EXHIBIT 2
TO COMMON CAUSE OBJECTIONS
(Mattingly Addendum)

Remedial Addendum on the House Districts

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1 Introduction

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

2 Analysis of House Plan H980

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

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

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

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

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

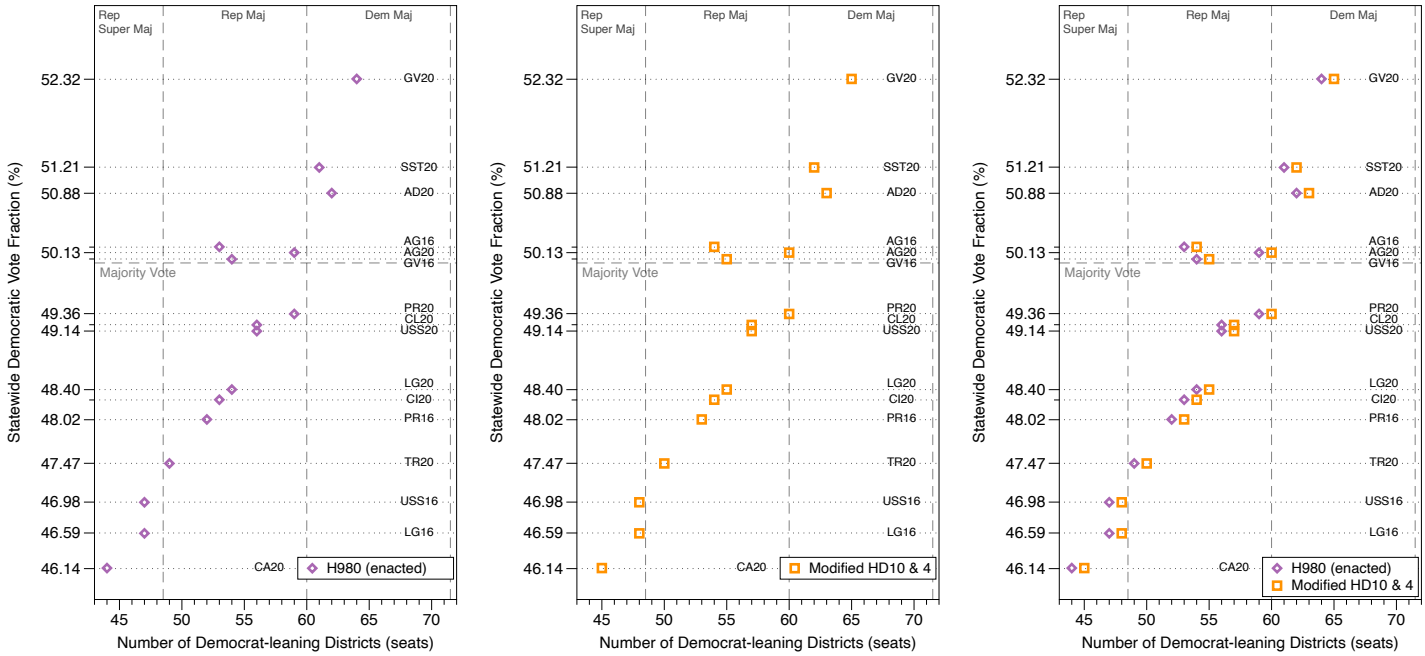

Figure 1: We show the number of seats (horizontal axis) compared with the statewide vote (vertical axis) in our 16 historic elections under the enacted map (left), the Ketchie modification (middle), and then directly compare them in the same plot (right).

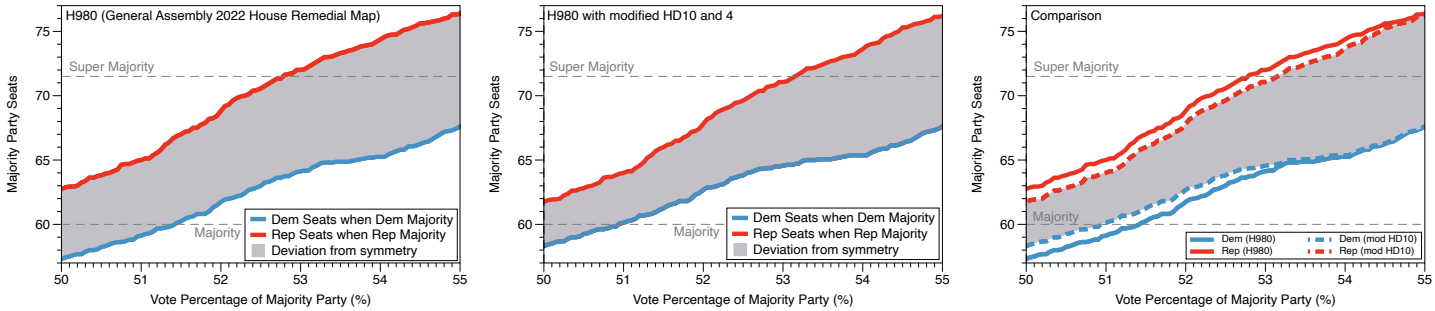

Figure 2: We show the statewide vote of the majority of the vote (horizontal axis) compared with the statewide won seats by the majority party (vertical axis) in our 16 historic elections under the enacted map (H980; left), and the modified plan (middle). We compare the difference in the deviation (right).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

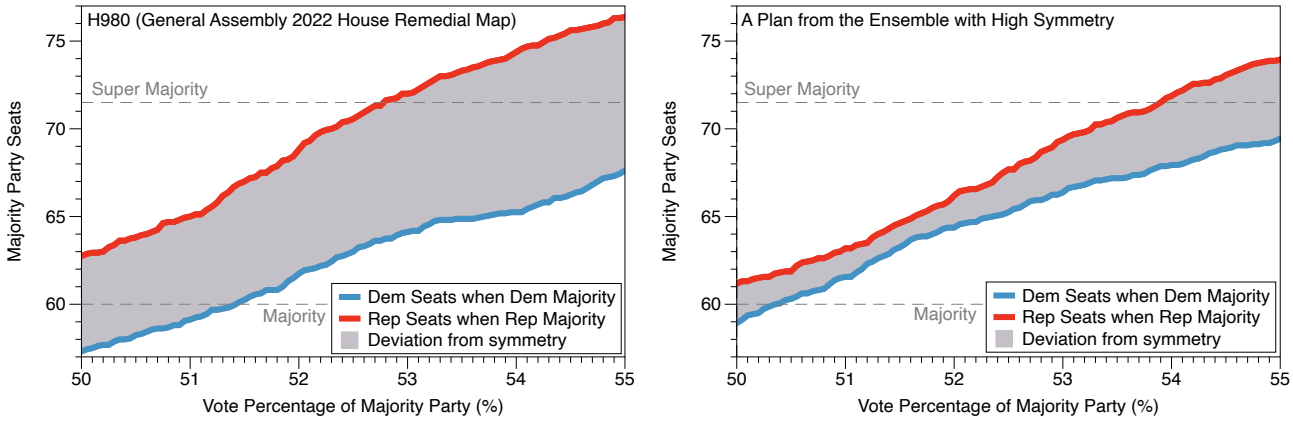

Figure 3: We show the statewide vote of the majority of the vote (horizontal axis) compared with the statewide won seats by the majority party (vertical axis) in our 16 historic elections under the enacted map (H980; left), and a plan from our ensemble that has high partisan symmetry deviation of (deviation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

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

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

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

Greg Herschlag 2/21/2022

Jonathan Mattingly, 2/21/2022