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.