan gerrymandering.

77. Because the 2017 Plans impermissibly interfere with the exercise of the fundamental right to vote, strict scrutiny applies. *See Stephenson*, 355 N.C. at 377-78, 562 S.E.2d at 393. Legislative Defendants have not established that the 2017 Plans are narrowly tailored to advance a compelling governmental interest. *See Id*. Advantaging a particular political party or discriminating against voters based on how they vote for the purposes of entrenching a political party's power is not a compelling government interest.

78. For the foregoing reasons, the Court concludes that Plaintiffs have met their burden of showing, plainly and clearly without any reasonable doubt, that the enacted plans violate the North Carolina Constitution's guarantee of equal protection in Article I, Section 19 of the North Carolina Constitution by demonstrating that (1) Legislative Defendants acted with the intent, unrelated to any legitimate legislative objective, to classify voters and deprive citizens of the right to vote on equal terms by subordinating Democratic voters to Legislative Defendants' partisan goals—in other words, by devaluing their vote as compared to the votes of Republican voters with the aim of entrenching the Republican Party in power—and this intent was the predominant purpose of drawing the district lines in individual districts and statewide; (2) that the legislative maps drawn by Legislative Defendants with this intent had the effect of depriving disfavored voters in North Carolina of substantially equal voting power and the right to vote on equal terms, as well as substantially equal legislative representation; and (3) Legislative Defendants have not provided a neutral justification or a compelling governmental rationale for their actions.

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***118** 79. Specifically, voters in specific districts in the following county groupings are unlawfully deprived of equal protection under the law in violation of the North Carolina Constitution. In these districts, Plaintiffs have demonstrated through Dr. Chen, Dr. Mattingly, and Dr. Cooper, whose expert testimony has been given substantial weight by the Court, that Democratic voters were packed or cracked into extreme gerrymandered districts so that the effect upon these voters was to deprive them of substantially equal voting power and the right to vote on equal terms, as well as substantially equal legislative representation. County groupings including these districts are as follows:

Senate Districts: FOF § C.1.a (Mecklenburg); C.1.b (Franklin-Wake); C.1.c (Nash-Johnston-Harnett-Lee-Sampson-Duplin); C.1.d. (Guilford-Alamance-Randolph); C.1.e (Davie-Forsyth); C.1.g (Buncombe-Henderson-Transylvania);

House Districts: FOF § C.2.a (Robeson-Columbus-Pender); C.2.b (Cumberland); C.2.d (Franklin-Nash); C.2.e (Pitt-Lenoir); C.2.f (Guilford); C.2.g (Davie-Rowan-Cabarrus-Stanly-Montgomery-Richmond); C.2.h (Yadkin-Forsyth); C.2.i (Mecklenburg); C.2.k (New Hanover-Brunswick); C.2.l (Duplin-Onslow); C.2.m (Anson-Union); C.2.n. (Alamance); C.2.o (Cleveland-Gaston); C.2.p (Buncombe).

In the remaining county groupings challenged by Plaintiffs, Drs. Chen and Mattingly similarly found that Legislative Defendants placed their thumbs heavily on the scale to favor Republicans. *See* FOF § C.

IV. THE 2017 PLANS VIOLATE THE NORTH CAROLINA CONSTITUTION'S FREEDOM OF SPEECH AND FREEDOM OF ASSEMBLY CLAUSES

80. The Freedom of Speech Clause in Article I, § 14 of the North Carolina Constitution provides that "[f]reedom of speech and of the press are two of the great bulwarks of liberty and therefore shall never be restrained." The Freedom of Assembly Clause in Article I, § 12 provides, in relevant part, that "[t]he people have a right to assemble together to consult for their common good, to instruct their representatives, and to apply to the General Assembly for redress of grievances."

81. The 2017 Plans violate the North Carolina Constitution's guarantees of free speech and assembly, irrespective of whether the plans violate the U.S. Constitution. *See Michigan v. Long*, 463 U.S. 1032, 103 S. Ct. 3469 (1983).

A. North Carolina's Constitution Protects the Rights of Free Speech and Assembly Independently from the Federal Constitution

82. "[I]n construing provisions of the Constitution of North Carolina," the North Carolina Supreme Court "is not bound by opinions of the Supreme Court of the United States construing even identical provisions in the Constitution of the United States." *State v. Hicks*, 333 N.C. 467, 483, 428 S.E.2d 167, 176 (1993). While the North Carolina Supreme Court gives "great weight" to decisions of the United States Supreme Court that interpret corresponding provisions in the federal constitution, *Hicks*, 333 N.C. at 484, 428 S.E.2d at 176, only North Carolina courts can "answer[] with finality" questions of North Carolina constitutional law, *State v. Arrington*, 311 N.C. 633, 643, 319 S.E.2d 254, 260 (1984). North Carolina courts thus "have the authority to construe [the State's] own constitution differently from the construction by the United States Supreme Court of the Federal Constitution, as long as [its] citizens are thereby accorded no lesser rights than they are guaranteed by the parallel federal provision." *State v. Carter*, 322 N.C. 709, 713, 370 S.E.2d 553, 555 (1988).

83. The North Carolina Supreme Court has held that the North Carolina Constitution's Free Speech Clause provides broader rights than does federal law. In particular, the Court has held that the North Carolina Constitution affords a direct cause of action for damages against government officers in their official capacity for speech violations, even though federal law does not. *Corum*, 330 N.C. at 783, 413 S.E.2d at 290. Noting that "[o]ur Constitution is more detailed and specific than the federal Constitution in the protection of the rights of its citizens," the Court explained that the North Carolina courts "give our Constitution a liberal interpretation in favor of its citizens with respect to those provisions which were designed to safeguard the liberty and security of the citizens in regard to both person and property." *Id.* Indeed, in recognizing a direct cause of action

under the State Constitution, the Court expressly relied on *the lack of* a federal remedy, which left plaintiffs with "no other remedy … for alleged violations of his constitutional freedom of speech rights." *Id.*

***119** 84. Similarly, in *Evans v. Cowan*, the Court of Appeals reversed a trial court that had dismissed a claim under Article I, § 14, on the erroneous ground that it was *res judicata* based on a prior dismissal of the plaintiff's claim under the federal First Amendment. 122 N.C. App. 181, 183-84, 468 S.E.2d 575, 577-78, *aff'd*, 477 S.E.2d 926 (N.C. 1996). While "both the North Carolina Constitution and the United States Constitution contain similar provisions proclaiming certain principles of liberty," North Carolina courts "are *not* bound by the opinions of the federal courts." *Id.* at 183-84, 468 S.E.2d at 577. "[A]n independent determination of plaintiff's constitutional rights under the state constitution [was] required, and the state courts reserve the right to grant relief under the state constitution in circumstances under which no relief might be granted under the federal constitution." *Id.* at 184, 468 S.E.2d at 577 (citation and internal quotations marks omitted); *see also McLaughlin v. Bailey*, 240 N.C. App. 159, 172, 771 S.E.2d 570, 579-80 (2015), *aff'd*, 781 S.E.2d 23 (N.C. 2016); *see also Lenzer v. Flaherty*, 106 N.C. App. 496, 418 S.E.2d 276 (1992).

85. In the context of partisan gerrymandering, it is especially important that North Carolina courts give independent force to North Carolina's constitutional protections. The United States Supreme Court recently held that federal courts applying the federal constitution have no power to adjudicate claims of partisan gerrymandering. *Rucho*, 139 S. Ct. 2484. That ruling does not mean that partisan gerrymandering complies with the constitution; it means that federal courts have no power to decide *whether* the practice complies with the constitution. "Having no other remedy," the North Carolina Constitution "guarantees [P]laintiff[s] a direct action under the State Constitution for alleged violations of [their] constitutional freedom of speech rights." *Corum*, 330 N.C. at 783, 413 S.E.2d at 290.

B. Voting, Banding Together in a Political Party, and Spending on Elections Are Protected Expression and Association

86. Voting for the candidate of one's choice and associating with the political party of one's choice are core means of political expression protected by the North Carolina Constitution's Freedom of Speech and Freedom of Assembly Clauses. The 2017 Plans burden that protected expression and thus are subject to scrutiny under those clauses.

87. Voting provides citizens a direct means of expressing support for a candidate and his views. *See Buckley v. Valeo*, 424 U.S. 1, 21, 96 S. Ct. 612, 635 (1976). Indeed, if donating money to a candidate constitutes a form of protected speech, then voting for that same candidate necessarily does as well. "There is no right more basic in our democracy than the right to participate in electing our political leaders"—including, of course, the right to "vote." *McCutcheon v. FEC*, 572 U.S. 185, 191, 134 S. Ct. 1434, 1440 (2014) (plurality op.). "[P]olitical belief and association constitute the core of those activities protected by the First Amendment." *Elrod v. Burns*, 427 U.S. 347, 356, 96 S. Ct. 2673, 2681 (1976).

88. Plaintiffs' expression is no less protected "merely because it involves the 'act'" of casting a ballot. *State v. Bishop*, 368 N.C. 869, 874, 787 S.E.2d 814, 818 (2016). "[M]uch speech requires an 'act' of some variety—whether putting ink to paper or paint to canvas, or hoisting a picket sign, or donning a message-bearing jacket." *Id.* Voting, like donating money to a candidate or signing a petition for a referendum, constitutes "expressive activity" that "express[es] [a] view" about the State's laws and policies. *Winborne v. Easley*, 136 N.C. App. 191, 198, 523 S.E.2d 149, 153 (1999); *Doe v. Reed*, 561 U.S. 186, 195, 130 S. Ct. 2811, 2817 (2010). Voting's expressive force is not diminished by the fact that it "is a legally operative legislative act." *Id.* at 195; *see also Nev. Comm'n on Ethics v. Carrigan*, 564 U.S. 117, 134, 131 S. Ct. 2343, 2355 (2011) (Alito, J., concurring) ("[T]he act of voting is not drained of its expressive content when the vote has a legal effect."). Having "cho[sen] to tap the energy and the legitimizing power of the democratic process," the government "must accord the participants in that process the First Amendment rights that attach to their roles." *Republican Party of Minn. v. White*, 536 U.S. 765, 788, 122 S. Ct. 2528, 2541 (2002) (quotation omitted). The ballots cast by Plaintiffs and other Democratic voters to elect candidates to the North Carolina General Assembly are protected by North Carolina's Freedom of Speech Clause.

***120** 89. Expression aside, the Freedom of Assembly Clause independently protects Plaintiffs' voting and their association with the Democratic Party. The Freedom of Assembly Clause—part of North Carolina's original 1776 Declaration of Rights—protects the right of the people "to assemble together to consult for their common good, to instruct their representatives, and to apply to the General Assembly for redress of grievances." N.C. Const. art. I, § 12; *see* N.C. Const. art. I, § 18 (1776). In North Carolina, the right to assembly encompasses the right of association. *Feltman v. City of Wilson*, 238 N.C. App. 246, 253, 767 S.E.2d 615, 620 (2014).

90. Just as voting is a form of protected expression, banding together with likeminded citizens in a political party is a form of protected association. "[C]itizens form parties to express their political beliefs and to assist others in casting votes in alignment with those beliefs." *Libertarian Party of N.C. v. State*, 365 N.C. 41, 49, 707 S.E.2d 199, 204-05 (2011). "[F]or elections to express the popular will, the right to assemble and consult for the common good must be guaranteed." John V. Orth, *The North Carolina State Constitution* 48 (1995).

91. A final form of relevant protected expression involves the expenditure of funds in support of candidates. It is now well-settled that "political contributions and expenditures" constitute "expressive activity" that are constitutionally protected. *Winborne*, 136 N.C. App. at 198, 523 S.E.2d at 153-54.

C. The 2017 Plans Burden Protected Expression and Association

92. The 2017 Plans are subject to strict scrutiny because they burden Plaintiffs' and Democratic voters' political expression and association.

1. The 2017 Plans Burden Protected Expression Based on Viewpoint by Making Democratic Votes Less Effective

93. It is "axiomatic" that the government may not infringe on protected activity based on the individual's viewpoint. *Rosenberger v. Rector & Visitors of Univ. of Va.*, 515 U.S. 819, 828, 115 S. Ct. 2510, 2516 (1995). "The government must abstain from regulating speech when the specific motivating ideology or the opinion or perspective of the speaker is the rationale for the restriction." *Id.* at 829, 115 S. Ct. at 2516. The guarantee of free expression "stands against attempts to disfavor certain subjects or viewpoints." *Citizens United v. FEC*, 558 U.S. 310, 340, 130 S. Ct. 876, 898 (2010).

94. Viewpoint discrimination is *most* insidious where the targeted speech is political. "[I]n the context of political speech, … [b]oth history and logic" demonstrate the perils of permitting the government to "identif[y] certain preferred speakers" while burdening the speech of "disfavored speakers." *Id.* at 340-41, 130 S. Ct. at 899. The government may not burden the "speech of some elements of our society in order to enhance the relative voice of others" in electing officials. *McCutcheon*, 572 U.S. at 207, 134 S. Ct. at 1450; *see also Winborne*, 136 N.C. App. at 198, 523 S.E.2d at 154 ("political speech" has "such a high status" that free speech protections have their "fullest and most urgent application" in this context (quotations marks omitted)).

95. Here, Legislative Defendants "identified[] certain preferred speakers" (Republican voters), while targeting certain "disfavored speakers" (Plaintiffs and other Democratic voters) for "disfavored treatment" because of disagreement with the views they express when they vote. *Citizens United*, 558 U.S. at 340-41, 130 S. Ct. at 899; *see Sorrell v. IMS Health Inc.*, 564 U.S. 552, 565, 131 S. Ct. 2653, 2663 (2011). Legislative Defendants analyzed the voting histories of every VTD in North Carolina, identified VTDs that favor Democratic candidates, and then singled out the voters in those VTDs for disfavored treatment by packing and cracking them into districts with the aim of diluting their votes and, in the case of cracked districts, ensuring that these voters are significantly less likely, in comparison to Republican voters, to be able to elect a candidate who shares their views.

***121** 96. The fact that Democratic voters can still cast ballots under gerrymandered maps changes nothing. The government unconstitutionally burdens speech where it renders disfavored speech *less effective*, even if it does not ban such speech outright.

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The government may not restrict a citizen's "ability to effectively exercise" their free speech rights. *Heritage Vill. Church & Missionary Fellowship, Inc. v. State*, 40 N.C. App. 429, 451, 253 S.E.2d 473, 486 (1979), *aff'd*, 299 N.C. 399, 263 S.E.2d 726 (1980). "It is thus no answer to say that petitioners can still be 'seen and heard'" if the burdens placed on their speech "have effectively stifled petitioners' message." *McCullen v. Coakley*, 573 U.S. 464, 489-90, 134 S. Ct. 2518, 2537 (2014).

97. In *McCullen*, for instance, the United States Supreme Court invalidated a law that imposed a buffer zone around abortion clinics because the law "compromise[d] [the] ability" of the plaintiffs to "initiate the close, personal conversations that they view as essential" to effectively communicate their message. 573 U.S. at 487, 134 S. Ct. at 2535. And in *Sorrell*, the United States Supreme Court invalidated on viewpoint discrimination grounds a state law that burdened drug manufacturers by denying them information that made their marketing more effective. 564 U.S. at 580, 131 S. Ct. at 2672. The Court stressed that "the distinction between laws burdening speech is but a matter of degree and the Government's content-based burdens must satisfy the same rigorous scrutiny as its content-based bans." *Id.* at 555-56, 131 S. Ct. at 2664 (quotation marks omitted).

98. These principles apply equally to burdens on political expression. In *Davis v. FEC*, the United States Supreme Court struck down a law that disfavored candidates who self-financed their campaigns. 554 U.S. 724, 128 S. Ct. 2759 (2008). The law in question did *not* limit how much money self-financing candidates could spend, but it still unconstitutionally "diminishe[d] the effectiveness of [their] speech." *Id.* at 736, 128 S. Ct. at 2770. The Court held the same in *Ariz. Free Enterprise Club's Freedom Club PAC v. Bennett*, where it invalidated a public-matching scheme because it rendered the money spent by privately financed candidates "less effective." 564 U.S. 721, 747, 131 S. Ct. 2806, 2824 (2011); *see also Randall v. Sorrell*, 548 U.S. 230, 248-49, 126 S. Ct. 2479, 2492 (2006) (invalidating limit on campaign donations that made such donations less "effective").

99. North Carolina courts have recognized "several paths" leading to the conclusion that laws burdening protected expression are impermissibly discriminatory and thus "subject to strict scrutiny." *State v. Bishop*, 368 N.C. 869, 875, 787 S.E.2d 814, 819 (2016). A finding of discrimination "can find support in the plain text of a statute, or the animating impulse behind it, or the lack of any plausible explanation besides distaste for the subject matter or message." *Id.* The 2017 Plans thus need not explicitly mention any particular viewpoint to be impermissibly discriminatory. *See, e.g.*, *Reed v. Town of Gilbert*, 135 S. Ct. 2218, 2227 (2015).

100. Here, all paths lead to the same conclusion: the 2017 Plans reflect viewpoint discrimination against Plaintiffs and other Democratic voters that render their protected political expression less effective.

101. Overwhelming, unrebutted evidence establishes that the 2017 Plans were laced with viewpoint-driven intent. Legislative Defendants directed Dr. Hofeller to assign voters to districts using "election data" reflecting the contents of their prior votes for Democratic or Republican candidates, and Dr. Hofeller abided, using a color-coded shading system to track voters based on their partisan preferences and voting histories. FOF § C. Within county groups, Dr. Hofeller placed Democratic voters in this district or that one based *solely* on their political views. If this direct evidence left any doubt, the expert testimony showed that the mapmaker crafted the plans with partisanship as the predominant (if not sole) focus. Dr. Cooper in particular illustrated the intentional packing and cracking of specific Democratic voters and communities. FOF § C.

***122** 102. This sorting of Plaintiffs and other Democratic voters based on disfavor for their political views has burdened their speech by making their votes less effective. Many Plaintiffs and other Democratic voters live in districts where their votes are guaranteed to be less effective—either because the districts are packed such that Democratic candidates will win by astronomical margins or because the Democratic voters are cracked into seats that are safely Republican. Plaintiff Derrick Miller testified that he is one such voter: with the Wilmington Notch having been placed in Senate District 8, it is "impossible for [he] and Democratic neighbors to elect a Democrat, a candidate of our choice." Tr. 205:13-15. Plaintiff Joshua Brown similarly testified that the mapmaker's placing High Point's Democrats into Senate District 26 "clearly dilutes the ability of Democrats to even attempt to run a fair race." Tr. 833:20-21.

103. By packing and cracking Democratic voters to make it harder for them to translate votes into legislative seats, the 2017 Plans "single[] out a subset of messages for disfavor based on the views expressed." *Matal v. Tam*, 137 S. Ct. 1744, 1766 (2017) (Kennedy, J., concurring). "This is the essence of viewpoint discrimination." *Id.*

104. Even were Legislative Defendants permitted to *consider* voters' political beliefs when drawing district maps, the 2017 Plans would still be unlawful. In arenas where the government is allowed (or even required) to consider the content or viewpoint of expression that it regulates, it is still forbidden from intentionally elevating one viewpoint over the other. In *Board of Education v. Pico*, for example, the Supreme Court recognized that, while local school boards "possess significant discretion to determine the content of their school libraries," their discretion may "not be exercised in a narrowly partisan or political manner." 457 U.S. 853, 870, 102 S. Ct. 2799, 2810 (1982). As the Court observed, "[i]f a Democratic school board, motivated by party affiliation, ordered the removal of all books written by or in favor of Republicans, few would doubt that the order violated the constitutional rights of the students denied access to those books." *Id.* at 870-71, 102 S. Ct. at 2810. So too here. Legislative Defendants did not simply look at partisan data to satisfy their curiosity. They drew the 2017 Plans in a way that deliberately minimized the effectiveness of the votes of citizens with whom they disagree.

2. The 2017 Plans Burden Plaintiffs' Ability to Associate

105. The 2017 Plans independently violate Article I, § 12 by burdening the ability of the NCDP, Common Cause, and Democratic voters to associate effectively.

106. The 2017 Plans severely burden—if not outright preclude—the ability of the NCDP, Common Cause, and Democratic voters "to instruct their representatives, and to apply to the General Assembly for redress of grievances." N.C. Const. art. I, § 12. Democratic voters who live in cracked districts have little to no ability to instruct their representatives or obtain redress from their representatives on issues important to those voters. FOF § E.3. And as a result of the gerrymanders, Democratic voters across the state, as well as the NCDP, will be unlikely to obtain redress from "the General Assembly" on important policy issues, because they will unlikely be able to obtain Democratic majorities in the General Assembly. *Id.* Common Cause likewise cannot instruct representatives or obtain redress on the issues central to its mission due to the gerrymanders. FOF § E.2. The 2017 Plans "burden[] the ability of like-minded people across the State to affiliate in a political party and carry out [their] activities and objects." *Gill*, 138 S. Ct. at 1939 (Kagan J., concurring).

107. The 2017 Plans separately violate NCDP's associational rights by "debilitat[ing] [the] party" and "weaken[ing] its ability to carry out its core functions and purposes." *Id.* Due to the unfair playing field created by the 2017 Plans, the NCDP "face[s] difficulties fundraising, registering voters, attracting volunteers, generating support from independents, and recruiting candidates to run for office." *Id.* at 1938; *see* FOF § E.1. And, even when overcoming these difficulties through extraordinary efforts, fundraising and enthusiasm, as was evidenced in the 2018 election cycle, the 2017 Plans nonetheless debilitate the NCDP and weaken its ability to translate its effort, funds and enthusiasm into a meaningful opportunity to gain majority control of the General Assembly. FOF § E.1.

3. The 2017 Plans Burden the NCDP's Expression Through Financial Support for Candidates

***123** 108. The 2017 Plans independently violate the NCDP's free expression and assembly rights under Article I, §§ 12 and 14 by burdening their campaign donations and expenditures. The NCDP must spend more money than it would need to under nonpartisan plans, both statewide and in individual races, and the money that the NCDP spends is less effective than it would be under nondiscriminatory maps. FOF § E.1. The NCDP's political opponent, the North Carolina Republican Party, faces no such burdens.

109. The operation of the 2017 Plans is analogous to the laws struck down in *Davis* and *Bennett* in this regard. Those laws did not preclude or limit any campaign expenditures, but were still held unconstitutional because they "diminishe[d] the effectiveness"

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of the expenditures of some candidates. *See Bennett*, 564 U.S. at 736, 131 S. Ct. at 2818 (quoting *Davis*, 554 U.S. at 736, 128 S. Ct. at 2770). The same is true here. The 2017 Plans create "a political hydra" that forces the NCDP to drain and divert resources across the State merely to avoid being relegated to a super-minority. *Id.* at 738.

D. The 2017 Plans Fail Strict Scrutiny—and Indeed Any Scrutiny

110. Because the 2017 Plans discriminate against Plaintiffs and other Democratic voters based on their protected expression and association, the burden shifts to the Legislative Defendants to establish that the 2017 Plans were narrowly tailored to achieve a compelling government interest. *See Petersilie*, 334 N.C. at 206, 432 S.E.2d at 853-54 (Mitchell, J., dissenting).

111. As noted above, COL § III.D., Legislative Defendants have offered no credible justification for their partisan discrimination. Nor could they have. Discriminating against citizens based on their political beliefs does not serve any legitimate government interest.

E. The 2017 Plans Impermissibly Retaliate Against Voters Based on Their Exercise of Protected Speech

112. The 2017 Plans violate the Freedom of Speech and Assembly Clauses for an independent reason. In addition to forbidding discrimination, those clauses also bar *retaliation* based on protected speech and expression. *See McLaughlin*, 240 N.C. App. at 172, 771 S.E.2d at 579-80. Courts carefully guard against retaliation by the party in power. *See Elrod*, 427 U.S. at 356, 96 S. Ct. at 2681; *Branti v. Finkel*, 445 U.S. 507, 100 S. Ct. 1287 (1980); *Rutan v. Republican Party of Ill.*, 497 U.S. 62, 110 S. Ct. 2729 (1990). When patronage or retaliation restrains citizens' freedoms of belief and association, it is "at war with the deeper traditions of democracy embodied in the First Amendment." *Elrod*, 427 U.S. at 357, 96 S. Ct. at 2682 (quotation marks omitted).

113. To establish a violation of the North Carolina Constitution under a retaliation theory, Plaintiffs must show, in addition to their engagement in protected expression or association, that (1) the 2017 Plans take adverse action against them, (2) the 2017 Plans were created with an intent to retaliate against their protected speech or conduct, and (3) the 2017 Plans would not have taken the adverse action but for that retaliatory intent. *See McLaughlin*, 240 N.C. App. at 172, 771 S.E.2d at 579-80. Plaintiffs proved all of these elements.

114. *First*, the 2017 Plans take adverse action against Plaintiffs. For the Individual Plaintiffs and the Organizational Plaintiffs' members, the plans dilute the weight of their votes. The enacted plans adversely affect the individual Plaintiffs' associational rights. In *relative* terms, Democratic voters under the 2017 Plans are far less able to succeed in electing candidates of their choice than they would be under plans that were not so carefully crafted to dilute their votes. And in *absolute* terms, Plaintiffs are significantly foreclosed from succeeding in electing preferred candidates or a Democratic majority.

***124** 115. *Second*, the Plans were clearly crafted with an *intent* to retaliate against Plaintiffs and other Democratic voters on the basis of their voting history. Again, Dr. Hofeller's files showed that when drafting the House and Senate maps he intentionally targeted Democratic voters based on their voting histories. Legislative Defendants cannot escape a finding of retaliatory intent by re-characterizing their actions as helping Republicans rather than hurting Democrats. In two-party elections, an intent to help one party necessarily implies an intent to hurt the other party. Nor does it matter that Legislative Defendants did not target specific individual voters. Plaintiffs were targeted for disfavored treatment because of a shared marker of political belief—their status as Democratic voters. That suffices. *See Miller v. Johnson*, 515 U.S. 900, 920, 115 S. Ct. 2475, 2490 (1995) (condemning State's targeting of areas with "dense majority-black populations").

116. *Third*, Legislative Defendants' impermissible partisan intent *caused* the burden on Plaintiffs' expression and association. The adverse effects described above would not have occurred if Legislative Defendants had not cracked and packed Democratic voters and thereby diluted their votes. In particular, Dr. Chen compared the districts in which the Individual Plaintiffs currently

reside under the enacted plans with districts in which they would have resided under each of his simulated plans. Many of the Individual Plaintiffs' actual districts are extreme partisan outliers when compared with their districts under the simulated plans.

117. For the foregoing reasons, the Court concludes that Plaintiffs have met their burden of showing, plainly and clearly without any reasonable doubt, that the enacted plans violate the North Carolina Constitution's guarantees of free speech and assembly under Article I, Sections 12 and 14 of the North Carolina Constitution.

V. PARTISAN GERRYMANDERING CLAIMS ARE JUSTICIABLE UNDER THE NORTH CAROLINA CONSTITUTION

118. In all but the most exceptional circumstances, North Carolina courts are duty-bound to say what the law of this State is and to adjudicate cases on the merits.

119. In cases brought under the North Carolina Constitution, "[i]t has long been understood that it is the duty of the courts to determine the meaning of the requirements of our Constitution." *Leandro v. State*, 346 N.C. 336, 345, 488 S.E.2d 249, 253 (1997). "When a government action is challenged as unconstitutional, the courts have a duty to determine whether that action exceeds constitutional limits." *Id.* "It is the duty of this Court to ascertain and declare the intent of the framers of the Constitution and to reject any act in conflict therewith." *Maready v. City of Winston-Salem*, 342 N.C. 708, 716, 467 S.E.2d 615, 620 (1996).

120. State courts' duty to decide constitutional cases applies with full force in the redistricting context. Although the North Carolina Constitution directs the General Assembly to revise and reapportion districts after each census, "[t]he people of North Carolina chose to place several explicit limitations upon the General Assembly's execution of the legislative reapportionment process," which state courts have not hesitated to enforce. *Stephenson*, 355 N.C. at 370, 562 S.E.2d at 389. North Carolina courts have adjudicated claims that redistricting plans violated the Whole County Provision, the mid-decade redistricting bar, the Equal Protection Clause, and other provisions of the North Carolina Constitution. *See Stephenson*, 355 N.C. at 376, 380-81, 562 S.E.2d at 392, 395; *State ex rel. Martin v. Preston*, 325 N.C. 438, 385 S.E.2d 473 (1989); *NAACP v. Lewis*, 18 CVS 2322 (N.C. Super. Ct. Nov. 2, 2018). "[W]ithin the context of … redistricting and reapportionment disputes, it is well within the power of the judiciary of [this] State to require valid reapportionment or to formulate a valid redistricting plan." *Stephenson*, 355 N.C. at 362, 562 S.E.2d at 384 (quotation marks omitted).

***125** 121. Courts of other states have decided constitutional challenges to redistricting plans, including partisan gerrymandering claims, on the merits. In adjudicating a recent partisan gerrymandering suit, the Pennsylvania Supreme Court held that "it is the duty of the Court, as a co-equal branch of government, to declare, when appropriate, certain acts unconstitutional." *League of Women Voters of Pa.*, 178 A.3d at 822. The Florida Supreme Court similarly held that "there can hardly be a more compelling interest than the public interest in ensuring that the Legislature does not engage in unconstitutional partisan political gerrymandering." *League of Women Voters of Fla. v. Detzner*, 172 So. 3d 363, 416 (Fla. 2015). And in another constitutional redistricting challenge, the Texas Supreme Court held that "[t]he judiciary … is both empowered and, when properly called upon, obliged to declare whether an apportionment statute enacted by the Legislature is valid." *Terrazas v. Ramirez*, 829 S.W.2d 712, 717 (Tex. 1991). "A judicial determination that an apportionment statute violates a constitutional provision is no more an encroachment on the prerogative of the Legislature than the same determination with respect to some other statute." *Id.*; *see also, e.g.*, *Johnson v. State*, 366 S.W.3d 11, 23 (Mo. 2012) (similar).

122. Indeed, state courts are particularly well-positioned to adjudicate redistricting disputes, as the public may "more readily accept state court intervention … than … federal intervention in matters of state government." *Brooks v. Hobbie*, 631 So. 2d 883, 890 (Ala. 1993). "The power of the judiciary of a State to require valid reapportionment or to formulate a valid redistricting plan has not only been recognized by th[e United States Supreme] Court but … has been specifically encouraged." *Scott v. Germano*, 381 U.S. 407, 409 (1965). In *Rucho*, the United States Supreme Court recently made clear that partisan gerrymandering claims are not "condemn[ed] … to echo in the void," because although the federal courthouse doors may be closed, "state constitutions can provide standards and guidance for state courts to apply." 139 S. Ct. at 2507.

123. If unconstitutional partisan gerrymandering is not checked and balanced by judicial oversight, legislators elected under one partisan gerrymander will enact new gerrymanders after each decennial census, entrenching themselves in power anew decade after decade. When the North Carolina Supreme Court first recognized the power to declare state statutes unconstitutional, it presciently noted that absent judicial review, members of the General Assembly could "render themselves the Legislators of the State for life, without any further election of the people." *Bayard v. Singleton*, 1 N.C. 5, 7 (1787). Those legislators could even "from thence transmit the dignity and authority of legislation down to their heirs male forever." *Id.* Extreme partisan gerrymandering reflects just such an effort by a legislative majority to permanently entrench themselves in power in perpetuity.

124. The fact that the process employed by the Legislative Defendant in crafting the 2017 Maps is a process that has been used in North Carolina for decades—albeit in less precise and granular detail—by Democrats and Republicans alike does render political gerrymandering nonjusticiable. Long standing, and even widespread historical practices do not immunize governmental action from constitutional scrutiny. *See e.g., Citizens United v. FEC*, 558 U.S. 310, 365 (2010); *Reynolds v. Sims*, 377 U.S. 533, 582 (1964) (holding that malapportionment of state legislative districts violates Equal Protection Clause, notwithstanding that malapportionment was widespread in the Nineteenth and early Twentieth Centuries.)

125. In rare instances, North Carolina courts have held that certain exceptional cases are non-justiciable because they present a "political question." "The political question doctrine controls, essentially, when a question becomes not justiciable because of the separation of powers provided by the Constitution." *Cooper v. Berger*, 370 N.C. 392, 407, 809 S.E.2d 98, 107 (2018) (quotation marks omitted; cleaned up). "The doctrine excludes from judicial review those controversies which revolve around policy choices and value determinations constitutionally committed for resolution to the legislative or executive branches of government." *Id.* at 408, 809 S.E.2d at 107 (quotation marks omitted; cleaned up). The "dominant considerations" in determining whether the political question doctrine applies are "the appropriateness under our system of government of attributing finality to the action of the political departments and also the lack of satisfactory criteria for a judicial determination." *Id.* (quotation marks omitted).

***126** 126. The Court concludes that partisan gerrymandering claims are justiciable under the North Carolina Constitution. Such claims fall within the broad, default category of constitutional cases the North Carolina courts are empowered and obliged to decide on the merits, and not within the narrow category of exceptional cases covered by the political question doctrine.

127. The Court concludes that partisan gerrymandering does not "involve a textually demonstrable constitutional commitment of the issue to a coordinate political department." *Bacon v. Lee*, 353 N.C. 696, 717, 549 S.E.2d 840, 854 (2001) (quotation marks omitted).

128. Although Article II, §§ 3 and 5, of the North Carolina Constitution direct the General Assembly to revise and reapportion state House and Senate districts after each decennial census, North Carolina courts often decide constitutional challenges to state redistricting plans. COL ¶ 125 (citing cases). These cases conclusively refute any notion that redistricting is "committed to the *sole* discretion of the General Assembly" without judicial review by the courts. *Cooper*, 370 N.C. at 409, 809 S.E.2d at 108 (emphasis added).

129. "[T]he General Assembly's authority pursuant to [Article II, §§ 3 and 5] is necessarily constrained by the limits placed upon that authority by other provisions." *Cooper*, 370 N.C. at 410, 809 S.E.2d at 109. The North Carolina Supreme Court has held that the State Constitution's Equal Protection Clause constrains the General Assembly's exercise of its redistricting authority pursuant to Article II, §§ 3 and 5. *Stephenson*, 355 N.C. at 376-82, 562 S.E.2d at 392-96. The people of North Carolina amended the Free Elections Clause to mandate that "all elections" not only "ought to be" but "*shall* be free." N.C. Const. art. I, § 10 (emphasis added). This change "ma[d]e [it] clear" that the Free Elections Clause is a "command[] and not mere[ly] [an] admonition" to proper conduct on the part of the government. *DuMont*, 304 N.C. at 639, 286 S.E.2d at 97 (quotation marks omitted). And the North Carolina Supreme Court has held that North Carolinians must have a judicial "remedy for the violation of plaintiff's constitutionally protected right of free speech." *Corum*, 330 N.C. at 784, 413 S.E.2d at 290.

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130. In North Carolina, cases presenting "a conflict between … competing constitutional provisions" involve proper "constitutional interpretation, … rather than a nonjusticiable political question arising from nothing more than a policy dispute." *Cooper*, 370 N.C. at 412, 809 S.E.2d at 110. The Court held in *Cooper* that a challenge to a statute creating a new State Board of Elections and Ethics Enforcement did not present a political question, because the General Assembly's authority over the functions and powers of administrative agencies was limited by the Governor's constitutional duty to "take care that the laws be faithfully executed." *Id.* at 417-18, 809 S.E.2d at 113-14. Similarly, in *News & Observer Publ'g Co. v. Easley*, the Court held that a suit seeking public records related to clemency applications was not a political question, because the Governor's power over clemency was limited by the General Assembly's power to enact laws "relative to the manner of applying for pardons." 182 N.C. App. 14, 16, 641 S.E.2d 698, 700 (2007). So too, partisan gerrymandering claims do not present a political question because the General Assembly's redistricting authority under Article II, §§ 3 and 5 is limited by the Equal Protection Clause, the Free Elections Clause, and the Freedom of Speech and Assembly Clauses. This Court's task is "to identify where the line should be drawn" between these provisions. *Id.* at 15-16, 641 S.E.2d at 700. "There can be no doubt that [the Court has] the power and the responsibility to do so." *Id.*

***127** 131. This case bears no resemblance to cases in which North Carolina courts have applied the political question doctrine. In *Bacon v. Lee*, for example, the North Carolina Supreme Court rejected a claim seeking a disinterested arbiter for a clemency application because the North Carolina Constitution "expressly commits the substance of the clemency power to the *sole discretion* of the Governor." 353 N.C. at 698, 717, 549 S.E.2d at 843, 854 (emphasis added). Similarly, in *Hoke Cnty. Bd. of Educ. v. State*, the Supreme Court rejected a challenge to a statute setting the proper age for children to attend public school because the Constitution placed "the determination of the proper age for school children … squarely … in the hands of the General Assembly." 358 N.C. 605, 639, 599 S.E.2d 365, 391 (2004). These cases centered on the appropriate exercise of authority under a single constitutional provision that was committed to the sole discretion of one of the political branches. Other cases cited by Legislative Defendants are similarly inapposite. *See* Leg. Defs.' Pre-Trial Brief at 17 (citing cases).

132. The Court also concludes that "satisfactory and manageable criteria [and] standards … exist" for adjudicating partisan gerrymandering claims under the North Carolina Constitution. *Hoke*, 358 N.C. at 639, 599 S.E.2d at 391. Plaintiffs have articulated satisfactory, manageable standards for each of their claims for relief.

133. The standard for Plaintiffs' claim under the Free Elections Clause is based on the venerable history of that clause, as well as the commonsense insight that elections are not "free" where the partisan will of the mapmaker predominates over the ascertainment of the fair and truthful will of the voters. COL § II. The Court concludes this standard is satisfactory and manageable.

134. The standard for Plaintiffs' claim under the Equal Protection Clause is based on the fundamental right to "substantially equal voting power" and to "vote on equal terms." *Stephenson*, 355 N.C. at 378-79, 562 S.E.2d at 393-94. The North Carolina Supreme Court has previously applied this long-recognized standard, including in redistricting cases. *See id.*; *Blankenship*, 363 N.C. at 522-24, 681 S.E.2d at 762-64; *Northampton Cnty.*, 326 N.C. at 747, 392 S.E.2d at 356. This standard is not only "manageable"—the North Carolina Supreme Court has already managed to apply it to resolve actual cases. The Court concludes that this standard is satisfactory and manageable.

135. The standards for Plaintiffs' claims under the Free Speech and Free Assembly Clauses are based on longstanding doctrine, which recognizes that (1) voting is an expressive and associative act, and (2) government actions that burden or discriminate against protected expression or association, are subject to strict scrutiny. COL § IV.B-D. Plaintiffs also rely on longstanding retaliation doctrine, which prohibits the government from taking adverse actions based on protected expression or association. COL § IV.E. North Carolina courts routinely apply these standards to numerous government actions and programs in various contexts. The Court concludes that these standards are satisfactory and manageable.

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136. Plaintiffs' claims are justiciable notwithstanding that they arise under broad constitutional provisions that require interpretation. Courts routinely interpret broad constitutional text, adopt legal standards to operationalize such text, and then apply those legal standards to adjudicate the constitutionality of statutes. That is exactly what the North Carolina Supreme Court did in *Stephenson*. There, the Court interpreted a broad constitutional requirement that "[n]o county shall be divided in the formation of a [district]," N.C. Const. art. II, §§ 3 and 5, to require a detailed, multi-step procedure for redistricting, 355 N.C. at 383-84, 562 S.E.2d at 396-97. In adopting this standard, the Court explained that it was "not permitted to construe the [Whole County Provision] mandate as now being in some fashion unmanageable." *Id.* at 382, 562 S.E.2d at 396. "Any attempt to do so," the Court explained, "would be an abrogation of the Court's duty to follow a reasonable, workable, and effective interpretation that maintains the people's express wishes." *Id.* So too here, it is the Court's responsibility to distill the Free Elections Clause, the Equal Protection Clause, and Free Speech and Free Assembly Clauses into a "reasonable, workable, and effective interpretation."

***128** 137. In *Stephenson*, the North Carolina Supreme Court also noted that "[p]rogress demands that government should be further refined in order to best respond to changing conditions." *Id.* (quotation marks omitted). Like the Whole County Provision, the constitutional provisions invoked by Plaintiffs in this case "provide the elasticity which ensures the responsive operation of government." *Id.* (quotation marks omitted). As the North Carolina Supreme Court asked rhetorically more than a century ago: "Is it true that we are living in a popular government, depending upon free and fair elections, and have a constitution that prohibits the legislature from authorizing a judge or a justice of the supreme court to investigate alleged irregularities of the election officers? If this were so, elections would become a farce, and free government a failure. But, fortunately for the people and the government, in our opinion, this is not true, and fair and honest elections are to prevail in this state." *McDonald*, 119 N.C. at 666, 26 S.E. at 134.

138. Legislative Defendants, joined by the Intervening Defendants, assert that this matter is not justiciable because when a claim, like they contend Plaintiffs' to be, is that a districting plan is "somehow harmful to democracy," there is "no way for the Court to address these concerns under a neutral, manageable standard." Leg. Defs.' and Int. Defs.' Proposed Findings of Fact and Conclusions of Law at para. 800. They further suggest that judicial review of political redistricting claims will amount to "freewheeling policymaking," *id.* at 803, and that "this court is not capable of controlling the exercise of power on the part of the General Assembly," *id*. at 806 (citing *Howell v. Howell,* 66 S.E. 571, 573 (N.C. 1911)).

139. However, this is not a case where this Court is called upon to answer whether partisan gerrymandering is harmful to democracy (although the United States Supreme Court has certainly suggested that partisan gerrymandering is indeed harmful to democracy. *See, Veith v. Jubelirer,* 541 U.S. 267, 292, 124 S. Ct. 1769, 1785 (plurality opinion); *id.* at 316, 124 S. Ct. at 1798 (Kennedy, J., concurring); *Ariz. State Legislature*, 135 S. Ct. at 2658.). Nor is it a case where this Court is called upon to engage in policy-making by comparing the enacted maps with others that might be "ideally fair" under some judicially-envisioned criteria. It is not a case that threatens the General Assembly's broad discretionary powers to create legislative districts, or threatens the General Assembly's consideration of political data for legitimate purposes when crafting such districts. Rather this is a case where the Court is called upon to take the Adopted Criteria that the General Assembly itself, in its sole discretion, established, and compare the resulting maps with those criteria to see "how far the State had gone off that track because of its politicians' effort to entrench themselves in office." *Rucho*, 139 S. Ct. at 2521 (Kagan, J., dissenting).

140. Allowing the General Assembly discretion to establish its own redistricting criteria and craft maps accordingly is what the North Carolina Constitution requires; systematically packing and cracking voters to the extent that their votes are subordinated and devalued for no legitimate governmental purpose, but rather the purposes of entrenching a political party in power, is what the North Carolina Constitution forbids. When the Court is presented with evidence of the scope and quality proffered by Plaintiffs that shows widespread and extreme partisan gerrymandering—multiple districts showing a greater partisan skew than any of 3,000 randomly generated maps (all with the State's political geography and districting criteria built in)—the standard is indeed clear and manageable. Such extreme partisan gerrymanders violate the fundamental constitutional rights of free elections, equal protection, speech, assembly and association. It is the Court's duty to say so.

***129** 141. The separation of powers—which is expressly guaranteed by the North Carolina Constitution, art. I, § 6, and which underlies the political question doctrine— underscores the Court's obligation to craft manageable judicial standards to adjudicate partisan gerrymandering claims. Each of the constitutional provisions invoked by Plaintiffs in this case appears in the Declaration of Rights in Article I of the North Carolina Constitution. And "[t]he civil rights guaranteed by the Declaration of Rights in Article I of our Constitution are individual and personal rights entitled to protection against state action." *Corum*, 330 N.C. at 782, 413 S.E.2d at 289. "The very purpose of the Declaration of Rights is to ensure that the violation of these rights is never permitted by anyone who might be invested under the Constitution with the powers of the State." *Id.* at 783, 413 S.E.2d at 290. And "[i]t is the state judiciary that has the responsibility to protect the state constitutional rights of the citizens." *Id.* Indeed, "this obligation to protect the fundamental rights of individuals is as old as the State." *Id.*

142. This Court is not bound by dicta from *Stephenson* that "[t]he General Assembly may consider partisan advantage and incumbency protection in the application of its discretionary redistricting decisions." 355 N.C. at 371, 562 S.E.2d at 390. To begin with, the Supreme Court in *Stephenson* stated that any such considerations "must" be "in conformity with the State Constitution." *Id.* In this case, Plaintiffs allege that partisan gerrymandering of the 2017 Plans violates provisions of the State Constitution, and there is an extensive trial record concerning those allegations. By contrast, *Stephenson* did not involve any partisan gerrymandering claim—let alone partisan gerrymandering claims under the constitutional provisions Plaintiffs invoke here—nor was there any record concerning partisan gerrymandering. The statements in *Stephenson* were "mere obiter dictum and [are] not binding on this Court or any other." *Taylor v. J.P. Stevens & Co.*, 300 N.C. 94, 100-01, 265 S.E.2d 144, 148 (1980). In a case with such important consequences, the Court will decide Plaintiffs' claims on the basis of the record and arguments presented by the parties here, rather than follow dicta from prior cases involving different claims and evidence.

143. In order to reject Defendants' invocation of the political question doctrine, this Court need not decide that the legal standards governing Plaintiffs' claims would apply in all future cases, including a hypothetical close case. This case is not close. The extreme, intentional, and systematic gerrymandering of the 2017 Plans runs far afoul of the legal standards set forth above, or any other conceivable legal standard that could govern Plaintiffs' constitutional claims. As Dr. Pegden testified, "[t]hese maps are so gerrymandered that no matter how you do the analysis, no matter who does the analysis, no matter which side is doing the analysis, you reach the same answer." Tr. 1400:18-21.

144. The Court concludes that partisan gerrymandering claims are justiciable under the North Carolina Constitution.

VI. ANY LACHES DEFENSE LACKS MERIT

145. To the extent Defendants contend that Plaintiffs' claims are barred by laches, that defense lacks merit. North Carolina courts have recognized that laches is inapplicable to continuing obligations. *See Malinak v. Malinak*, 242 N.C. App. 609, 612-13, 775 S.E.2d 915, 917 (2015). State and federal courts alike routinely refuse to apply laches in voting-rights and other constitutional cases seeking solely prospective relief. *E.g.*, *Sprague v. Casey*, 550 A.2d 184, 188-89 (Pa. 1988); *Garza v. Cnty. of Los Angeles*, 918 F.2d 763, 772 (9th Cir. 1990); *Am. Trucking Ass'ns, Inc. v. N.Y. State Thruway Auth.*, 199 F. Supp. 3d 855, 872 (S.D.N.Y. 2016), *vacated on other grounds*, 238 F. Supp. 3d 527 (S.D.N.Y. 2017); *Miller v. Bd. of Comm'rs of Miller Cnty.*, 45 F. Supp. 2d 1369, 1373 (M.D. Ga. 1998). Multiple federal courts have held that laches does not apply to partisan gerrymandering claims as a matter of law. *See League of Women Voters of Mich.*, 373 F. Supp. 3d at 909; *Ohio A. Philip Randolph Inst. v. Smith*, 335 F. Supp. 3d 988, 1001-02 (S.D. Ohio 2018).

***130** 146. Moreover, "laches is an affirmative defense which the pleading party bears the burden of proving." *Malinak*, 242 N.C. App. at 611, 775 S.E.2d at 916. Defendants presented no evidence at trial supporting laches.

147. Defendants offered no evidence of any "unreasonable" delay in filing this case. *Id.* at 612, 775 S.E.2d at 916. Plaintiffs commenced this case just fourteen months after the 2017 Plans were enacted.

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148. Even if there had been any delay, Defendants presented no evidence that it "worked to the[ir] disadvantage, injury or prejudice." *Id.* While Defendants have suggested that the time pressures of this case prevented their experts from conducting additional or more thorough analyses, any limitation on the time for Defendants' expert reports was not the result of any delay by Plaintiffs. Rather, any such limitation resulted from Defendants' own discovery misconduct in this case, which led the Court to extend the time for Plaintiffs' expert reports at the expense of the time for Defendants. *See* Order of Mar. 25, 2019. And the Court later granted Defendants a one-week extension to file their expert reports. Order of May 1, 2019.

VII. DEFENDANTS' FEDERAL DEFENSES LACK MERIT

149. Legislative Defendants and Intervenor Defendants raise a series of defenses under federal law, but none of these defenses has merit.

A. The *Covington* Remedial Order Does Not Bar Changes to the 2017 Plans

150. Legislative Defendants contend that the *Covington* court's remedial order in January 2018 precludes *any* changes being made to the current House and Senate plans. Legislative Defendants argue that the *Covington* remedial order contained an "express command that the 2017 plans be used in future elections," so as to purportedly immunize the 2017 Plans from any state-law challenge. Leg. Defs.' Pre-Trial Br. at 39.

151. Legislative Defendants made this same argument when they removed this case to federal court in December 2017, and the federal district court rejected it. The federal court held that the *Covington* remedial order "does not mandate the specific existing apportionment to the exclusion of no others." *Common Cause v. Lewis*, 358 F. Supp. 3d 505, 512 (E.D.N.C. 2019). That holding constitutes law-of-the-case, or at minimum is entitled to controlling deference.

152. In any event, the federal court's holding was clearly correct. In the very same remedial order that Legislative Defendants now cite, the *Covington* district court made clear that the 2017 Plans *could be* challenged on state-law grounds in state court. At Legislative Defendants' urging, the *Covington* court declined to address state-law objections that the *Covington* plaintiffs had raised to the 2017 Plans, because those objections involved "unsettled questions of state law." *Covington v. North Carolina*, 283 F. Supp. 3d 410, 428 (M.D.N.C. 2018). In declining to address such "unsettled question of state law," the *Covington* court expressly stated that its order was "without prejudice to Plaintiffs or other litigants asserting such arguments in separate proceedings, including in "state court." *Id.* at 447 n.9. The *Covington* court even noted that any "partisan gerrymandering objection" to the 2017 Plans "would demand development of significant new evidence and therefore [would] be more appropriately addressed in a separate proceeding." *Id.* at 427. These statements squarely refute Legislative Defendants' contention that the *Covington* remedial order precludes any changes to the 2017 Plans based on state-law violations that a state court may find.

***131** 153. The United States Supreme Court's holding on appeal from the *Covington* remedial order eliminates any doubt on this score. The Court held that "[t]he District Court's remedial authority was … limited to ensuring that the plaintiffs were relieved of the burden of voting in racially gerrymandered legislative districts." 138 S. Ct. 2548, 2554 (2018). The Court explained: "Once the District Court had ensured that the racial gerrymanders at issue in this case were remedied, its proper role in North Carolina's legislative districting process was at an end." *Id.* at 2555. The *Covington* district court thus had no authority to do anything other than ensure the curing of the prior racial gerrymandering. It did not and could not immunize the plans from future challenge.

154. The *Covington* remedial order does not preclude North Carolina courts from invalidating the 2017 Plans for violations of state law and ordering the creation of new plans.

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B. There Is No Conflict with Federal Civil Rights Laws

155. The Court also rejects Legislative Defendants' arguments that affording Plaintiffs relief on their claims would necessarily violate federal civil rights laws.

156. As described, Legislative Defendants introduced no evidence at trial to establish that any of the three *Gingles* factors, including the existence of legally sufficient racially polarized voting, is present in any area of the State or any particular districts. Legislative Defendants' failure to present any evidence to establish that the *Gingles* factors are met is "is fatal to [any] Section 2 defense" under the VRA. *Covington v. North Carolina*, 316 F.R.D. 117, 169 (M.D.N.C. 2016), *aff'd*, 137 S. Ct. 2211 (2017).

157. Indeed, Legislative Defendants affirmatively represented throughout the 2017 redistricting process that the third *Gingles* factor was *not* met. FOF § F.6. Legislative Defendants have presented no evidentiary basis for any change in that position. The Court concludes that Legislative Defendants have not established that the VRA justifies the current House or Senate districts or precludes granting Plaintiffs relief on their claims.

158. Legislative Defendants also have not established any defense under the Fourteenth or Fifteenth Amendment. Legislative Defendants argue that affording Plaintiffs relief would require intentionally lowering the BVAP in purported "crossover" districts below the level necessary to elect candidates of choice of African Americans, but Legislative Defendants again have advanced no evidence to substantiate this claim. They provided no evidence to establish any district qualifies as a "crossover district," or that remedying the partisan gerrymander in any district or grouping would require lowering the BVAP of any crossover district below the level necessary for African Americans to elect candidates of their choice.

159. Indeed, Legislative Defendants' own expert Dr. Lewis generated estimates of the minimum BVAP needed in certain county groupings for African-American-preferred candidate to win, and Dr. Chen demonstrated that his nonpartisan simulations produce districts within each such county grouping with BVAPs above Dr. Lewis's estimates. FOF § F.6.

160. Legislative Defendants' federal equal protection defense suffers from another fatal defect—it requires a showing of an intent to discriminate against African Americans. To establish a Fourteenth or Fifteenth Amendment violation, there must be "racially discriminatory intent," *Lee v. Va. State Bd. of Elections*, 843 F.3d 592, 603 (4th Cir. 2016), which in the redistricting context means "intentional vote dilution," *i.e.*, "invidiously minimizing or canceling out the voting potential of racial or ethnic minorities," *Abbott v. Perez*, 138 S. Ct. 2305, 2314 (2018) (quotation marks and alterations omitted).

***132** 161. The Court finds without difficulty that Plaintiffs have no intent to discriminate against racial minorities in seeking remedial plans to replace the current plans that violate state constitutional provisions. Further, Plaintiffs alone cannot adopt or approve remedial plans in this case. The remedial plans approved or adopted in this case, as ordered below, will not intentionally dilute the voting power of any North Carolina citizens.

C. Granting Relief Will Not Violate the Fundamental Right to Vote

162. Finally, Legislative Defendants contend that affording Plaintiffs relief in this case will violate the "fundamental right to vote" under the Fourteenth Amendment. Legislative Defendants cite no federal precedent for this purported defense, but in any event it lacks merit.

163. Granting Plaintiffs relief will promote, not violate, the fundamental right to vote of North Carolina citizens. Legislative Defendants' defense operates from the misapprehension that voting rights must be a zero-sum game, such that curing discrimination against one set of citizens necessarily requires discriminating against another set of citizens. The right that Plaintiffs seek to vindicate is the right to be free from intentional discrimination, and vindicating that right in no way requires or will result in discriminating against others.

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VIII. THE COURT WILL ENJOIN USE OF THE 2017 PLANS IN FUTURE ELECTIONS AND THE GENERAL ASSEMBLY IS TO IMMEDIATELY BEGIN THE PROCESS OF REDRAWING THE RELEVANT DISTRICTS

A. The Court Will Require the Redrawing of Specific County Groupings

164. For the reasons stated above, and as set forth in the decree below, the Court declares that there is no reasonable doubt the 2017 House and Senate Plans are unconstitutional under the North Carolina Constitution, and the Court enjoins their use in the 2020 primary and general elections. In particular, the Court enjoins use of the districts in the specific House and Senate county groupings as specified in the decree below.

165. The Court does not enjoin or order any relief with respect to the current House districts in Wake County. Shortly before the trial in this matter, those districts were redrawn pursuant to a separate litigation. *See NAACP v. Lewis*, No. 18 CVS 2322 (N.C. Super. Ct. Nov. 2, 2018); N.C. Sess. Laws 2019-46. Plaintiffs did not present evidence in this case regarding the new Wake County House districts and do not seek relief with respect to those districts.

166. The Court does not enjoin or order the redrawing of House Districts 57, 61, and 62 or Senate Districts 24 or 28, all of which were redrawn by the *Covington* Special Master. With respect to House District 59 and Senate District 27, for which small portions of the current districts were added by the Special Master in *Covington*, the Court will order that the remedial versions of these districts not alter any portions of these districts that were added by the Special Master, but any other portions of these districts may be redrawn. Neither House District 59 nor Senate District 27 were found by the *Covington* court to have been racially gerrymandered (under either the 2011 Plans or the 2017 Plans enacted by the General Assembly), and the *Covington* court did *not* direct the Special Master to redraw either of these districts. The Special Master nonetheless made small changes to these districts, principally to equalize population, in the course of constructing other districts he was tasked with redrawing. While this Court concludes that there is no legal impediment to redrawing any portion of House District 59 and Senate District 27, including the portions that the Special Master added, the Court nonetheless imposes the limitation set forth in this paragraph out of an abundance of caution.

B. The Court Will Require the Use of the Adopted Criteria, with certain exceptions, and Prohibit the Use of Other Criteria in Redrawing the Districts

***133** 167. As set forth in the Court's decree below, the Court will require that Remedial Maps for the House and Senate legislative district maps for the 2020 election (hereinafter "Remedial Maps") be drawn, and that the Remedial Maps comply with the criteria adopted by the General Assembly's House and Senate Redistricting Committees on August 10, 2017, with several exceptions.

168. First, with respect to "Incumbency Protection," the drafters of the Remedial Maps may take reasonable efforts to not pair incumbents unduly in the same election district. Because Representative David Lewis, Chair of the House Redistricting Committee, explained at the time of the adoption of the Adopted Criteria that the "Incumbency Protection" criteria was "simply saying that mapmakers may take reasonable efforts to not pair incumbents unduly," PX603 at 122:4-18; Tr. 1640:16-1641:12, and the criteria was understood as such, *see* PX606 at 9:24-10:1 (Sen. Hise: "The Committee adopted criteria pledging to make reasonable efforts not to double-bunk incumbents"), the Remedial Maps shall comply with this explanation and understanding.

169. Second, the "Election Data" criteria shall not be permitted in the drafting of the Remedial Maps. In other words, partisan considerations and election results data *shall not* be used in the drawing of legislative districts in the Remedial Maps. The Court likewise will prohibit any intentional attempt to favor voters or candidates of one political party.

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170. In redrawing the relevant districts in the Remedial Maps, the invalidated 2017 districts may not be used as a starting point for drawing new districts, and no effort may be made to preserve the cores of invalidated 2017 districts. *See Covington*, 283 F. Supp. 3d at 431-32 (holding that remedial plan could not seek to "preserve the 'cores' of unconstitutional districts").

171. Any Remedial Maps must comply with the VRA and other federal requirements concerning the racial composition of districts. The Court will afford all parties an opportunity to submit briefing, which may attach expert analysis, on whether the *Gingles* factors are met in particular counties and county groupings and/or the minimum BVAP needed in particular counties and county groupings for African-Americans to be able to elect candidates of their choice to the General Assembly. Any such submission by Legislative Defendants, however, is subject to two limitations set forth below.

a) First, if Legislative Defendants assert that the *Gingles* factors are met in any particular district or county grouping, they must not only provide evidentiary support for that assertion, but also must also show good cause why they did not compile such evidence during the 2017 redistricting process and must show good cause why they should not be held judicially estopped from arguing that the *Gingles* factors are met given their repeated representations to the *Covington* court in 2017 that the third *Gingles* factor was not met anywhere in the State.

b) Second, for districts in counties and county groupings for which Legislative Defendants' expert Dr. Lewis estimated the minimum BVAP needed for an African-American preferred candidate to prevail in a state legislative election, Legislative Defendants may not assert that the VRA or the United States Constitution requires or justifies making the BVAP of any such district higher than the minimum BVAP threshold estimated by Dr. Lewis in his Amended Table 4 (which was admitted into evidence at trial) for the relevant county or county grouping. PX773. For districts in counties and county groupings that Dr. Lewis did not analyze, Legislative Defendants may not assert that the VRA or the United States Constitution requires or justifies any minimum BVAP for the districts in that county or county grouping. The Court holds that Legislative Defendants are bound by the BVAP threshold-estimates generated by the expert they retained in this case and are estopped from departing from those estimates, which were relied upon by Plaintiffs' experts, at this late stage of the litigation.

***134** 172. The Court will afford the General Assembly two weeks from the date of this Order, namely through September 18, 2019, to enact Remedial Maps in conformity with this Order. *See* N.C.G.S. § 120-2.4.

173. The Court concludes that this two week period is consistent with N.C.G.S. § 120-2.4, which states that "in no event may a court impose its own substitute plan unless the court first gives the General Assembly a period of time to remedy any defects identified by the court in its findings of fact and conclusions of law. That period of time shall not be less than two weeks." Although § 120-2.4 goes on to state that a longer period of time might be required in some instances, that longer period, the Court concludes, is applicable only if the General Assembly is not currently in session. *See* N.C. Sess. Laws 2018-146, § 4.7. The Court notes that the General Assembly, as of the date of this Order, is in session.

174. The Court will require Legislative Defendants and their agents to conduct the entire remedial process in full public view. At a minimum, that would require all map drawing to occur at public hearings, with any relevant computer screen visible to legislators and public observers. Given what transpired in 2017, the Court will prohibit Legislative Defendants and their agents from undertaking any steps to draw or revise the new districts outside of public view.

175. If Legislative Defendants wish to retain one or more individuals who are not current legislative employees to assist in the map-drawing process, the Court will require Legislative Defendants to obtain approval from the Court to engage any such individuals.

176. Notwithstanding the General Assembly having the opportunity to draw Remedial Maps in the first instance, the Court will still immediately appoint a Referee to (1) assist the Court in reviewing any Remedial Maps enacted by the General Assembly; and (2) to develop remedial maps for the Court should the General Assembly fail to enact lawful Remedial Maps within the time allowed.

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C. The Court Will Not Stay the Remedial Process Pending Appeal

177. The Court orders that the remedial process commence immediately upon entry of this Order, and the Court will not grant a stay of the remedial process pending appeal.

178. The central inquiry in deciding whether to grant a stay of relief pending appeal is a balancing of the prejudice and risk of irreparable harm to the parties. *See 130 of Chatham, LLC v. Rutherford Elec. Mbrshp. Corp.*, 2014 WL 3809066, at *9 (N.C. Super. Ct. July 31, 2014).

179. Here, the balance of the equities weighs definitively against any stay. "[C]ourts evaluating redistricting challenges have generally denied motions for a stay pending appeal." *Harris v. McCrory*, 2016 WL 6920368, at *1 n.1 (M.D.N.C. Feb. 9, 2016) (citing cases and denying stay pending appeal). In such cases, a stay pending appeal could "risk that the State would not be able to implement" the remedial plans "in time for the [next] elections in the event that the [appellate courts] affirm[] this Court's judgment." *Covington*, 2018 WL 604732, at *6 (denying stay pending appeal). "The risk of harm is particularly acute where Plaintiffs and other North Carolina voters have already cast their ballots under unconstitutional district plans" in every election this decade. *Id.* The prejudice to Plaintiffs here would be magnified because the state legislators elected in 2020 will redraw the state House and Senate districts in 2021 following the Decennial Census, substantially compounding the effects of allowing the current unconstitutional plans to be used in the 2020 elections.

***135** 180. In contrast, Legislative Defendants will suffer little if any prejudice from refusing any stay pending appeal. If Legislative Defendants ultimately prevail in an appeal, then the current districts will remain in place for the 2020 elections, and there will be no tangible harm from having allowed the remedial process to move forward while the appeal was pending. On balance, the equities and the public interest counsel strongly against a stay.

D. The Court Retains Discretion to Move the Primary Dates

181. Finally, the Court holds that the remedial schedule and process that the Court has set forth in this Order should ensure that remedial plans will be in place sufficiently in advance of the current primary date of March 3, 2020. However, the Court retains authority and discretion to move the primary date for the General Assembly elections, or all of the State's 2020 primaries, including for offices other than the General Assembly, should doing so become necessary to provide effective relief in this case.

182. While the Court concludes that moving the 2020 primaries is not needed at this date, the Court may consider doing so if necessary to grant effective relief in this case.

DECREE

Having considered all of the evidence, the memoranda and arguments of counsel, and the record proper, the Court ORDERS the following:

1. The Court declares that the 2017 House and Senate Plans are unconstitutional and invalid because there is no reasonable doubt each plan violates the rights of Plaintiffs and other Democratic voters under the North Carolina Constitution's Equal Protection Clause, art. I, § 19; the Free Elections Clause, art. I, § 10; and the Freedom of Speech and Freedom of Assembly Clauses, art. I, §§ 12 & 14.

2. Legislative Defendants and State Defendants, and their respective agents, officers, and employees, are permanently enjoined from preparing for or administering the 2020 primary and general elections for House districts in the following House county groupings:

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a. Alamance

b. Anson-Union

c. Brunswick-New Hanover

d. Buncombe

e. Cabarrus-Davie-Montgomery-Richmond-Rowan-Stanly (except that House District 66 shall not be redrawn)

f. Cleveland-Gaston

g. Columbus-Pender-Robeson h. Cumberland

i. Duplin-Onslow

j. Franklin-Nash

k. Forsyth-Yadkin

l. Guilford (except that House Districts 57, 61, and 62 shall not be redrawn, and any portions of House District 59 added by the *Covington* Special Master shall not be altered)

m. Lenoir-Pitt

n. Mecklenburg

3. Legislative Defendants and State Defendants, and their respective agents, officers, and employees, are permanently enjoined from preparing for or administering the 2020 primary and general elections for Senate districts in the following Senate county groupings:

a) Alamance-Guilford-Randolph (except that Senate Districts 24 and 28 shall not be redrawn, and any portions of Senate District 27 added by the *Covington* Special Master shall not be altered)

b) Bladen-Brunswick-New Hanover-Pender

c) Buncombe-Henderson-Transylvania

d) Davie-Forsyth

e) Duplin-Harnett-Johnston-Lee-Nash-Sampson

f) Franklin-Wake

g) Mecklenburg

4. The Court will afford the General Assembly two weeks from the date of this Order, namely through September 18, 2019, to enact Remedial Maps for the House and Senate legislative districts for the 2020 election (hereinafter "Remedial Maps") in conformity with this Order.

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5. Except as otherwise noted in this Order, the following criteria shall exclusively govern the redrawing of districts in the House and Senate county groupings set forth above:

***136** a. *Equal Population*. The mapmakers shall use the 2010 federal decennial census data as the sole basis of population for drawing legislative districts in the Remedial Maps. The number of persons in each legislative district shall comply with the +/- 5 percent population deviation standard established by *Stephenson v. Bartlett*, 355 N.C. 354, 562 S.E. 2d 377 (2002).

b. *Contiguity*. Legislative districts shall be comprised of contiguous territory. Contiguity by water is sufficient.

c. *County Groupings and Traversals*. The mapmakers shall draw legislative districts in the Remedial Maps within county groupings as required by *Stephenson v. Bartlett*, 355 N.C. 354, 562 S.E. 2d 377 (2002) (*Stephenson I*), *Stephenson v. Bartlett*, 357 N.C. 301, 582 S.E.2d 247 (2003) (*Stephenson II*), *Dickson v. Rucho*, 367 N.C. 542, 766 S.E.2d 238 (2014) (*Dickson I*) and *Dickson v. Rucho*, 368 N.C. 481, 781 S.E.2d 460 (2015) (*Dickson II*). Within county groupings, county lines shall not be traversed except as authorized by *Stephenson I*, *Stephenson II*, *Dickson I*, and *Dickson II*. The county groupings utilized in the 2017 House and Senate Maps shall be utilized in the Remedial Maps.

d. *Compactness*. The mapmakers shall make reasonable efforts to draw legislative districts in the Remedial Maps that improve the compactness of the districts when compared to districts in place prior to the 2017 Enacted Legislative Maps. In doing so, the mapmaker may use as a guide the minimum Reock ("dispersion") and Polsby-Popper ("perimeter") scores identified by Richard H. Pildes and Richard G. Neimi in *Expressive Harms, "Bizarre Districts," and Voting Rights: Evaluating Election-District Appearances After Shaw v. Reno*, 92 Mich. L. Rev. 483 (1993).

e. *Fewer Split Precincts*. The mapmakers shall make reasonable efforts to draw legislative districts in the Remedial Maps that split fewer precincts when compared to districts in place prior to the 2017 Enacted Legislative Maps.

f. *Municipal Boundaries*. The mapmakers may consider municipal boundaries when drawing legislative districts in the Remedial Maps.

g. *Incumbency Protection*. The mapmakers may take reasonable efforts to not pair incumbents unduly in the same election district.

h. *Election Data*. Partisan considerations and election results data *shall not* be used in the drawing of legislative districts in the Remedial Maps.

6. In redrawing the relevant districts in the Remedial Maps, the invalidated 2017 districts may not be used as a starting point for drawing new districts, and no effort may be made to preserve the cores of invalidated 2017 districts.

7. Any Remedial Maps must comply with the VRA and other federal requirements concerning the racial composition of districts. Within 14 days of this Order, all parties may submit briefing, which may attach expert analysis, on whether the *Gingles* factors are met in particular counties and county groupings and/or the minimum BVAP needed in particular counties and county groupings for African Americans to be able to elect candidates of their choice to the General Assembly. Any such submission by Legislative Defendants is subject to the limitations set forth in subparagraphs (a) and (b) immediately below.

a) If Legislative Defendants assert that the *Gingles* factors are met in any counties or county groupings, they shall not only provide evidentiary support for that assertion, but shall also show good cause why they did not compile such evidence during the 2017 redistricting process and shall show good cause why they should not be held judicially estopped from

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arguing that the *Gingles* factors are met given their repeated representations to the *Covington* court in 2017 that the third *Gingles* factor was not met anywhere in the State.

***137** b) For districts in counties and county groupings for which Legislative Defendants' expert Dr. Lewis estimated the minimum BVAP needed for an African-American preferred candidate to prevail in a state legislative election, Legislative Defendants shall not assert that the VRA or the United States Constitution requires or justifies making the BVAP of any such district higher than the minimum BVAP threshold estimated by Dr. Lewis in his Amended Table 4 (PX773) for the relevant county or county grouping. For districts in counties and county groupings that Dr. Lewis did not analyze, Legislative Defendants shall not assert that the VRA or the United States Constitution requires or justifies any minimum BVAP for the districts in that county or county grouping.

8. Legislative Defendants and their agents shall conduct the entire remedial process in full public view. At a minimum, this requires all map drawing to occur at public hearings, with any relevant computer screen visible to legislators and public observers. Legislative Defendants and their agents shall not undertake any steps to draw or revise the new districts outside of public view.

9. To the extent that Legislative Defendants wish to retain one or more individuals who are not current legislative employees to assist in the map-drawing process, Legislative Defendants must seek and obtain prior approval from the Court to engage any such individuals.

10. Notwithstanding the General Assembly having the opportunity to draw Remedial Plans in the first instance, the Court, by subsequent Court Order, shall promptly appoint a Referee to (1) assist the Court in reviewing any Remedial Maps enacted by the General Assembly; and (2) to develop remedial maps for the Court should the General Assembly fail to enact lawful Remedial Maps within the time allowed.

14. No later than September 6, 2019, the parties may submit to the Court names and qualifications of suggested referees. The Court will thereafter appoint a referee by subsequent Court Order.

15. The Court orders that the remedial process will commence immediately upon entry of this Order.

17. The Court, on its own motion, denies a stay of the remedial process pending appeal.

18. The Court retains jurisdiction to move the primary date for the General Assembly elections, or all of the State's 2020 primaries, including for offices other than the General Assembly, should doing so become necessary to provide effective relief in this case.

SO ORDERED, this the 3rd day of September, 2019.

/s/ Paul C. Ridgeway

Paul C. Ridgeway, Superior Court Judge

/s/ Joseph N. Crosswhite

Joseph N. Crosswhite, Superior Court Judge

/s/ Alma L. Hinton

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Alma L. Hinton, Superior Court Judge

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