IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF GEORGIA
ATLANTA DIVISION

GEORGIA STATE CONFERENCE
OF THE NAACP, et al.,
Plaintiffs,

v. CASE NO. 1:21-CV-5338-ELB-SCJ-SDG

STATE OF GEORGIA, et al.,
Defendants.

_____

COMMON CAUSE, et al.,

Plaintiffs,

v. CASE NO. 1:22-CV-00090-ELB-SCJ-SDG

BRAD RAFFENSPERGER,

Defendant.

VIDEO DEPOSITION OF JOHN B. MORGAN
March 14, 2023
9:32 a.m.
Taylor English Duma
1600 Parkwood Circle SE
Suite 200
Atlanta, Georgia
Valerie N. Almand, RPR, CRR, CRC
David Ramirez, Legal Video Specialist

INDEX OF EXHIBITS

PLAINTIFFS;

EXHIBIT	DESCRIPTION	PAGE
Exhibit 1	Expert Report of John B. Morgan, signed 12/05/2022 (Opening Report)	11
Exhibit 2	Expert Report of John B. Morgan, signed 2/15/2023 (Rebuttal Report)	11
Exhibit 3	Expert Report of Dr. Moon Duchin, dated 1/13/2022 (Opening Report)	11
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Also Present: Patrick Hanson, SPLC extern
Andrew Stahl, Dechert LLP

Legal Video Specialist: David Ramirez

THE VIDEOGRAPHER: We are on the record, and the time is approximately 9:32 a.m. This is the beginning of the videotaped deposition for John Morgan.

Would counsel present please identify themselves and who they represent for the record.

MR. ROSENBERG: Ezra Rosenberg for the Lawyers' Committee for Civil Rights Under Law representing the plaintiffs in the Georgia NAACP case.

MR. TYSON: And I'm Bryan Tyson on behalf of the defendants in the Common Cause in Georgia and NAACP cases.

MR. DAVIS: Alex Davis, Lawyers' Committee for Civil Rights on behalf of the NAACP plaintiff group.

MR. CANTER: Jacob Canter, Crowell & Moring, on behalf of the NAACP plaintiffs.

MR. GENBERG: Jack Genberg from the Southern Poverty Law Center on behalf of the Common Cause plaintiffs.

THE VIDEOGRAPHER: Looks like an Andrew Stahl joined. Can you introduce yourself.

MR. STAHL: Hi, Andrew Stahl, law clerk at Dechert LLP, for the Common Cause plaintiffs.

THE VIDEOGRAPHER: Thank you, Counsel.
Will the court reporter please swear in the witness.
JOHN B. MORGAN, Esquire
being duly sworn, was examined and testified as follows:
EXAMINATION
BY MR. ROSENBERG:
Q. Good morning, Mr. Morgan. I'm Ezra Rosenberg. I represent the plaintiffs in the Georgia NAACP suit. And as you know, we're here to take your deposition in connection with that case and in connection with the Common Cause case. Are you aware of that?
A. Yes, that's my understanding.
Q. And I know you've been deposed before, so I'm not going to go through all of the instructions. It's a little different than the usual deposition because this is on Zoom. But nevertheless, it's important for you to answer questions I pose orally. Shrugs of the shoulder and nods of the head, while the Zoom camera might pick it up, the court stenographer cannot. So please answer orally. Do you understand that?
A. Yes.

Q. And if you have any question as to my questions, and if you want to make them clearer, please tell me and I will try to do so, okay?

A. Okay.

Q. Also, this is not meant to be an endurance test other than for me and Mr. Tyson. So if there's anytime that you want to take a break, so long as there's no question on the table, let me know and we'll accommodate you, okay?

A. Okay.

Q. Is there any reason, medically or in terms of any medicines you might be taking, that you can't testify today fully and accurately?

A. None that I'm aware of.

Q. Great, thanks. Mr. Morgan, could you tell me what you did to prepare for today's deposition?

A. I reviewed my reports. I reviewed Dr. Duchin's rebuttal report, and I met with Mr. Tyson yesterday.

Q. And how long did you meet with Mr. Tyson?

A. About three -- three and a half hours.

Q. And other than your -- when you said your report, do you mean your opening report or your

rebuttal report or both?
A. Both.
Q. And you said you reviewed Dr. Duchin's rebuttal report. Does that mean that you did not review her opening report?
A. Not yesterday.
Q. When was the last time you reviewed Dr. Duchin's opening report?
A. In February, I think.
Q. Do -- are you familiar with Dr. Duchin, I assume?
A. Yes. I've met her before.
Q. Do you consider her an expert in her field?
A. I believe so.
Q. Have you read any of her other reports in other cases other than in this case?
A. No.
Q. Have you read any of her published articles?
A. No.
Q. Have you ever reviewed the complaints in this case?
A. Not directly, no.
Q. When you say "not directly," what does

that mean?

A. I have not read the complaints. I have some understanding of what's in the complaints.

Q. What is your understanding of what's in the complaints?

MR. TYSON: And I'll just object to the extent that calls for privileged conversations. If you have a non-privileged understanding, you can answer. And Ezra, I guess I should have asked earlier. Are you going to reserve objections except as to form and responsiveness?

MR. ROSENBERG: Agreed.

MR. TYSON: Okay. Sorry, you can answer, John, if you can.

A. Well, what I'd say is there's been several cases here. And in this specific case, I'm probably not as aware as I am about the other cases.

BY MR. ROSENBERG:

Q. And when you say "this specific case," are you talking about the Georgia NAACP case and the Common Cause case or just the Georgia NAACP case?

A. I'm not -- I don't have an understanding of what the differences are between them.

Q. And to the extent you have an understanding of what is involved in this case, what is that understanding?

A. Well, I just said that I don't think I have a distinction between them. It -- I think that this case may be about creating additional minority districts but not necessarily majority-minority districts.

Q. Any other understanding you have about the case?

A. As of right now, that probably covers it for the moment.

Q. Have you ever discussed this case with anyone other than counsel?

A. No.

Q. Have you ever discussed this -- do you know who Dr. Alfred is?

A. I understand he's an expert in this case.

Q. Have you read his report in this case?

A. No.

Q. Have you ever talked with Dr. Alfred about this case?

A. No.

Q. Have you read any depositions that have been taken in this case?

A. No.
Q. Have you read any depositions that had been taken in the Grant case?
A. I have not read any depositions taken in the Grant case.
Q. Any depositions -- have you read any depositions that were taken in the Pendergrass case?
A. No.
Q. Let's -- and Alex, maybe you forgot to help me out. To speed things up, we've pre-marked your reports and Dr. Duchin's reports. And let's get them identified for the record, if we can.
MR. DAVIS: So for the record, in the marked exhibits folder, marked Exhibit 1 is Mr. Morgan's opening report; marked Exhibit 2 is Mr. Morgan's rebuttal report. Marked Exhibit 3, this is Dr. Duchin's opening report, and marked Exhibit 4 is Dr. Duchin's rebuttal report.
(Plaintiffs' Exhibit 1, Plaintiffs' Exhibit 2, Plaintiffs' Exhibit 3, and Plaintiffs' Exhibit 4 marked)
BY MR. ROSENBERG:
Q. Mr. Morgan, do you have those four reports in front of you?

MR. TYSON: So we have, Ezra, his opening report, rebuttal report, Dr. Duchin's rebuttal report. Her primary report is on the printer, but I -- we see it in the marked exhibit folder and can refer to it there, if needed. I'll grab it off the printer at a break.

MR. ROSENBERG: Okay. Can -- would you agree that -- and if you want to wait, Brian, till we get the printed version of Dr. Duchin's first report -- but will you stipulate that the reports that have been marked as exhibits are accurate copies of the reports that have been served in this matter?

MR. TYSON: Yes, we'll stipulate to that.

MR. ROSENBERG: Thank you.

THE WITNESS: And for my part of this, I just want to confirm. The reports I have in front of me that are printed do not have the appendices.

MR. TYSON: The exhibits, yes.

MR. ROSENBERG: Understood. Thank you for clarifying that.

BY MR. ROSENBERG:

Q. Mr. Morgan, are all of the opinions that you intend to give at trial in this case -- and when I say "this case," I mean both the Georgia

NAACP case and the Common Cause case -- contained in your two reports?

A. I believe so.

Q. Thank you. Are there any changes or corrections or modifications that you wish to make in either your opening report, which is Exhibit 1, or your rebuttal report, which is Exhibit 2?

A. Not at this time.

Q. Have you undertaken any analyses of any issues relevant to this case -- and again, from now on, whenever I say "this case," I mean both the Georgia NAACP case and the Common Cause case -- that you've not included in any report?

MR. TYSON: Object to form.

A. I'm not sure I understand what you're asking.

BY MR. ROSENBERG:

Q. Have you started any analysis on any issue related to this case that is not included in any report?

A. I guess I'd say that I've loaded the plans that are referenced in Dr. Duchin's initial report into my redistricting software. In my report, I detailed the reports that I ran and some analyses that I performed and those are in the

written report and the appendices. However, I do still have those plans in my computer system, and I haven't -- I haven't recorded any observations other than what's in my written report and the appendices.

Q. Thank you. Mr. Morgan, are you familiar with the Supreme Court opinion in Thornburg v. Gingles also?

A. I'm aware -- I believe it was from the early eighties, maybe 1982.

Q. Do you have an awareness of -- or what the -- that case was about?

A. Generally, I believe it has to do with the creation of majority/minority districts.

Q. Have you ever read that opinion?

A. I think I have at one time read portions of it.

Q. How long ago was that?

A. That may have been up to 20 years ago.

Q. Do you have any understanding whether that case has any bearing on the opinions you intend to give in this case?

MR. TYSON: I'll object to the form.

A. I'm not sure I understand, the opinion itself have any bearing on my opinions?

BY MR. ROSENBERG:
Q. Whether the discussions in that case have any bearing on your opinions here?
A. I don't know.
Q. Are you aware of what are called the Gingles preconditions?
A. Yes.
Q. What's your understanding of the Gingles preconditions?
MR. TYSON: Object to form.
A. I haven't seen them listed directly, but I understand that there is a series of questions that are raised in this kind of discussion.
BY MR. ROSENBERG:
Q. When you say "this kind of discussion," what do you mean?
A. Well, you had mentioned the Gingles preconditions. So if we're talking about those, that there's a series of questions that are related to those preconditions.
Q. Can you -- do you know what any of those preconditions are?
A. Not off the top of my head.
Q. If I had told you that there are three Gingles preconditions, do you have a basis to

disagree with me?

A. No. I would assume that if there are three you would say that there are three.

Q. Thank you. If I said the first precondition is to show that the racial or language-minority group is sufficiently large and geographically compact to constitute a majority in a single-member district, does that sound right to you?

A. Generally, that sounds correct.

Q. Have you yourself ever undertaken an analysis in any case to show whether or not a racial or language-minority group is sufficiently large and geographically compact to constitute a majority in a single-member district?

MR. TYSON: Object to form.

A. I don't know that I've done what you might describe as an analysis. I know that I've drawn districts that could be said to satisfy that criteria.

BY MR. ROSENBERG:

Q. And where did you do that?

A. I'm thinking particularly about Indiana.

Q. Did you say -- Indiana, did you say?

A. Yes.

Q. And when was that?
A. This would have been in the 1991 redistricting.
Q. And did you, in fact, draw the majority/minority districts that you believe were sufficiently large and geographically compact to constitute a majority in a single-member district in Indiana?
A. In this context, I'm thinking about a district for the statehouse in Fort Wayne, Indiana, yes.
Q. Any other instances where you drew a map that showed that a racial or language-minority group was sufficiently large and geographically compact so as to constitute a majority in a single-member district?
MR. TYSON: Object to form.
A. If I understand your question, I don't know that I would say that it was part of an analysis. I would say, in the practice of drawing maps, I have drawn districts in which the minority communities constituted a majority of a single-member district.
BY MR. ROSENBERG:
Q. In this case, do you understand that

Dr. Duchin's report of January 13th, which has been marked as Exhibit 3 here, addressed the issue of whether or not black and/or Hispanic groups were sufficiently large and geographically compact to constitute a majority in several single-member districts in Georgia's congressional district map and the senate district map and the house district map?

MR. TYSON: Object to form.

A. I'm looking at the table of contents, and it does reference the demographics of Georgia and Gingles demonstration plan, so it appears that the report does contain that information.

BY MR. ROSENBERG:

Q. Do you understand that Dr. Duchin's congressional district Alt 1 map creates four black-majority districts, each of which is comprised of a black voting-age population that is sufficiently large and geographically compact to constitute a majority in a reasonably configured congressional district?

MR. TYSON: I'll object to form. Ezra, do you want me to turn to a page in the report to have him look at that?

MR. ROSENBERG: Sure. What -- you know,

I can make it easier. Let me direct your attention to page 25 of exhibit -- do you have the exhibit now, from Brian, in front of the witness?

MR. TYSON: Yes. We're looking at Exhibit 3 --

MR. ROSENBERG: Dr. Duchin's report, Exhibit 3.

MR. TYSON: -- and this is page 25. And just for reference, Mr. Morgan, I believe is also referencing his rebuttal report, which is Exhibit 2, but I guess -- no, you're not, okay.

THE WITNESS: Yeah. I am referencing that. I'm just trying to clarify if the CD-Alt 1 is the same as the CD January 11, or is that a different map?

BY MR. ROSENBERG:

Q. We're looking at page 25, CD-Alt 1, under Section 7.1 of Exhibit 3.

A. Okay, I see that.

Q. Do you agree that there Dr. Duchin sets forth four black-majority districts? Do you see under black VAP in the chart?

A. Okay. So if I read that correctly, there are four districts that are above 50 percent, District 3, 4, 5 and 13.

Q. And do you see, under the black-Hispanic VAP, she says four to six districts? Do you see that, that are 50 percent or more?

A. With the combination of what, exactly?

Q. Black and Hispanic voting-age population.

A. Is that non-Hispanic, black and Hispanic?

Q. That is black and Hispanic.

A. Is the black metric non-Hispanic-black --

Q. The black is --

A. -- or any part black?

Q. There is no duplication between the black population and the Hispanic population.

A. Okay. I see those numbers in the chart.

Q. Do you agree that those -- let's -- we can start with the black VAP districts -- meet the first Gingles threshold?

MR. TYSON: Object to form.

A. I don't know that I can say that. I can see that they are majority black voting-age population.

BY MR. ROSENBERG:

Q. Do you dispute that any of the congressional black-majority districts created in Dr. Duchin's CD-Alt 1 plan meet the first Gingles threshold?

MR. TYSON: I'll object to form. It calls for a legal conclusion.

A. I don't know that I have a way to answer that.

BY MR. ROSENBERG:

Q. Meaning that you don't have a basis to dispute it sitting here today?

MR. TYSON: Object to form.

A. I don't have a basis to dispute it or confirm it.

BY MR. ROSENBERG:

Q. Do you agree that each of the four black-majority districts created by Dr. Duchin in her CD-Alt 1 plan is comprised of a black voting-age population that is sufficiently large and geographically compact to constitute a majority in a reasonably configured congressional district?

MR. TYSON: I'll object to form, calls for a legal conclusion.

A. I see that the numbers in the chart indicate that on that metric the districts in question are above 50 percent.

BY MR. ROSENBERG:

Q. And do you have a basis to dispute that

those four black-majority districts are each comprised of a black voting-age population that's sufficiently large and geographically compact to constitute a majority in a reasonably configured congressional district?

A. I have not --

MR. TYSON: Object to form.

A. I haven't undertaken that analysis.

BY MR. ROSENBERG:

Q. So you have no basis to dispute it?

MR. TYSON: Object to form.

A. I don't have the basis to dispute or confirm that.

BY MR. ROSENBERG:

Q. And if I ask you the same question as to the six black and Hispanic districts in that chart as to whether or not you have a basis to dispute that each of those is comprised of a combined black-Hispanic citizen of voting-age population that is sufficiently large and geographically compact to constitute a majority in a reasonably configured congressional district, do you have a basis to dispute that?

MR. TYSON: I'll object to form.

A. The information on the chart says black

and Hispanic voting age. It doesn't indicate that it's citizen voting age. If it is, it doesn't indicate that on the chart.

BY MR. ROSENBERG:

Q. Have you read all of Dr. Duchin's report?

A. Not word-for-word, no.

Q. Are you aware that Dr. Duchin did a separate CVAP analysis in this report?

A. I believe I saw that that was undertaken in this report.

Q. Having read her report, do you have a basis to dispute that the black and Hispanic -- that -- I'm sorry -- that Dr. Duchin created in her CD-Alt 1 six black and Hispanic CVAP districts comprised of a combined black-Hispanic CVAP population that is sufficiently large and geographically compact to constitute a majority in a reasonably configured congressional district?

MR. TYSON: Object to form.

A. I did not undertake that analysis myself.

BY MR. ROSENBERG:

Q. So you do not have a basis to dispute it?

MR. TYSON: Same objection.

A. I don't have a basis to dispute or confirm that.

BY MR. ROSENBERG:

Q. Okay. Moving to -- if you look at that same page, Section 7.2 on page 25, you'll see that Dr. Duchin has also created 14 -- I'm sorry. Let me actually get back to that.

Let me ask you this question: Do you have a basis -- if I were to run through Dr. Duchin's senate plans, under her Effective 1 and Effective 2, to dispute whether any of the majority-minority plans, be they black majority or black and Hispanic majority, are comprised of a majority -- or minority population that is a majority for the district that is sufficiently large and geographically compact to constitute a majority in a reasonably configured senate district?

MR. TYSON: Object to form.

A. I see that she asserts that, and I don't have any basis to not believe that or to support that.

BY MR. ROSENBERG:

Q. And if I ask you the same question as to the house districts that she creates as either a majority black or majority black and Hispanic districts, do you have a basis to dispute that any

one of those districts is comprised of either a black-majority population or a black-Hispanic CVAP population that is sufficiently large and geographically compact to constitute a majority in a reasonably configured house district?

MR. TYSON: Object to form.

A. I haven't analyzed that myself. And if it's asserted in the report, then I don't have a reason to dispute or confirm that.

BY MR. ROSENBERG:

Q. Are you aware of the other two Gingles thresholds or preconditions?

A. I have some awareness of that, yes.

Q. And what's the nature of your awareness?

A. That there are other information that is discussed in the Gingles case and is -- and that it may be in this report as well.

Q. And what is that other information?

A. I don't have that information in front of me.

Q. Are you aware of a Gingles precondition that states that the minority population -- that the minority group is politically cohesive, meaning its members tend to vote similarly? Does that sound familiar to you?

A. Yes, that sounds familiar.
Q. Have you undertaken an analysis in this case relating to whether plaintiffs have met the second Gingles precondition?
MR. TYSON: Object to form.
A. I have not undertaken that kind of analysis.
BY MR. ROSENBERG:
Q. Are you aware of what the third Gingles precondition is?
A. Not word-for-word, no.
Q. How about -- not word-for-word, how about paraphrase?
A. I'm sorry. I don't understand the --
Q. You said "not word-for-word," so can you paraphrase the third Gingles precondition for me?
A. No.
Q. If I tell you that the third Gingles precondition is whether the majority votes sufficiently as a block to enable it usually to defeat the minority's preferred candidate, does that sound right to you?
MR. TYSON: I'll object to form.
A. I don't quite understand what you asked. Could you repeat the question, please?

BY MR. ROSENBERG:

Q. Sure. If I stated that the third Gingles precondition is whether the majority votes sufficiently as a block to enable it usually to defeat the minority's preferred candidate, does that sound correct to you?

MR. TYSON: Object to form.

A. Generally, that sounds similar to my understanding.

BY MR. ROSENBERG:

Q. In this case, have you undertaken an analysis relating to whether plaintiffs have met the third Gingles precondition?

MR. TYSON: Object to form.

A. I have not undertaken that analysis.

BY MR. ROSENBERG:

Q. Do you intend to offer any opinion in this case as to whether race predominated in the drawing of any house, congressional, or state districts?

MR. TYSON: Object to form.

A. I did not offer that type of opinion in my reports to date.

BY MR. ROSENBERG:

Q. So the answer is, you do not intend to

offer any opinion as to whether race predominated in the drawing of any house, congressional, or senate districts?

MR. TYSON: Same objection.

A. At this point, I haven't undertaken that in my reports. It could be possible that something like that would come up during the context of the trial, but it's not in my report.

BY MR. ROSENBERG:

Q. Okay. Let's turn to your report, which has been marked as Exhibit 1, and I'd like to turn to page -- give me one second.

THE WITNESS: If there's no question now, could I take a short break, please?

MR. ROSENBERG: Sure. How long do you want, Mr. Morgan?

THE WITNESS: Five to six minutes.

MR. ROSENBERG: Sure.

THE VIDEOGRAPHER: Stand by. The time is 10:03 a.m. We are off video record.

(Recess)

THE VIDEOGRAPHER: The time is 10:11 a.m. We are back on video record.

BY MR. ROSENBERG:

Q. Thank you. Mr. Morgan, during the break,

did you talk with anybody?

A. Yes. I talked with Mr. Tyson.

Q. Did you talk with -- about questions I had posed in the deposition?

A. No. I asked about what "object to form" meant.

Q. Did you discuss anything else related to the deposition?

A. No.

Q. Before we broke, I had asked you some questions about whether you could dispute that the majority-minority districts created by Dr. Duchin's report and I used the phrase "SD effective" and HD effective." If I -- I'd like to just rephrase it to make it clear.

Do you agree that you cannot dispute whether the majority districts created in Dr. Duchin's senate plans as evidenced in her SD-Alt plans and the house plans as evidenced in her HD-Alt plans were comprised of minority populations that were sufficiently large and geographically compact to constitute a majority in a reasonably configured senate district or regional configured house district? Is your answer the same that you're not in a position to

dispute that?

MR. TYSON: I'll object to form.

A. I didn't undertake that analysis, so I don't dispute or confirm that.

BY MR. ROSENBERG:

Q. Thank you. Now, turning to your report, I'd like to -- which is Exhibit 1. I'd like to draw your attention to paragraph 48 on page 42.

A. Okay.

Q. And there you say that, My review of the enacted house and senate plans -- this is under the phrase, Conclusion -- My review of the enacted house and senate plans combined with drawing the blind illustrative plans demonstrates the tendency that racial considerations had an effect on district composition and district shapes in the enacted plans.

Did I read that correctly?

A. Yes.

Q. Is that the only opinion that you intend to provide at trial based on your analysis provided in this report, Exhibit 1?

A. Well, that is a conclusion at the end of the report. There have been other opinions probably in the report as well.

Q. Other opinions that are supportive of that overall conclusion?

A. There's numerous opinions in the report.

Q. I'm sorry. I could not hear you. Could you repeat that, your answer, please?

A. There are numerous opinions in the report.

Q. Do any of those opinions support a conclusion other than the conclusion set forth in paragraph 48?

A. I haven't considered it in that context, but I believe they would support that conclusion.

Q. How long did it take you to perform the analysis that you did in this report and to write the report?

A. I don't know, many hours.

Q. When you say "many," more than 20?

A. Yes.

Q. More than 50?

A. Probably.

Q. More than 100?

A. Probably not.

Q. Someplace between 50 and 100. And this is the same report that you submitted in the Grant and Pendergrass cases; is that correct?

A. Yes, that's my understanding.
Q. Now, on page 5 of the report, you say that you were asked to review the house and senate plans; is that correct?
A. Yes.
Q. You were not asked to review the congressional plan?
A. Not in this report.
Q. So in this opening report, you undertook no analysis of the congressional plan; is that correct?
A. That's correct. I looked at the legislative plans, and I drew some illustrative plans for the house and the senate, and that's what I analyzed in this report.
Q. Did you ever try to draw a plan for the -- a map for the congressional plan?
MR. TYSON: I'll just object to the extent that calls for any conversations with counsel, if -- you can answer.
A. Regarding the congressional plans, I didn't include any plans that I drafted in any way in this report.
BY MR. ROSENBERG:
Q. But did you try to draw any congressional

plan?

MR. TYSON: Same objection.

A. I didn't do that, and I did not do that in this report.

BY MR. ROSENBERG:

Q. Did you do that in any report?

MR. TYSON: Same objection.

A. I don't recall including a congressional plan that I drafted in any report.

BY MR. ROSENBERG:

Q. To the extent that you drew conclusions as to the relationship between compactness and the drawing of majority-minority districts as to the senate- and house-enacted plans, is it true that you did not draw any similar conclusions as to the congressional plan?

A. There's no information about congressional districts in this report.

Q. Now, on page 3, paragraph 5, you say, I was asked to draw a blind plan that did not include -- I'm sorry -- that did not consider race or incumbency or past redistricting plans for Georgia. Do you see that?

A. Yes.

Q. What is a blind plan?

A. I used a quote, unquote, blind plan. I think the implication is that it's blind to racial considerations. And as I stated in the report, I did not use racial information in the drafting of this plan.

Q. Had you ever drawn such a blind plan before?

A. In the context of my work experience, yes, I've drawn plans like this.

Q. Where?

A. In other states.

Q. Which other states?

A. North Carolina, South Carolina, New Jersey.

Q. Any others?

A. There may have been others, but I don't recall them at the moment.

Q. In each of those plans, did you include the same factors that you included in this plan?

A. I'm not sure I understand the question.

Q. Sure. I'll clarify that. Well, before you said that a blind plan is one that does not include racial considerations; is that correct?

A. Generally, that's -- generally, that's what was done in this report.

Q. Right. And my question is: In the blind plans that you say you drew in North Carolina, South Carolina and New Jersey, did you draw them blind to -- let's start with this: Did you draw them blind to racial considerations, each of those plans?

A. Generally, yes.

Q. What do you mean by "generally"?

A. Just what I said, generally I was blind to racial considerations.

Q. When you say generally, does that mean sometimes you were not blind to racial considerations?

A. No. That's not what I said.

Q. You said "generally." Are -- is your testimony that you -- they were always blind to racial considerations?

A. As I recall, yes.

Q. Okay. Were they blind to considerations other than race, in addition to being blind to racial considerations?

A. In some instances, yes.

Q. Okay. Let's start with North Carolina. What considerations, other than race, were the North Carolina plans that you drafted blind to?

A. Incumbency.
Q. Any other considerations that they were blind to?
A. In this context, the previous districts.
Q. When you say "this context," do you mean the maps you drew in this case or North Carolina?
A. When I say "in this context," I'm referring to the report. So in the report, I mentioned that the previous -- the past redistricting plans were generally not considered. And in North Carolina, that was also the case.
Q. Were there any other considerations that the North Carolina plans were blind to other than race, incumbency and past redistricting plans?
A. Yes, they did not consider politics as well.
Q. When you say "they did not consider politics," what do you mean by that?
A. I'm saying I did not look at political data when drafting those plans.
Q. Were the maps -- were the blind plans that you drew here also blind to political data?
A. I did not look at political data when drafting these plans, so yes.
Q. I don't think I saw any place in your

report that you said that the maps here were blind to political data. Am I correct that you did not include that in your report?

A. I'd have to review the report again.

Q. Well, looking at paragraph 5, the second sentence on page 3, you say, I was asked to draw a blind plan that did not consider race or incumbency or past redistricting plans for Georgia. Do you see that?

A. Yes.

Q. But you say that -- you do not say that you did not consider politics. Is there a reason you left that out?

A. In paragraph 4, I mention that I was provided with the election data files used by the Georgia General Assembly the during the redistricting process, as well as the census geography, which is in the next sentence. And I did not say at that time that I used any of that election data.

Q. For some reason, I went on mute accidentally.

Turning to the plans you drew in South Carolina, did they -- were they also blind to incumbency.

A. Sometimes yes, sometimes no.
Q. What do you mean by "sometimes yes, sometimes no"?
A. I think I drew some plans without knowledge of individual members' addresses. And at a later time, I was given that information.
Q. Were those plans also blind to past redistricting plans?
A. Not -- not specifically. I think, in that case, I was using the boundaries of the pre-existing districts.
Q. Were those plans also blind to past -- I'm sorry -- to politics?
A. Sometimes, yes.
Q. And let's turn to New Jersey. Were those plans also blind to incumbency?
A. No. In New Jersey, the residency of the members is tied to a town. And in New Jersey in the legislative maps, it's not permitted to split a town except those towns that are greater than the population of a district. So in that sense, it was usually known what town the incumbent lived in but not the specific address. So I would say that information was available to some extent in New Jersey.

Q. And were those plans also blind to past redistricting plans?

A. In some cases, yes, in the sense that the configurations were different from the previous redistricting. But in other cases, I would have looked more carefully at the previous redistricting.

Q. And were those plans also blind to politics?

A. Probably less so. I think that the political information was probably used more directly in those plans.

Q. Was it explained to you why you were being asked to draw a blind plan?

MR. TYSON: Object to the extent that calls for conversations with counsel. You can answer otherwise.

A. I don't know how to answer that. I don't know that I was given a context of why. I knew that I could do this, and so I did this.

BY MR. ROSENBERG:

Q. Do you have an understanding as to why you were requested not to consider race or incumbency or past redistricting plans?

MR. TYSON: Same objection.

A. No, I don't know.
BY MR. ROSENBERG:
Q. So you were just asked to do this, and you did that without understanding why?
A. Generally, yes.
Q. And who asked you to draw a blind plan that did not consider race or incumbency or past redistricting, just drew the plans?
A. The counsel in this case.
Q. Is that Mr. Tyson?
A. Yes.
Q. Anyone else?
A. Not that I know of.
Q. Did Mr. Tyson request that you -- let me rephrase this.
Did Mr. Tyson instruct you otherwise what to include or not include in your blind plan?
MR. TYSON: I'll object to that to the extent that calls for conversations with counsel. You can answer otherwise.
A. I don't recall specific instructions on some of those other considerations.
BY MR. ROSENBERG:
Q. Did you make any independent decisions as to what factors to include and to exclude in the

blind plans, other than what you were instructed to do?

A. I'm sorry. I don't understand that question. Could you repeat it, please?

Q. Sure. Did you make any decisions on your own as to what factors to include or to exclude in the blind plans, independent of what you were instructed to do so by counsel?

A. Well, as we pointed out here, the -- it never really occurred to me to look at political data, so I didn't look at that. And I don't know -- I don't recall that being a specific instruction.

Q. So did you make any decisions as to what factors to include or to exclude, other than what was instructed to you by counsel?

A. I think that when I talk about not considering past redistricting plans, I would say that from my work experience, having the boundaries of the existing districts is something that could be done, and it wasn't done in this case. And again, I don't recall a specific instruction on that.

Q. Would you have preferred that it be done?

A. Not necessarily, no.

Q. Prior to your -- beginning your drawing of your illustrative maps, how would you describe the depth of your knowledge as to the factors that map drawers typically take into consideration specifically when dealing with Georgia?

A. I would say --

MR. TYSON: Object to form.

A. I would say I have an understanding of redistricting in Georgia. I've done this 20 years ago in conjunction with the minority in the house and the senate in 2001 and 2002. I've done a lot of work in Georgia over many years, so I believe that I have a fair understanding of Georgia.

BY MR. ROSENBERG:

Q. When you say you "have a fair understanding of Georgia," do you have an understanding of Georgia's geography?

A. Yes, I do.

Q. At what level?

A. I don't understand the question.

Q. Well, do you have a knowledge of Georgia's geography at the county level?

A. Yes, I do.

Q. At the municipal level?

A. Generally, yes.

Q. And when you say "generally, yes," could you please describe the nature of your knowledge of Georgia's municipalities.

A. I've personally traveled extensively through Georgia. I've also looked at census boundaries, municipal boundaries. I've done redistricting work and election-analyses work and demographic-analyses work in Georgia. I'd say I have a pretty strong understanding of Georgia municipalities and counties.

Q. And when you say you "have a pretty strong understanding of Georgia municipalities" and you mentioned "demographic analyses," do you have a pretty strong understanding of the racial and ethnic demographics of Georgia at the municipal level?

A. I have a historical approach to that, so I'm aware of what's existed in the past and sometimes as the cases -- I'm sorry, not cases -- but as the circumstances allow for me to review demographic data from the census, I can -- I have, and can look at that.

Q. And do you have an understanding of where different racial and ethnic populations live in Georgia?

A. In general, yes. But since I've looked at this over many decades, I'm aware that this information changes from decade to decade and year to year.

Q. Do you have an understanding of the racial demographics in terms of where different racial and ethnic groups live in Georgia currently?

A. Somewhat, yes.

Q. When you say "somewhat," what do you mean?

A. Just what I said, somewhat. I have a somewhat understanding of that.

Q. And what does somewhat mean? Do you consider it a thorough understanding, a not-thorough understanding? What do you mean?

A. I just mean that there's a difference between looking at specific data on a map when I'm drawing a map and just having a general idea of, you know, some area has a higher concentration of minority population than some other area.

Q. So you look -- would you -- and would it be fair to say that you are aware that certain areas in Georgia have higher populations -- higher populations of certain racial groups than other

areas of Georgia do?
A. Yes, of course.
Q. And did you use that knowledge when you were drawing the maps?
A. No, I specifically did not.
Q. Did you -- are you certain that you did not allow your knowledge of Georgia's demographics to creep into your preparation of the illustrative maps?
A. Generally, I would say I did not allow that knowledge to be part of this plan-drafting process.
Q. And when you say "generally," are you saying always?
A. Yes.
Q. Now, do you know whether when drawing the plans, the map drawers who drew the plans for the Georgia legislature, did or did not consider race?
A. I don't have any firsthand knowledge of that, but it would surprise me if they didn't consider race.
Q. And why would it surprise you?
A. My experience in previous redistricting has indicated that the Georgia legislative groups that I've worked with would have looked at race at

some point in the redistricting process.

Q. And do you have any understanding as to why they would have looked at race at some point in the redistricting process?

A. Well, 20 years ago, it would have been required under the pre-clearance process under Section 5, for certain. At this time, I understand that there are Section 2 considerations that the legislature would probably have had to dealt with -- deal with.

Q. Have you spoken with anyone who was involved in the map-drawing process for Georgia in this round of redistricting?

A. No.

Q. Has anyone told you any facts as to whether and to what extent the map drawers did or did not consider race in their map drawing in Georgia in this redistricting round?

A. Nothing specific was told to me.

Q. When you say nothing specifically, was something generally told to you?

A. Nothing was told to me.

Q. Now, you used Maptitude to draw your plan; is that correct?

A. That's correct.

Q. And what data layers are available in Maptitude to you?

A. The Maptitude has a full suite of census data. It would be counties; it would be places or municipalities, county subdivisions, census blocks, rivers, other geographic features, Native American tribal lands. There would be railroads and roads, things along those lines. All that would be available.

Q. Was -- or did the Maptitude program you use have demographic data available to it?

A. Yes.

Q. Including data as to racial and ethnic demographics?

A. Yes. But as I stated in my report, I did not use that information.

Q. The Maptitude that you used, was that the same Maptitude data that the legislature used to draw its maps?

A. My understanding is that that is correct; that it was the Maptitude data, which includes the census data. It's from the same source as the census. In addition, there was election data that was available to me, but I did not use that in drafting the plans in this report.

Q. And was that the Maptitude with the August 2021 data updated titled, P.L. 94-171; do you know?

A. I'm not sure what the vintage of that data was. It was provided to me by counsel.

Q. Do you have an understanding as to why you were asked not to consider incumbency?

A. I don't know that I stated that there was a reason for that.

Q. And when you say not considering incumbency, what do you mean by that?

A. I mean I did not look at the residences of the incumbent members that I had access to.

Q. Do you have an understanding as to whether the Georgia map drawers applied -- strike that.

Is it your opinion that protecting incumbents is a traditional districting principle?

A. Generally speaking, that would be something that I would consider, yes.

Q. And turning your attention to page 8, paragraph 19 of your report, Exhibit 1. Do you see you say, In my experience, protecting incumbents, including preserving cores of districts, is a traditional districting principle.

Continuity of district representation is a traditional districting factor. Voters and residents establish relationships with their elected representatives. Did I read that correctly?

A. No. You didn't read it correctly, but I understand the gist of what you said.

Q. Oh, what did I miss?

A. You substituted "districting" for redistricting in two cases.

Q. Oh, I'm sorry. Well, with that correction, is that -- did I read it correctly?

A. I understand what you're trying to say, and I see what I've written in the report, yes.

Q. Is it your opinion that protecting incumbents and preserving cores of districts are a one and the same principle?

A. No. They can be different.

Q. Is it your opinion that incumbents have a right to be protected from losing elections as part of the redistricting process?

A. I don't understand the context of "a right" in this situation.

Q. Do you have an understanding as to how the Georgia map drawers applied, if they did at

all, the districting principle of incumbent protection in their map drawing?

A. I'm not aware of what the legislative process used.

Q. If they did apply the districting principle of protecting incumbents, could that have affected compactness scores?

A. I didn't undertake that analysis. I suppose it's possible.

Q. What do you mean by the phrase that you "did not consider past redistricting plans"?

A. Generally in this context, I would say that I'm referring to the district boundaries of the previous plan, the plan that was in force before the 2021 redistricting.

Q. And is not considering past redistricting plans the same as not preserving existing districts, which is a phrase I think you used on page 17?

A. They're similar. I don't think they're exactly the same.

Q. How do they differ?

A. In some contexts, you would look at the physical boundary of the district and you could compare the boundary to another proposed district.

But there's also the issue of core constituencies in the sense of, you know, what's the -- what's the -- what really makes a district a district.

So in some cases, it might have a slightly different geographic boundary and could look very different, but the core might be the same, in the sense that it's a Macon district with a different county than the existing district. But it's still a Macon-focused district, as an example.

Q. And that -- when you talk about core -- the concept of core that you just mentioned, is that the concept of core retention?

A. Generally speaking, that's one way to measure it is to talk about core retention, yes. But in my experience in working with legislators, it doesn't always mean population. It may also mean political context. Somebody may consider a town to be a core, and I've seen circumstances where an incumbent or legislator is very specific about a town or an area of the district. Even though population-wise, it might not be significant in terms of its size or in terms of its perceived political effectiveness or importance.

But to that incumbent, the incumbent would consider that a core of their district. And so in that sense, it's a little different from a mechanical measurement of population retention from a previous district.

Q. And do plans, in terms like whether or not they adhere to the concept of core retention, do you look at the percent of population that has been shifted in the new plan as compared to the benchmark plan?

A. Yes. That's generally something I would look at.

Q. And do you have any metrics as to what is an appropriate level of core retention for a plan overall?

A. No, I don't. I would say that there's a lot of input on that information. And, again, when we talked about the difference between a core constituency and incumbent protection, I could imagine a situation where an incumbent is in a district, but the district has changed so much that the incumbent would be at a disadvantage in that district.

Q. So there, there would be a tradeoff that the map drawers might do in terms of either

protecting the incumbent or protecting the -- or retaining the core?

A. Yes. In that hypothetical circumstance, yes.

Q. And if you were looking at a map statewide and saw that 10 percent of the population had been shifted to new districts, would that raise any questions in your mind as to whether or not the map drawers adhere to the traditional redistricting principle of core retention?

MR. TYSON: Object to form.

A. I really don't know. I'd have to look more carefully at that information.

BY MR. ROSENBERG:

Q. What if it was 30 percent of the population? Would that raise any concerns?

MR. TYSON: Object to form.

A. Again, I don't know. I'd have to look at the circumstances in each case. For example, the populations shift between the previous decade and the current decade. And so, for example, you might have an area of the state which would have to have a lot of changes. And so in that area, it might be pretty standard to have a higher amount

of change from the existing districts because of the population shifts.

BY MR. ROSENBERG:

Q. If -- do you have an understanding as to whether the map drawers in Georgia in this redistricting cycle applied the traditional redistricting principle of core retention in their map drawing?

A. I don't know specifically.

Q. If they did, could that have affected their compactness scores?

A. I don't know. I didn't conduct that analysis. I suppose it's possible.

Q. And do you have an understanding as to whether the map drawers in Georgia in this redistricting cycle applied to a traditional districting principle of preserving existing districts?

A. I believe that's the case, but I don't know specifically.

Q. And if they did, could that have affected their compactness scores?

A. I suppose that's possible, but I didn't conduct that kind of analysis.

Q. Now, on page 3, paragraph 5, again, you

state that your -- this plan, referring to your blind plan, did consider other traditional redistricting principles. Do you see that?

A. Yes.

Q. What other traditional redistricting principles did you consider in arriving at the conclusions in the report?

A. Generally, they would include things like the split counties, precincts, and sometimes localities, such as cities. Also, for example, general concepts of compactness. Also, I would consider the communities of interest that I'm aware of and that makes sense to me from my experience and my hands-on working with the data for Georgia.

Q. Are any traditional districting principles more important than any other traditional districting principles?

A. I don't know how to answer that. I suppose it depends on the jurisdiction locality as to priorities placed by the enacting bodies.

Q. Let me put the question this way: Is there a hierarchy of traditional districting principles?

A. I don't know. It would depend very much

on the jurisdiction.

Q. Are you aware of Georgia's -- the Georgia legislative criteria for assessing district plans?

A. I don't know about assessing district plans, but I was given the guidelines that my understanding the -- were produced for the redistricting process.

Q. When you say you were given guidelines, who gave them to you?

A. Counsel, in this case.

Q. Did you -- were they given to you prior to your preparing your report?

A. They were given to me for the -- for hearings in this case before reports were written.

Q. Did you consider the Georgia legislative criteria for assessing district plans in the preparation of your plans?

A. Again, I'm not sure I understand the context of using the word assessing. The guidelines were written down, and I looked at them at one point.

Q. Well, you're -- I'd like to turn your attention to page 20 of Dr. Duchin's report, which is Exhibit 3 in this deposition.

A. Okay. Just a moment, please.

Q. Sure.
A. Okay. You said page 20; is that correct?
Q. Page 20, yeah.
A. Okay.
Q. Are you there?
A. I'm here.
Q. Okay. I meant there on the paper. I know I can see you on --
A. Yes.
Q. Do you see where Dr. Duchin sets forth what she says are the general principles for drafting plans? Do those look familiar to you as Georgia's general principles for drafting plans?
A. Generally, yes. They look similar to what I've seen.
Q. And looking at that, can you tell me whether you applied those principles in your drafting of the blind plan?
MR. TYSON: Object to form.
A. Again, I drew the plan. I didn't evaluate whether the plan would satisfy all those requirements.
BY MR. ROSENBERG:
Q. Looking at those requirements, do you agree that some of them are mandatory and some of

them are not mandatory?
MR. TYSON: Object to form.
A. I'd have to look more carefully at it. Let me see. Yes, it appears that there's different language in some of the statements.
BY MR. ROSENBERG:
Q. And by "different language," general principle number 1 uses the word "should." Number 2 uses the word "should." Number 3 uses the phrase "will comply." Number 4 uses the phrase "will comply," and number 5 uses the phrase "shall be composed," and number 6 uses the phrase "shall be composed." Do you agree that those are written in mandatory form?
MR. TYSON: Object to form.
A. Again, they're different languages. It's implied that there's -- that 3 and 4 and maybe some others could be taken to be mandatory, yes.
BY MR. ROSENBERG:
Q. And on the other hand, number 7 says the committee should consider as opposed to saying "should be drawn." And that's -- and that is not the mandatory language; do you agree?
MR. TYSON: Object to form.
THE WITNESS: I'm sorry. Did -- was

there an objection to that? I didn't -- I did -- did you --

MR. TYSON: I'm sorry, I was trying to say "object to form." My voice is coming in and out, so I apologize for that.

THE WITNESS: Okay.

MR. TYSON: You can answer, John.

THE WITNESS: Sure.

A. On number 7, it says "should consider." Yes, I see that.

BY MR. ROSENBERG:

Q. And that is not mandatory as compared to that a district should be drawn or will comply. You see a difference in that language?

A. There's a difference in that language, yes.

Q. And number 8, it says, Efforts should be made to avoid the unnecessary pairing of incumbents, and you agree that is not as strong language as saying that it should be drawn or will comply; is that right?

A. The language is different. Yes, it's not as strong.

Q. Turning to a different issue, in state legislative maps, what's your understanding as to

the reasonable population deviations between and among districts?

A. It varies a lot. In my experience, some states have very strict deviation requirements and other states have very wider-ranging deviation requirements. For example, my understanding is Nevada, it's probably .25 of a percentage point or .5 of a percentage point. Whereas in North Carolina, it's mandated to go all the way up to plus or minus 5 percent.

I'm sorry. If you asked a question, I didn't hear it; you were muted.

BY MR. ROSENBERG:

Q. My computer was -- just went on mute again. Do you have an understanding as to whether Georgia has any such mandatory requirements as to population deviation other than what's set forth in general principle number 2?

A. I -- my understanding is that, if those guidelines have a deviation, it's contained in the text of the guidelines.

Q. And by that, you're referring back to the general principles for drafting plans that we discussed a few minutes ago?

A. I believe so.

Q. Are you aware as to whether or not there is any strict numerical guideline in those principles?

A. I don't recall seeing one.

THE WITNESS: If there's no question posed, could we take a break, please?

MR. ROSENBERG: Sure.

THE VIDEOGRAPHER: Stand by. The time is approximately 10:57 a.m. We are off video record.

(Recess)

(Patrick Hanson joined)

THE VIDEOGRAPHER: The time is 11:06 a.m. We are back on video record.

BY MR. ROSENBERG:

Q. Mr. Morgan, during the break, did you discuss the deposition with anyone?

A. I asked Mr. Tyson if objections are like instant replay in sports. Like, is there a limited number of them, or do you just get to say that anytime. I don't know.

MR. ROSENBERG: Well, I'm very interested in Mr. Tyson's answer to that question.

MR. TYSON: I told him that there was no limits; that I've been in a deposition once where I had opposing counsel object to every question I

asked. That wasn't fun, so I'm trying not to do that.

MR. ROSENBERG: Appreciate it.

THE WITNESS: Yeah, and also, I just wanted to make sure that the objection was heard the time that it sounded soft.

MR. ROSENBERG: Appreciate that, Mr. Morgan.

BY MR. ROSENBERG:

Q. Mr. Morgan, a few minutes before we broke you mentioned the fact that you've done some election-analyses work in Georgia. Could you tell me what the nature of that work was?

A. Sure. I did work for Congressman Kingston when he was running for United States senate. I've previously worked with many congressional candidates and congressmen over the years. I've done analyses for Georgia legislative candidates in the state senate. I did a little bit of analyses for a special election for a congressional seat a few years ago. So yeah, over the years, I've done lots of analyses of Georgia.

Q. Excuse me -- when were -- and was all of that work for candidates who were Republicans or Democrats, or was there a mix?

A. Generally speaking, it would be for Republicans, although I've worked with Democrats in the legislature in redistricting 20 years ago.

Q. And when you say you've worked with Democrats in the legislature who were Democrats 20 years ago, what was the nature of the work that you did with them?

A. There was some of the -- as I recall at that time, some of the Democratic senators were working in concert with Senator Sonny Perdue on some issues, and that included redistricting. So in that context, I met with some of the incumbent Democrat members who wanted to discuss redistricting.

Q. And in turning back to the election-analyses work that you did for Congressman Kingston and for congressional candidates and for state senate candidates, what was the nature of that election-analyses work?

A. Generally speaking, I would do election analyses focused on winning an upcoming election, either a primary or a general election. So in the case of Mr. Kingston, it was the primary election for the US senate in 2014. I've worked with Congressman Newt Gingrich over the years, and I've

worked with dozens of legislative candidates, either in one-on-one for elections, and also sometimes I would have met with candidates for another job that I was involved in at the national level.

Q. In the context of that work, did you ever analyze percentage of racial populations that were relevant to the elections you were looking at? Any kind of racial demographic work at all?

A. In the context of the overall election modeling, I would have looked -- I generally would have looked at some demographic data, which in some cases, would include racial data, education levels. I would look at income levels and, again, that would be part of a profile that I would look at.

Q. And what was the relevance of the racial data to your election analyses?

A. Usually, the candidates or members would be interested to know in a particular district what the racial composition was. It would be the equivalent of a single slide of, you know, maybe 50 or 70 slides.

Q. Did you ever undertake a racial-polarized voting analysis in connection with your

election-analyses work?
A. Not in Georgia.
Q. Where did you do some of that?
A. I provided an analysis to a Section 5 submission in Guilford County, North Carolina.
Q. Do you have any opinions as to whether races -- or as to whether there is racially-polarized voting in Georgia?
MR. TYSON: Object to form.
A. I wasn't asked to analyze that.
BY MR. ROSENBERG:
Q. All right. So you have no opinion?
MR. TYSON: Same objection.
A. I would say, in my previous experience, it would not surprise me to find that there is racially-polarized voting.
BY MR. ROSENBERG:
Q. And what do you mean by it would not surprise you to find racially-polarized voting? What would you not be surprised by?
A. I believe there's been evidence of that in the past, and it wouldn't surprise me if there's still some evidence of that today.
Q. In that, black voters vote cohesively for candidates of choice and then white voters vote

cohesively for different candidates of choice?
MR. TYSON: Object to form.
A. Something along those lines.
BY MR. ROSENBERG:
Q. I'd like to ask you just a few questions about compactness? I -- you used the Reock and Polsby-Popper scores because they're available in multitude -- in Maptitude, right?
A. That's one of the reasons, yes.
Q. What are the other reasons?
A. In my experience, I've seen those metrics used in court cases.
Q. Are you familiar with the cut-edges approach to assessing compactness?
A. No.
Q. You've never heard of that?
A. I've never heard of that.
Q. Now, I think you talk in your report about eyeballing compactness. Is there an eye test for determining compactness, an eyeball test?
A. I'm sorry. I don't believe that I said anything like that in my report.
Q. Let me see if I can find it quickly. If not, we'll come back to it. We'll come back to that.

Now, you talk in your report about following civic boundaries as being a traditional districting principle. Do you recall that?

A. Could you show me that in the report?

Q. Sure. I think that's in that -- well, here -- let me see, paragraphs 17. Yeah, paragraph 17, page 7, second sentence, In my experience, some of these factors are referred to as traditional redistricting principles, such as population equality, following civic boundaries. Do you see that?

A. I do, yes.

Q. What do you mean by that?

A. In this context, it would include municipalities, sometimes precinct lines, and certainly counties.

Q. And do you have an understanding as to whether the Georgia map drawers in this redistricting cycle applied this traditional districting principle in their map drawing?

A. I don't know, specifically.

Q. If they did, could that have affected the compactness scores?

MR. TYSON: Object to form.

A. I don't know. I didn't look at that,

specifically. I would say that, in my experience, map drawers would often look at civic boundaries and take that into consideration.

BY MR. ROSENBERG:

Q. And could that affect compactness scores?

MR. TYSON: Same objection.

A. I don't know. It's possible.

BY MR. ROSENBERG:

Q. In that same paragraph, you refer to Judge Jones's recognition of some of these traditional redistricting principles, including maintaining communities of interest. Do you see that in paragraph 17? And then you also talk about communities of interest in paragraph 18. Do you see that?

A. Yes.

Q. Do you have an understanding as to whether the Georgia map drawers applied that traditional districting principle in their map drawing in this redistricting cycle?

A. I don't know. In my experience, legislators often look at things like that.

Q. If they did, could that have affected their compactness scores?

MR. TYSON: Object to form.

A. I don't know.
BY MR. ROSENBERG:
Q. Did you look at communities of interest and take communities of interest into consideration in your drawing of your blind plan?
A. Generally speaking, yes, communities as I understood them.
Q. What do you mean by "generally speaking"? Does that mean you always did or sometimes did?
A. I would say that there can be differences or tradeoffs. For example, a municipal boundary for a city or town -- a municipality, that is, you know, might have a -- has -- it has a specific boundary. However, the precinct boundaries might encapsulate that area. So if you were to draw by the municipal boundary, you would have a different district shape than if you were to draw by the precinct boundaries, which contain the municipal boundaries.
Q. Right. But we're talking about communities of interest. Is that the same thing as precinct boundaries and municipal boundaries?
A. In some circumstances, I think so, yes.
Q. But in some circumstances not?
A. I -- there would be circumstances where I

could imagine that not being the case.

Q. As a matter of fact, in paragraph 18 of your report, you say that communities of interest often include things based on socioeconomic factors, transportation corridors, watersheds, mountain and valley communities, urban, suburban and rural areas and school-attendance zones, right?

A. Yes. That -- those are things that could be considered communities of interest in my experience.

Q. And you also say that geographic features can define some communities of interest and that communities of interest can also include military areas; is that correct?

A. Those are some examples that I gave in my report, yes.

Q. And so those examples are not necessarily the same as precinct lines or municipal lines or county lines, correct?

A. That's correct.

Q. Do you know whether or not -- well, strike that.

Did you take those considerations into effect in your drawing of your plans?

A. To the extent that I was aware of them, yes.

Q. And did -- does that mean that there were certain areas that you drew where you took communities of interest into consideration and certain areas that you drew when you did not take communities of interest into consideration?

A. No. I generally would apply the same methodology throughout the drafting of the entire plan.

Q. Were you aware of communities of interest in every district that you drew in your plan?

A. To the extent that I understood the communities of interest that existed in those areas, yes.

Q. But to the extent that you did not understand the communities of interest in those areas, you did not take that into consideration; is that correct?

A. If I was unaware of it, I couldn't take it into consideration.

Q. Were there some districts where you were unaware of communities of interest that you drew?

A. I don't know how to answer that. If I was unaware of it, I was unaware of it.

Q. Did you make sure that you were aware of communities of interest in every district that you drew?

A. I don't understand how one would do that. I have my understanding of communities of interest, and I applied that throughout the map-drawing process.

Q. So is it your testimony that throughout your map-drawing process you were aware of the socioeconomic status of the residents in each of the districts that you drew?

A. That is not what I said in my report and that's not --

Q. But that's -- that's what I'm asking you.

A. I'm sorry?

Q. Were you -- let me put it this way, and that's a fair objection on your part.

Were you aware of the socioeconomic status of the population groups in each of the districts that you drew?

A. As I stated in my report, I gave a general example of what some communities of interest could be. In drafting my plan, I took into consideration communities of interest that I was aware of.

Q. But you were not necessarily aware of communities of interest in every district that you drew; is that correct?

A. I took into account the communities of interest of which I was aware while drawing the plan, and I applied that consistently throughout the drafting of the plan.

Q. Do you have an understanding as to whether the Georgia map drawers who drew the maps during this redistricting process took into consideration communities of interest in the district they drew?

A. I don't know, but I would believe that some attention was given to communities of interest as the legislators and the map drawers understood them.

Q. Do you have an understanding as to whether the knowledge of the Georgia map drawers who drew the maps in this redistricting cycle as to communities of interest in the districts they drew was the same as your knowledge of communities of interest in the districts you drew?

A. I can't imagine that it's the same.

Q. And if they did take into consideration their knowledge of communities of interest in the

district they drew, could that have affected the compactness scores for those districts?

MR. TYSON: Object to form.

A. I don't know. I suppose it could. I really don't know. I would say I can think of an example where in Gwinnett County I chose to follow communities based on some of the municipalities. And in my experience, the legislature chose to follow transportation corridors more clearly rather than the municipal boundaries, and I think that is something that is different from the legislative draft of maps and the map that I drew.

BY MR. ROSENBERG:

Q. And is that instance that led to your drawing district lines that were different than how the legislature drew those lines; is that correct?

A. I don't know. I don't know exactly why they drew the map exactly the way they drew it. But my understanding is that the maps in the enacted plan seem to follow the transportation corridors, but I don't see that it was explicitly explained that that's why that was done.

Q. Now, you drew one illustrative map for the senate and one illustrative map for the house;

is that correct?
A. Yes.
Q. And how long did it take you to draw those maps?
A. I don't know. It was many hours.
Q. That's within that 50 to 100 hours that we talked about earlier?
A. Yes. I would say it's in that range, yes.
Q. Did you draw other illustrative maps that you considered in arriving at your conclusions, other than the maps that appear in your report?
A. I would say that they were not maps that are unique, but I would say that in the map-drafting process, I considered many district configurations. So, for example, in drawing some house districts in a particular county, I would have drawn them one way and a slightly different way. And at the end of the process, the districts that I drew are in the plan that I drew.
Q. Is it your testimony that there are no other illustrative maps that you could have drawn that could have made a better comparison with the enacted maps than the ones that appear in your report?

A. I don't believe I said that in my report, and I wouldn't say that here. I just said that I looked at many district configurations while drawing the plans, and the plans that I submitted in the report are the work of many hours and a lot of thinking and consideration.

Q. What's the basis for -- strike that.

On the basis of the map for the senate and the map for the house that you drew, you come to your ultimate conclusion in paragraph 48 of your report; is that correct?

A. I suppose you could look at it that way. I drew -- I looked at the enacted plan. I drew the plans that I drew; I compared them. As I said in my report, I did not look at the racial data until after I had completed drafting the illustrative plan and then I provided some information about the districts after having drafted that.

Q. Are you aware of any literature in your field that supports the proposition that drawing a single illustrative map is sufficient to reach a conclusion as to why enacted maps were drawn less compact than they might have been?

A. In my experience, I would say that there

are many possibilities when drawing maps, but a lot of times I would distill it down to not many configurations to bring to the deciders. So, for example, if a legislator wanted to see a different proposal in an area, I would draw something like that.

And I can think of an instance in North Carolina where I drafted a proposed map in an area and the -- I shared it with Democratic legislators, and those legislators adopted the map portion that I had drawn into their plan. You know, I didn't really get credit for that, but that's okay.

Q. But the purpose in those exercises was not a comparison of one map with another to draw a conclusion as to why one map is less compact than another, was it?

A. I didn't set out to draw conclusions on compactness. I set out to draw a plan. And then after drawing it, I looked at some of the -- I added in the racial data and I looked at the other considerations regarding compactness.

Q. Yeah, I understand that. But the other examples you gave of the single maps you used, in those instances, you did not use those maps to

ultimately draw a conclusion as to a lack of compactness in some -- another map you were comparing it to; is that correct?

A. I don't think I understand the question.

Q. You just testified that you had used single maps in the past when a legislator asked you to come up with a map; is that correct?

A. Yes.

Q. In that instance, the purpose of your providing the single map was not to draw conclusions comparing it to another map as to why there was more or less compactness; is that correct?

A. I don't think so.

Q. It's not correct? Then why isn't it correct?

A. I'm not following your question.

Q. We can move on. Did you read Dr. Duchin's rebuttal record? I think you mentioned you did.

A. Yes.

Q. Are you familiar with the literature that she cites on page 1 of that report, and that's Exhibit 4, in the last paragraph beginning with the word "comparison"?

A. No.
Q. You're not familiar with the literature?
A. No.
Q. And you're aware, of course, that Dr. Duchin has drawn different illustrative maps than yours; is that correct?
A. My understanding, yes.
Q. And you agree that some of her maps create more majority-minority districts than do the enacted maps; is that correct?
A. I believe she states that in her report, yes.
Q. And you agree that the districts in her maps are generally more compact than the districts in the enacted maps; is that correct?
A. I don't know. I -- are you talking about the rebuttal report, or are you talking about the previous report?
Q. Well, if you look at your rebuttal report and let's look at page 9 -- I'm sorry, let's start with page 5 -- actually, let's go to page 6, which is her Alt 1. You compare HD-Alt 1 of Dr. Duchin to house-enacted, and there the mean compactness scores are -- certainly on Reock, they're identical and Polsby-Popper they're almost

identical.

A. I don't know. What report are you referring to, please?

Q. I'm sorry. I'm looking at your exhibit -- at your rebuttal report, Exhibit 2, page 6.

A. Okay. Page 6, there's Chart 2.

Q. Right. In comparing her HD-Alt 1, with the house-enacted, the compactness scores are virtually identical?

A. The compact -- the mean compactness score, in this context, I've reported the mean compactness score of the whole plan. It's .39 for her Alt 1, and it's .39 for the house-enacted. The Polsby-Popper is .26, and the house-enacted is .28.

Q. And you would consider certainly the Reock scores to be identical, correct?

A. To the 100th, yes.

Q. And the difference between .26 and .28, do you consider that a significant difference on the Polsby-Popper score?

A. They're close.

Q. And turning to your comparison of her HD-Alt 2, with the house-enacted, you compare her

Reock score is .4; with house-enacted, 39; again, very close, virtually identical; is that correct?

A. Yes.

Q. And similarly with Polsby-Popper, you have that same .26 and .28 difference?

A. Yes. The mean compactness scores are those.

Q. And if you turn to page 9, your Chart 5, both of her compactness scores under Reock and Polsby-Popper are at least as high and therefore more compact than the state senate-enacted plans; is that correct?

A. The Reock score of the Alt 1 senate plan is .43, and the senate-enacted plan is .42. And the Polsby Popper scores are .29 for the Alt plan and .29 for the senate-enacted plan.

Q. And turning to the next page, page 10, your Chart 6, the mean compactness Reock score for Dr. Duchin's senate district Alt 2 is .44 compared to the senate-enacted as you calculated it at .42. And the Polsby Popper score of Dr. Duchin's Alt 2 plan, senate, is .3 compared to the senate-enacted .29; is that correct?

A. Yes.

Q. And so and yet again, in that instance,

Dr. Duchin's plans are as -- at least as compact, if not more compact, under your analysis, and that's her plan, Alt 2 plan as a whole, than the senate-enacted plan; is that correct?

MR. TYSON: Object to form.

A. The mean compactness scores are what they're stated here, yes.

BY MR. ROSENBERG:

Q. And turning to page 11 of the congressional plan comparing Dr. Duchin's CD-Alt 1 with the CD-enacted, again, her Reock and Polsby-Popper scores are both higher than the CD-enacted scores; is that correct?

A. Yes.

Q. And you also agree that some of the -- her maps created more majority-minority districts than do the enacted maps, right?

A. I'd have to look at that; generally, yes.

Q. Is that -- are those facts consistent with --

A. I --

Q. -- your conclusion -- I'm sorry.

A. I'm sorry.

Q. Go ahead.

A. Yeah, on the Chart 4, it appears that

the -- Dr. Duchin's plan has fewer majority African-American seats.

Q. But you did not take into consideration how many majority black and Hispanic plans Dr. Duchin created; is that correct?

A. I don't understand the question.

Q. In these charts, you did not take into consideration how many majority combined black and Hispanic districts Dr. Duchin created.

A. I didn't look at that.

Q. Are you aware of any techniques that are used in your field to check whether a map is an outlier?

MR. TYSON: Object to form.

A. I don't understand what you mean by that.

BY MR. ROSENBERG:

Q. Well, when you put forward a map, you want to make sure that it is a map that is reasonable in terms of its configuration and the way the lines were drawn, right?

A. I don't know how you would determine that.

Q. Have you ever run an ensemble -- excuse me -- do you know what the phrase "ensembles" is -- or what the word ensembles means in the

context of your field?

A. As a map drawer, I have not --

Q. Yes, as a map drawer.

A. As a map drawer, I have not seen that phrase used in drawing in the context of the work that I do.

Q. So you yourself have never done any ensemble -- or run any ensembles in terms of map drawing?

A. I've drawn maps; I've drawn hundreds and hundreds of maps.

Q. Have you ever used a computer and put in an algorithm which uses certain factors and does not use other factors to spit out thousands of maps?

A. No. That's not something I would do. That's not the type of work that I do.

Q. Are you aware that there are people who do that in your field?

A. I don't know that I'd say they're in my field. As a map drawer, I have not experienced that being used in the legislative process and the map drawing process for the governing bodies that produce maps for use in elections.

Q. I'd like to draw your attention now to

page 16, paragraph 27 of Exhibit 1, which is your report. And you state that after completing the house illustrative plan you then selected several metrics and you cite county splits, voting precinct splits, compactness scores, paired incumbents and the number of majority 18 or older, all of persons black districts; is that correct?

A. Yes.

Q. Now, why did you select those metrics?

A. I believe that similar metrics had been used in the preliminary injunction phase of another trial, and so I used similar metrics here.

Q. And when you say they were "used," they were used by whom?

A. I believe that I submitted an affidavit in a related case, and I provided that information as part of the preliminary injunction phase of the trials.

Q. When you say you looked at voting precinct splits, were those actual precinct splits or were those what are called the VTD splits?

A. I think I identified that the data I was using was the census VTDs, and that was the data that was available to the Georgia legislature that I was given by counsel.

Q. And when you say "VTDs," that means voting tabulation districts?

A. A lot of times people also say "precincts." And in this context, for purposes of splits, I'm talking about voting precinct splits.

Q. Are VTDs identical to precincts?

A. Sometimes, yes.

Q. Sometimes not, right?

A. It could be that there's a difference.

Q. And it could be there's a difference because the VTDs are based on data that's provided by the States to the Census Bureau which is not -- which could be a couple of years before you're looking at the actual precincts; isn't that correct?

A. It really depends on the circumstances. As I -- I identified the data that I used for my analysis, and it came from the data that I believe was available to the Georgia legislature at the time of redistricting.

Q. Do you know what year the data that underlie the VTDs was submitted to the Census Bureau by the States?

A. No.

Q. If I told you that it was 2018, would you

have a basis to disagree with that?

A. It seems reasonable to me that that's possible.

Q. Do you know whether the precincts in Georgia changed between 2018 and the time the maps were drawn?

A. Well, as I'm sure you're aware, the 2020 census was delayed and this is an unusual circumstance for the entire nation where an election in 2020 was available for use in the redistricting; it was available. But in addition to that, afterwards, there was -- 2021 was sometimes available. So in the case of Virginia, there was additional election data information. And more specifically --

Q. Do you -- I'm sorry.

A. -- And more specifically to your point, I believe that there probably would have been changes in the voting precinct that were used in the elections in 2020 from the census VTDs that were provided to the legislature. That would not surprise me.

Q. And you mentioned that -- your understanding is that the Georgia map drawers used VTDs in their map-drawing process. What's the

basis for that understanding?
A. I was given the data by counsel, and it was represented to me that this was the data that was used by the map drawers.
Q. If it was not the data that was used by the map drawer, would you rather use the data that was used by the map drawer in your report?
A. I think that in this context the VTDs are a unit that's fairly well understood, and I used them in my analysis.
Q. If there were significant changes in terms of whether the VTDs accurately represented the VTD data that you relied on accurately represented the precincts as existed at the time that the map drawers drew their lines, which would you rather use, the VTD data or the precinct data?
A. I suppose I could look at both.
Q. Why would you look at outdated data if you have current precinct data?
A. I didn't have that data available, and I don't know if the map drawers had the precinct data in their map-drawing system.
Q. If the map drawers did have precinct data available, would that change your opinion?
A. I don't believe so. I evaluated the

reports that I ran consistently in every analysis that I did.

Q. If the precinct data was different than the VTD data, how could that affect your opinion?

A. I don't know.

Q. If someone was drawing a map so as to limit the number of precinct splits, do you have an opinion as to whether that map drawer should rely on current precincts or on outdated VTD data?

A. I don't know because I've seen circumstances where analyses of legislatively drawn maps, which were many years forward in the future and the analyses was done -- sometimes additional precinct information was used and sometimes not. Because if you're evaluating the state of the situation at the time of the map drafting, it might make more sense to use the data that was available at the time of the map drafting.

Q. But if the map drawers did have the precinct data available and relied on that data, would that affect the answer you just gave?

A. I don't know.

THE WITNESS: If there's not a pending question, I'd like a short break, please.

MR. ROSENBERG: Okay. How short?
THE WITNESS: Five minutes. I need to use the bathroom.
MR. ROSENBERG: Sure.
THE VIDEOGRAPHER: Stand by. The time is 11:45 a.m. We are off video record.
(Recess)
THE VIDEOGRAPHER: The time is 11:53 a.m. We are back on video record.
BY MR. ROSENBERG:
Q. Hi, again, Mr. Morgan. During the break, did you discuss the deposition with Mr. Tyson?
A. No.
Q. Thank you. We were talking about VTDs. Are you aware that the people who drew the maps used an updated precinct layer which was inputted into Maptitude?
MR. TYSON: Object to form.
A. I don't know.
BY MR. ROSENBERG:
Q. If they did, would that affect any of your opinions as to precinct splits in your reports?
A. It wouldn't affect what I produced in my reports. If I had another set of data, I could

rerun the reports on that set of data.

Q. But if that were the situation, the people who drew the maps would have used different data than you did for the purposes of assessing how many precinct splits there were; isn't that correct?

A. I suppose so, but I ran the reports on the information that I had.

Q. And do you know what data Dr. Duchin used in calculating her precinct splits and the enacted plans' precinct splits?

A. No.

Q. And again, if she was using the actual precinct data and not the outdated VTD data, that could explain a difference between your calculation of voting precinct splits and her calculation of precinct splits; isn't that correct?

MR. TYSON: Object to form.

A. It wouldn't change the analysis that I did because I was using the precinct splits for her plan using the data that she provided to me, so those comparisons would be the same. If she used a different set of precinct data, I don't know when that was from, but I could run reports

on that data if it was provided to me.
BY MR. ROSENBERG:
Q. But your calculation of voting precinct splits is based on VTD data; is that correct?
A. It's based on the data that was provided to me by counsel.
Q. Which you testified was VTD data; is that correct?
A. I believe that's the case. Again, it was provided by counsel.
Q. By the way, do you have access to updated precinct data -- precinct layer data?
A. I do not. To be more specific, it was not provided to me.
Q. By the way, you agree that political data is not available below the VTD level; is that correct?
A. It depends on your definition because you just said that precinct data and VTD data are different. So in that context, I'm not sure that I know what you mean.
Q. Well, in the past, have you discussed the relationship between VTD level and political data availability?
A. My understanding is that political data

is reported in voting precincts at the time of an election.

Q. And how about racial data? Is that available at the VTD level?

A. My understanding is that racial data is provided by the census at the block level.

Q. And contained within the precinct level?

A. It can be aggregated to the precinct level, the VTD level, municipal level, anything that has -- shares a boundary with the census blocks.

Q. If you saw a lot of precinct splits in a plan, would that be consistent with the use of racial data in a line drawing?

A. I don't know.

MR. TYSON: Object to form.

A. Yeah, I don't know.

BY MR. ROSENBERG:

Q. It could be?

A. I don't know.

Q. In your report, you did not analyze any Hispanic data; is that correct? Any data relating to Hispanic voters or Hispanic population?

A. It's not in the reports that I produced.

Q. And why did you not analyze any Hispanic

metrics?

MR. TYSON: Object to the extent that calls for conversation with counsel. You can answer otherwise.

A. I used the data with the African-American population in my report.

BY MR. ROSENBERG:

Q. And why did you use only the data for African-American population in your report?

MR. TYSON: Same objection.

A. It was the same data that I used in the preliminary injunction phase of the trial, and I used it in this report as well.

BY MR. ROSENBERG:

Q. And why did you only use data relating to African-American metrics in the PI hearing -- in connection with the PI hearing?

A. That was the data that I produced.

Q. Why did you choose to produce only that data?

A. I didn't see that it was a choice. I just produced this data.

Q. Are you aware that there are coalition claims dealing with the majority-minority districts in comprise of combined black and

Hispanic populations in this case?

A. That seems to make sense, based on my understanding.

Q. Would analysis of Hispanic metrics be relevant to such claims?

MR. TYSON: I'll object to form.

A. I don't know. I didn't make that analysis in my reports.

BY MR. ROSENBERG:

Q. In your report, you say that you looked at two regions of roughly similar geography to compare the house illustrative plan to the house-enacted plan; is that correct?

A. Yes.

Q. And you did the same thing when you created your senate illustrative plan except you looked at only one region for purposes of comparison; is that correct?

A. Yes.

Q. Can you walk me through the steps that you took to select your house regions?

A. In paragraph 28, on page 17, I identify that Region 1 consists primarily of DeKalb, Clayton, Henry, Rockdale, Newton, and Walton Counties.

Q. Right. And why did you choose those counties?

A. Those are the -- generally those -- the two region -- or the region -- I chose the districts that generally are in those counties.

Q. Right. Why would you choose the regions that were generally in those counties?

A. Generally speaking, there was a contrast in district shape in some of that area that I noticed.

Q. What do you mean by contrasting district shape that you noticed?

A. In my report, I say that, in the illustrative plans, the districts look compact and only cross county lines in a limited way. By contrast, looking at the district's and the house-enacted plans, the districts look elongated and they cross county lines in a number of places.

Q. So in deciding which region to compare, you looked at your illustrative plan and saw how compact it was and then you looked and found a region that had elongated districts? Is that what you're saying?

A. That is true. And also, I did then add the racial data in after I drafted my plan, and I

looked at the racial data in that region as well.

Q. And is that the same approach you took to selecting Region 2?

A. I would say there's an additional factor that I should have mentioned, and that is that the Region 1 and Region 2 don't overlap that much in the sense that, for example, in the house enacted plan, Fulton County crosses into Fayette County. And so in my experience, you would associate Fayette County with Fulton County in the enacted plan rather than the other regional breakdown that I provided.

So looking back at my report and looking at the enacted plan, DeKalb County districts are associated strongly with Rockdale and Henry County. Clayton is more or less self-contained as it is in my illustrative plan. So I would say that the additional factor is the association of counties. And going back to the Region 2, I noticed in the enacted plan that Douglas County and Fulton County are connected in the districts. So it would make sense to me to include Douglas County with Fulton County in a region rather than have Douglas County be separated.

Q. Did you undertake any demographic

analysis before you chose your regions?

A. Not specifically. But as I'm aware in this case, a lot of the African-American districts tend to be in Fulton, DeKalb, Clayton, Douglas, sometimes Cobb. We talk about Henry, Rockdale, Newton.

Q. Now, the outside contour of your Region 1, meaning the boundary that surrounds your entire Region 1, is not identical to the boundaries surrounding the combined districts in the enacted plan to which you compare your Region 1; isn't that correct?

A. Yeah. As I pointed out in my discussion of -- in paragraph 28, they're generally consisting of DeKalb, Clayton, Henry, Rockdale, Newton, and Walton Counties. And as you can note from the illustrative plan and the enacted plans, some of the districts either do not fully cover that -- those counties or they go out of that slightly.

For example, on page 19, Map 3, of my illustrative plan, one district from DeKalb County has a small portion of Fulton and the district that includes Newton County in yellow does not have all of Walton County. So there's a portion

of Walton County that's not included in the district boundaries.

Q. And similarly, you're -- the outside contour, the outside boundaries that surround your Region 2, is not identical to the outside boundary of the combined districts in the enacted map to which you're comparing your district to.

A. No. Nor did I say that it was in my report.

Q. When -- if you don't compare areas -- or strike that.

In terms of the outside boundary of your Region 1 and the outside boundary of the region to which you're comparing it to, doesn't the outside boundary define the configuration of those entire areas?

A. No.

Q. It does not? You're saying the outside boundary does not define the configuration of your -- the outside configuration of your Region 1?

A. That's correct. I pointed out that the region generally consists of those counties. And as I also just stated now, some of the district boundaries include some territory that is outside

of the boundaries of those counties or in another case it does not include the full county. But the districts in that area, the regions that I created, are substantially the same areas.

Q. But if you're -- if you don't compare areas with the same outside boundaries, by definition, aren't you increasing the likelihood that there's going to be a difference in compactness scores?

A. Not necessarily. I'm looking at the districts that are in the region that is based primarily on counties. And as I pointed out, I'm associating the regions with counties that have districts that cross county lines.

As I pointed out with Douglas and Fulton and Fayette and Fulton, they are associated in the enacted plan. And even though in the case of my illustrative plan, Fayette County is self-contained. It does not cross the line with Fulton County. I still included that in the region.

Q. But doesn't the outside boundary of the region affect compactness scores?

MR. TYSON: Object to form.

A. Not the way I presented it in my

analysis. I don't believe that's the case.
BY MR. ROSENBERG:
Q. If you have one area that has an area that sticks out like a needle and another does not, and I'm talking about the outside boundary, doesn't that have the potential for affecting the relative compactness scores of those two regions?
MR. TYSON: Object to form.
A. The district boundaries create compactness scores. So whatever the boundary is, it will have an associated compactness score with it.
BY MR. ROSENBERG:
Q. Those districts that border on the outside boundary, they're compactness scores are going to be affected by that outside boundary; are they not?
A. It's included in the district compactness score.
Q. So the outside boundary of the district that borders on the outside boundary -- by outside boundary, I mean the outside boundary of the region as a whole -- is going to affect the compactness score of a district that borders on the outside boundary; is that correct?

A. Well, I didn't have fractional districts. I believe that it was probably appropriate to include whole districts as opposed to cutting off a district at the county line. So if a district went outside of the county-region area, then I included the entire district compactness score in my analysis. And, you know, I wanted to be as clear as possible on that point and I was.

Q. And that would affect the relative compactness score of a district that went outside a county and a district that did not go outside the county; isn't that correct?

A. Well, the district compactness score is what it is. Whether it goes out of the county or not, the district compactness score is reported in my report.

Q. Is the compactness score of your district affected by the lines of the district?

A. Yes. It's defined by the lines of the district as far as the geographic compactness score, yes.

Q. Now, if you'll trying to compare the racial distribution of two multidistrict plans, wouldn't you want the two plans to cover the same geographic areas?

A. Not exactly. And in this case, I provided the districts that included the same counties and generally they were -- they're going to be similar in population. They're going to be similar in the geographic area.

Q. But they weren't exactly the same in population; is that correct?

A. No. And as I identified in the report -- in my report, they were not intended to be.

Q. And they were not exactly the same in terms of their racial demographics; is that correct?

A. No. I don't see how that would be possible.

Q. And they were not exactly the same in terms of the location of any racial or ethnic group; is that correct?

A. The district boundaries are what they are in the illustrative plan and the enacted plan, and the regions I chose are basically based upon the counties in that area. And some of the districts go outside of the counties a little bit, and some of them do not fully fill in the counties.

Q. And let's look at your house-enacted plan on page 25 of Exhibit 1, Map 5 -- or actually, you

know, could we mark an exhibit, Alex -- oh, no, we have it. Actually, I can compare it right there. And comparing it to the house-enacted plan -- or strike that.

Let's go to Region 1 first, which is on page --

MR. ROSENBERG: What is it, 19? Yeah.

BY MR. ROSENBERG:

Q. Page 19 is your house illustrative plan for Region 1. Map 3 and Map 4 is the house-enacted plan for Region 1; is that correct?

A. Yes.

Q. Okay. The enacted map that you're comparing Region 1 to covers all of Walton County; is that correct?

A. Yes.

Q. You originally had a chunk on the east corner; is that correct?

A. Yes. I previously stated that at least twice.

Q. And the enacted map that you're comparing Region 1 to includes three portions of Gwinnett County; is that correct?

A. Yes.

Q. Yours includes none of Gwinnett; is that

correct?

A. That's correct. In drawing the plans, DeKalb County was principally self-contained with a small portion of Fulton. Whereas the enacted plans go into Gwinnett County and Fulton County and Rockdale.

Q. The enacted map you're comparing Region 1 to includes only about a third of the geography of Newton County, but yours includes all of Newton?

A. I don't know what the ratio is. Whether that's based on area or based on population, I don't know.

Q. I was eyeballing it based on area.

A. Okay. Then if that's a third, then I guess you'd conclude that it's a third.

Q. The enacted map you're comparing Region 1 to doesn't include the eastern tip and southwest corner of Henry County. Your map includes all of Henry County; is that correct?

A. Yes. I drew four districts that were completely self-contained within Henry County.

Q. The enacted map you're comparing Region 1 to extends on the north tip of DeKalb County, westward into some of Fulton, but nowhere else; is that right?

A. I don't understand. The Fulton County --
Q. Well, yours extends a bit from the center of DeKalb westward into Fulton County.
A. Yes. And the enacted plan has a small portion of Fulton County to the north.
Q. It was different than yours.
A. Yes, different.
Q. And the enacted map you're comparing Region 1 to extends from the southern part of Henry County to a piece of the northern part of Spalding County, but yours doesn't do that?
A. I'm sorry. Spalding County is not in Region 1?
Q. No. The enacted map extends into -- to a piece of the northern part of Spalding County, but yours does not?
A. Yes, that's correct.
Q. And then if we go to -- let's go to pages 25 and 26, and 25 is your Region 2 map, and 26 is the house-enacted plan to which you're comparing Region 2; is that correct?
A. Yes.
Q. The enacted map of the region to which you're comparing Region 2 extends northward from Fulton County, picking up some portions of

Cherokee and Forsyth --
A. Yes, that's correct.
Q. -- is that correct?
A. Yes, that's correct.
Q. And extends eastward from Fulton to a piece of Gwinnett; is that correct?
A. Yes.
Q. But yours does not, right?
A. That's right.
Q. The enacted map of the region to which you're comparing Region 2 loses a piece of Fulton County around a quarter of the way down from the northern tip that your map has; is that correct?
A. Yes.
Q. The enacted map of the region to which you're comparing Region 2 has none of Cobb County. Yours has a piece in the southwest corner; is that right?
A. Yes.
Q. The enacted map of the region to which you're comparing Region 2 has a piece of Fulton County on the southeast corner, and yours has none of that?
A. I'm sorry. Could you repeat that again, please?

Q. Sure. The enacted map to which you're comparing Region 2 has a piece of Paulding County --

A. Yes, Paulding County. That's correct.

Q. -- to the southeast corner. Yours has none of Paulding County?

A. That's correct. My districts in that area did not cross into Paulding. Instead it --

Q. The enacted map of the region to which you're comparing Region 2 has a piece of Carroll County, but yours does not have any part of it?

A. That's correct?

Q. The enacted map of the region to which you're comparing Region 2 has different parts of Coweta County than does your map; is that right?

A. Yes. The Coweta portions are -- there are two whole districts in Coweta in the illustrative plan, and it's split differently in the enacted plan.

Q. And the enacted map of the region to which you're comparing Region 2 has very different parts of Spalding County than does your map; is that right?

A. It has a lot of the same area.

Q. Well, yours -- the enacted map has

primarily -- you've got somewhat more than the western half, right? And your map has mostly all of Spalding except for a chunk on the southwest corner; is that right?

A. In my illustrative plan, I have one whole district contained within Spalding County. Spalding County has about 1.16 percent of a house district, so I created one district wholly in Spalding and the residual is that southern portion. That's not --

Q. I'm sorry. I didn't mean to interrupt you.

A. Oh, that's not in the illustrative District 134.

Q. And the enacted map of the region to which you're comparing Region 2 has a chunk of Henry County, and your map has none; is that right?

A. That's right.

Q. Now, did anything stop you from drawing an illustrative plan precisely within the contours of a group of districts in the enacted plan?

A. Yes? That was --

Q. What?

A. -- absolutely not what I was intending to

do. I was drawing from a blank slate with the whole state. And as I said in my report, I did not make reference to the existing districts. So that would have been exactly counter to what I was doing.

Q. But you could have drawn from a blank slate by just saying, Okay, I'm going to pick these districts all from the enacted plan, and I'm going to draw my lines within that outside boundary of those districts, right?

A. No. That seems to be the exact opposite of a blank slate.

Q. Without taking into consideration race, you could have done that, though?

A. No. It wouldn't have fit into the rest of the illustrative plan that I had drawn. By definition, they're different.

Q. Did you do or undertake any analysis as to the difference in the racial demographics of your Region 1 and the racial demographics of the districts that comprise the region to which you're comparing it to?

A. I don't understand. I defined the region as primarily those counties and then looked at the districts within those counties, and some of them

go outside or don't fully take the population from the counties.

Q. But the districts to which you're comparing your Region 1 to have different racial demographics than the district -- within the districts in Region 1 as combined; is that correct?

A. I'm not sure I understand the question.

Q. The racial demographics of the districts in the enacted plan to which you're comparing your Region 1 are different; is that correct?

MR. TYSON: Object to form.

A. I still don't understand what you're saying.

BY MR. ROSENBERG:

Q. I think you earlier testified that you agreed that the racial demographics of Region 1 differ from the racial demographics of the districts that comprise the region to which you're comparing your Region 1 districts.

MR. TYSON: Object to form.

A. You asked me how I chose my region, and I stated what I stated in my report; that it's primarily based on the contiguous counties within the area. And I pointed out that I picked some of

those counties because they're associated with each other in the enacted plan, and the racial demographics of the districts are what they are.

BY MR. ROSENBERG:

Q. And they're different from the districts that you set forth in your Region 1. The racial demographics of those districts as combined are different than the racial demographics of the districts as combined to which you are comparing your Region 1 districts.

MR. TYSON: Object to form.

A. I didn't undertake that kind of analysis here. I didn't aggregate the districts into a single super district of 28 districts; no, I didn't do that.

BY MR. ROSENBERG:

Q. Could the compactness of the enacted house map as compared to the -- strike that. Could the compactness of the region in the enacted house map to which you compare your Region 1 be affected by the differences in the geographic area covered by the districts in the enacted map to which you're comparing Region 1 and the districts in Region 1?

MR. TYSON: Object to form.

A. As I said in my report, I picked an area that was substantially the same area based on counties and the districts that were associated crossing county lines. The districts that I chose are the districts that I chose.

BY MR. ROSENBERG:

Q. Well, I understand the districts that you chose are the districts that you chose. But could the geographic area of the districts to which you're comparing the districts that you chose for your Region 1 affect the relative compactness scores between the districts in your Region 1 and the districts in the region to which you're comparing them from the enacted plan?

MR. TYSON: Object to form.

A. We're back to Region 1 now? There's a great deal of overlap in the districts.

BY MR. ROSENBERG:

Q. Did you do any analysis to see whether the differences, aside from the overlap, could affect the compactness -- relative compactness scores of your Region 1 and districts -- and the districts to which you're comparing them from the enacted map?

A. I didn't undertake to do that analysis.

I didn't do that in my report.
Q. Thank you.
MR. ROSENBERG: It's -- I think we're at a time to break, if you're okay, breaking for lunch? It's 12:25 -- or oh, wait, it's -- we're in different time zones there -- no, we're in the same. Why don't we take a 45-minute break?
MR. TYSON: (Nods head affirmatively.)
THE VIDEOGRAPHER: Stand by.
MR. ROSENBERG: Brian, does that work for you?
THE VIDEOGRAPHER: Stand by. The time is 12:26 p.m. We are off video record.
(Recess)
THE VIDEOGRAPHER: The time is 1:18 p.m. We are back on video record.
BY MR. ROSENBERG:
Q. Hi again, Mr. Morgan. Before the lunch break, you mentioned that you had drawn different configurations before you came up with your ultimate illustrative plan. Did you calculate the compactness in those other configurations?
A. No. I didn't run compactness reports on those.
Q. Did you do any analysis of those

configurations in terms of the movement of racial groups, the -- or the creation of majority-minority districts?

A. No. As I stated, I did not look at any racial data in the drafting of this plan.

Q. Turning back to your initial report, Exhibit 1, and looking at the maps on pages 38 and 39, the map on 38 being the senate -- your senate illustrative metro region and on 39 being your -- or being the senate-enacted metro region; is that correct?

A. Yes.

Q. And how did you choose what to include within your illustrative metro region?

A. Well, as I pointed out, I generally looked at the counties in the area. So it's on page 36, Douglas, Fulton, Coweta, DeKalb, Clayton, Fayette, Henry, Rockdale and Newton Counties, and that comprised the region.

Since the senate districts are larger than the house districts it seemed reasonable to do a single region.

Q. Now, your comparison of the senate regions does not compare to all of the regions that Dr. Duchin set forth in her report; is that

correct?

A. Which region -- which report? I'm sorry.

Q. Well, for example, she -- in both the house and the senate, she has -- I should say in either the house or the senate, she has calculated or set forth majority-minority maps for the's east black belt, for southwest, or southeast, and you don't have -- you don't address those in your maps; is that correct?

A. When was Dr. Duchin's report filed?

Q. This is right. This is your original report. But in any report, you don't set forth any maps compared -- you don't do a comparison with any of those regions; is that correct?

A. I'm not sure when Dr. Duchin's report was filed, but my report was filed December 5th of 2022.

Q. But you chose only to focus on the regions that you did in those maps. Your illustrative map for the senate is limited to the metro region, and your illustrative maps for Region 1 and 2 are listed to the counties that you set forth in your report?

A. Yes. That's what's in the report.

Q. And your senate illustrative plan does

not cover precisely the same terrain. The metro regions did not cover precisely the same terrain as the enacted metro region on page 39 of your report; is that correct?

A. The districts in the illustrative plan and the enacted plan are slightly different, but the counties that I chose for the region are the same counties.

Q. The enacted senate map includes all of -- other -- includes almost none of Fayette County, but yours includes all of it; is that correct?

A. Yes. The enacted district -- the district that includes Fayette County, I believe, has Fayette and Spalding and I think some more territory as well.

Q. And the enacted senate map includes only the western third geographically of Henry County. Yours includes about two-thirds geographically of Henry County including the entire northern half?

A. Yes.

Q. And the enacted senate map includes the southern part of Gwinnett County. Yours includes -- excludes all of Gwinnett?

A. Yes. My -- in my illustrative plan, there are four senate districts entirely within

DeKalb County. And in the enacted plan, there are seven districts that include a portion of DeKalb County.

Q. And the enacted senate map excludes the northern part of -- the northern piece of Fulton County that you include in yours?

A. In my illustrative plan, the -- I don't have the district that includes the very top portion of Fulton County.

Q. And the enacted map includes portions of Cobb County while yours excludes all of Cobb County; is that correct?

A. Yes. I believe, in my illustrative plan, I had districts that were self-contained within Cobb.

Q. And the illustrative -- the enacted senate map and yours have different parts of Douglas and Newton Counties that are included, right?

A. Yes. But I would say it's -- in that case, it's substantially the same territory that's not included in both the senate-enacted and the senate illustrative maps.

Q. And as was the case with the house regions, the racial demographics of the enacted

senate map metro region and the racial demographics of your illustrative metro region -- senate metro region are fairly different; is that correct?

A. I'm sorry. I didn't hear the last part of that question.

Q. Sure. As was the case with the house regions, your senate illustrative map region has different racial demographics from the senate-enacted metro region?

MR. TYSON: Object to form.

A. The districts in the regions are the districts in the illustrative map, and the enacted map are slightly different districts, yes. But it covers roughly the same geographic area.

BY MR. ROSENBERG:

Q. But you've done no calculation as to what those differences are in terms of the racial demographics?

A. Well, the racial demographics of the districts are included in the report.

Q. You've done no calculation as to how those racial demographics affected your conclusions as to compactness?

MR. TYSON: Object to form.

A. Well, as I stated concerning the house, I didn't create a super district of a dozen districts and looked at the racial demographics of a super district.

BY MR. ROSENBERG:

Q. So you did not calculate what the effect of any differences in racial demographics between your -- between the senate-enacted metro region and your illustrative senate metro region were?

A. Again, they're not precisely the same boundaries, and the district demographics are all included in the report. In the appendices, all of the districts are included. So if there's information about the racial demographics, it's in the appendix as well.

Q. But you did not do a calculation as to the effect of the differences in the racial demographics between the senate-enacted metro region and your illustrative senate metro region?

A. The differences between them? No, I guess I didn't do that. There are some boundaries that are different, as we've discussed.

Q. And you did not do a calculation as to how those differences affect the relative compactness of your illustrative senate metro

region compared to the enacted senate metro region?

A. Well, I provided the compactness scores for the districts in the area, and I made some conclusions and observations of that in my report.

Q. But you did not calculate how the differences in racial demographics as between the senate-enacted metro region and your illustrative senate metro region work?

A. I didn't create a supercluster of districts. I didn't aggregate all of the data from the districts into a single group.

Q. And therefore, you did not do that calculation?

A. As I said, I didn't put them -- all of those districts together in one super district.

Q. So as to compare the effect of the differences of the racial demographics as between the senate-enacted metro region and the illustrative senate metro region on compactness; is that correct?

A. That was not what I was looking at in my report.

Q. Okay. On page 18, paragraph 28, you say, Looking at the districts in the house illustrative

plan, the districts look compact and only cross country [sic] lines in a limited way. That's what I was looking for earlier.

When you say the districts look compact, the different kind of eyeball tests you made of compactness?

A. Well, I provided an inset of the house illustrative plan in Region 1. And to me, they appear to be compact and they clearly don't cross county boundaries except in a limited way.

Q. And that's what you meant by they look compact?

A. In looking at this, they appear to look compact to me.

Q. And that's why earlier when I said I was looking for where you said you eyed it. Is this where you, kind of, eyed it, kind of an eyeball check on compactness?

A. I didn't say that anywhere in my report about an eyeball test. That's your characterization of it.

Q. My -- I just asked about my characterization. What I'm asking you is: Is that what you did, just looked at this and said, Yeah, they look compact?

A. As a starting point, yes.
Q. Okay. On page 20, paragraph 29, you say that the contrasting compactness leads one to ask why these maps of the region are so different. While they may be many causes, reviewing the compactness of the districts along with the 18-plus AP black percentages allows for analysis of the impact of racial considerations. Did I read that correctly?
A. Yes.
Q. What are some of those many causes you refer to?
A. I didn't identify them, and I -- there's possibilities that could be many things, but I was focused on looking at the racial information because, as I said, I drew the plan without racial considerations. And then at this point, I added them in to look at that.
Q. Well, other than racial considerations, you said, While there may be many causes. What are the many causes?
A. I don't have a list of many causes.
Q. Do you know of any of the many causes?
A. I -- it -- I suppose that's open to interpretation.

Q. Did your analysis rule out any of these other many causes?

A. I postulated that there could be other causes, and I looked at one of them.

Q. But you didn't rule out any others; is that correct?

A. I didn't specify what they were, so I couldn't rule them out.

Q. Did you -- you mentioned earlier that you looked at Dr. Duchin's rebuttal report yesterday; is that correct?

A. Yes.

Q. Is that the first time you read her rebuttal report?

A. I think I had been given some information from it before then, but yesterday I read it in full.

Q. When you say "given some information," what do you mean?

A. I mean, I had a discussion with Mr. Tyson about it.

Q. Did you review that portion of Dr. Duchin's rebuttal report that discussed her experiment to examine whether there's evidence of a relationship between the lack of compactness and

the increasing racially effective districts?
MR. TYSON: Object to form.
A. I think I looked at that portion.
BY MR. ROSENBERG:
Q. And by the way, before I ask you about that, is your testimony that there is a statistical correlation between compactness and the creation of majority-minority districts?
A. I didn't say that in my report.
Q. So you are not opining that there is one.
A. I didn't say that anywhere in my report.
Q. So therefore, you do not have an opinion that there is one; is that correct?
A. I didn't offer that in my report. And here today, I don't know that I would offer that opinion.
Q. What's your understanding of what Dr. Duchin did in her rebuttal report in terms of examining the relationship between lack of compactness and racially effective or majority-minority districts?
A. In her rebuttal report?
Q. Yes.
A. It appears to me that she had her computer draw thousands of plans that were

apparently different from each other, and then she analyzed some of those plans.

Q. Have you analyzed what she did there?

A. I don't have the data to analyze it, but I read what she put in her report.

Q. Do you have any opinions as to what she put in her report?

A. That's a broad question. I may have some opinions about what's in her report.

Q. When you say you may have opinions, you mean you may have opinions sitting here today?

A. Again, that was a broad question about do I have any opinions about her report.

Q. Well, the question was specific. Do you have any opinions about this specific aspect of her report?

A. And what aspect is that?

Q. The aspect dealing with the experiment that she said she did as to whether there's evidence of a relationship between lack of compactness and increasing majority-minority districts?

A. Yeah. I don't know what she did in her experiment, but that's clearly not what I did in my report.

Q. Well, I understand it's different than what you did in your report. Is that the extent of your opinions as to what she did?

A. No. I looked at some of the maps that she listed for visual comparison, and I have some opinions on those maps.

Q. And what's your opinions on those maps?

A. I think that the example maps have many districts that are odd to me and don't make a lot of sense.

Q. And which maps are those?

A. The one -- the visual comparison maps that are on page -- Figure 7 and Figure 8.

Q. Well, that's not the part of the report that I'm asking about right now.

A. Is it not a subset of the report that -- of the maps that she created?

Q. Let me just -- I'm referring to that portion of her report on page 4 to 5, Section 1.3.

A. Okay. And what I'm wondering is if the visual maps are a part of her hundred thousand steps or the maps that she created.

Q. Do you have an understanding of what Dr. Duchin did on -- in Section 1.3 of her report?

A. Not really. It seems very arcane to me.

Q. What does "arcane" mean?
A. I think we understand the common definition of that.
Q. Well, I'm not sure. I want to make sure that you and I are speaking the same language. What does arcane mean in the context of your answer just now?
A. Difficult to understand, obtuse.
Q. I'm sorry. Difficult to understand and what was the second part?
A. Obtuse.
Q. Obtuse. And any other reactions to what Dr. Duchin did in Section 1.3 of her report?
A. I don't know at this point. I don't have anything specific in mind.
Q. Is it your intention to analyze what Dr. Duchin did in Section 1.3 of the report?
A. If I was given some additional data, I might look at it. In my experience, I do like to look at maps and that's why I was pointing out the visual-comparative maps which I find interesting and useful for my analysis.
Q. And what are the additional data that you think you don't have?
A. For -- I don't know. She doesn't -- I

can't tell if she's intending to admit into the record those individual plans as plans with data sets.

Q. And how is that relevant to your concerns about what she did?

A. Well, one of the considerations is there's a discussion of the number of black-majority districts. I have no basis to know other than the total number that she says is equal to the number of the majority-black districts in the enacted plan. I have no idea or sense of what those districts are, what are the ranges of the black population in those districts, where are they located, what -- you know, how were they constructed. I have no information about that.

Q. Any other information you think you need?

A. If I were to do more analysis, I think it would be useful. Because, for example, just counting the numerical number of black-majority districts from a numerical or mathematical perspective. Again, I have no idea about the basis for those districts, how were they created, what minority communities are potentially represented by these constructed districts.

Q. Anything else?

A. I think that covers some of the material that I can think of now.

Q. In your report, you had mentioned that there were more crossing of county lines in the house- and senate-enacted plans compared to your illustrative plan. But you don't mention crossing county lines as being the result of an attempt to create additional majority-minority districts; is that correct?

A. I don't recall specifically saying that.

Q. And is there a reason you did not say that?

A. I may have referred to it indirectly when I point out that DeKalb County was -- in the senate, was split into seven different districts as opposed to the illustrative plan where it's four.

Q. Other than that, did you analyze whether crossing county lines was done by the map drawers in any instance in order to increase the number of majority-minority districts?

A. That's the instance that comes to mind.

Q. Is it possible that the number of county splits was also done to decrease the effectiveness of black voters in any district?

MR. TYSON: Object to form.
A. I don't know. I didn't analyze that in my report.
BY MR. ROSENBERG:
Q. Now, turning back to house Region 1, you undertook a comparison of a couple of individual districts; is that correct?
A. I believe so.
Q. And specifically on page 22, paragraph 30, you discuss a comparison of your illustrative District 90 with enacted plan District 89, correct?
A. I'm sorry. What paragraph was that?
Q. Paragraph 22, page 30 -- oh, no, not 20 -- yeah -- I think that page 30 is a mistype I made, but it is paragraph 22 -- oh, page 22.
On page 22, paragraph 30, you start off by saying, Looking at some specific districts shows a compactness, et cetera, et cetera, and that's where you discuss comparing your illustrative plan, District 90, with an enacted plan and District 89; is that correct?
A. Yes.
Q. And those are the only -- that's the only comparison as to your house Region 1 that you set

forth in narrative of your report; is that correct?

A. Yes. It was an illustrative example.

Q. Did you undertake a comparison of any other individual districts in Region 1?

A. Well, all of --

Q. Similar to your comparison of District 90 illustrative with District 89 enacted?

A. Well, all the compactness scores on the racial information for each of the districts in the region are on the charts, Chart 3 and Chart 4. And also in the appendix, are the compactness scores for all the districts in the illustrative plan and the enacted plans.

Q. I understand that. But in this paragraph, you actually took one district and you compared it -- one district from your illustrative plan and you compared it to a district in your enacted plan. Did you undertake a similar analysis comparing a specific illustrative plan district with a specific enacted plan district in Region 1 other than your comparison of 90 and 89?

A. As I said, all the data is available in the report. And in the body text of the report, I have that example that you referenced.

Q. Right. I understand that. Did you undertake a specific comparison of one district from the illustrative plan with another district in your -- in the enacted plan similar to your description as set forth in paragraph 30 on page 22 and 23?

A. That's the only one that's included in the report.

Q. Did you consider comparing any other two districts, one from your illustrative plan with another from the enacted plan, from house Region 1?

MR. TYSON: Object to form.

A. Well, again, all the data is provided in the table, and it's possible for one to compare any districts that one wants to compare.

BY MR. ROSENBERG:

Q. And is that -- and you're saying comparing is just simply then by picking any district from your illustrative plan and comparing it with any district from the enacted plan according to APB and compactness scores?

A. No. That's not what I said. I'm saying that you could compare any district you want. But in the case that I chose, I picked districts that

were in the same geographic area.

Q. Okay. Now, we're getting a little closer. Did you undertake any analysis of any other two districts that were in the same geographic area from Region 1, similar to the analysis that you set forth in paragraph 30?

A. As I said, I have the one example in the text of the report.

Q. So is the answer that you did not make any other comparison of two districts in the same geographic area from your illustrative plan in Region 1 compared to the enacted plan in Region 1 other than that which is set forth in paragraph 30 on pages 22 to 23?

A. Again, that is the example that I included in the text of the report.

Q. That's not my question. I understand that is the example. My question is: Did you compare any other two districts that were in the same geographic region, one from your illustrative plan and the other from the enacted plan other than the two that are described in paragraph 30? It's a yes or no question.

A. Okay. The answer is I don't think so, but I'm not sure. I don't recall.

Q. Okay, thank you. Thank you. Now, why did you select these two districts?

A. Well, again, I talked a lot about how the districts in DeKalb County are elongated, and I pointed out that district as an example of one that is elongated, and I provided the information about that district and the comparable district in the illustrative plan.

Q. And why did you think it was comparable?

A. Because it's the same geographic area and the black percentage is lowered by elongating the district.

Q. So you chose those two because you looked at the map, and you saw that one district was elongated and that you believed that that elongation is for the creation of another black district; is that correct?

MR. TYSON: Object to form.

A. What I point out in the text of my report is that the district in the enacted plan is lowered by connecting a heavily black-populated area to an area that's less heavily populated with black population to the north.

BY MR. ROSENBERG:

Q. And by the way, what district are you

talking about that was created in the enacted plan that you are stating was created because of the elongation of enacted plan house District 89?

A. It is District 89; that's the one.

Q. And you're saying that that is what is the -- is the majority-minority district that was created by the elongation; is that correct?

A. The enacted plan, District 89, has a Reock compactness score, reading from my report, of .14 and Polsby-Popper of .1, and the district is 62 percent black. In that same area in the illustrative plan, the District 90 in southern DeKalb is .4, Polsby-Popper; .4, Reock; and it's 94.9 percent voting-age black population. So I would say that -- pointing out that the map drawers did not create a 94.9 percent black district. Instead they created a 62.5 percent black district.

Q. Are you saying that there were no other factors that can explain the compactness of District 89 other than the creation of another majority-minority district?

A. I didn't state that in my report.

Q. Could changes in other districts within the region that you do not analyze affect the

compactness score of the specific districts that you do analyze?

A. I suppose. I looked at that district and the other -- there are several districts that are elongated in that region as well.

Q. Could changes in districts that are outside the region that you did not analyze affect the compactness scores of the specific districts within the region that you selected to analyze?

A. I don't believe so.

Q. You say on page 23, paragraph 30 that this allows the black -- and this relating to the compactness -- lack of compactness, allows the black population to be redistributed and to create other majority-black districts, right?

A. Yes.

Q. Did you do any analysis to determine whether this was actually the case?

A. I believe that to be the case based on my experience and the work I did in analyzing the districts that were drawn in the enacted plan and the illustrative plan.

Q. When you say your experience, what do you mean?

A. My experience is one of the techniques

that map drawers use to lower the black population of a prospective district is to include areas of lower concentrations of African-American voters. And that, to me, is exactly what's happening in the DeKalb County area.

Q. Now, other than your analysis of what's happening in DeKalb County, are you drawing any broader conclusions as to what happened elsewhere in the house redistricting in terms of the creation of additional majority-minority districts?

A. In this specific report, I'm comparing the illustrative plan to the enacted plan. In other reports, I've compared other plans to the enacted plans and I've seen evidence of this type of technique being used in the drafting of those other plans.

Q. What other reports are you referring to?

A. I'm referring to the reports in the Alpha case and the Grant cases.

Q. But not in the Georgia NAACP case or the Common Cause case; is that correct?

A. Well, actually, in the context of this report, which I filed on December 5th, I did not have Dr. Duchin's report. So I didn't look at her

district's configurations when considering my opinion about the illustrative plan that I drew and the enacted plan.

Q. Right. But then my question was: Other than your analysis comparing your illustrative plan with the enacted plan for house Region 1, insofar as you focused on this one district in DeKalb County, did you focus on districts outside of DeKalb County in terms of Region 1?

A. Yes. But it includes DeKalb County. The enacted district that includes Rockdale -- I can't quite read it -- 93, I think, includes a portion of DeKalb, Rockdale and Newton.

Q. And are you saying that they were more majority-minority districts, other than District 89, that were created by what you say was a lack of compactness?

A. I believe so. I believe the Rockdale district that I just described is an example of that.

Q. Did you analyze whether there were a dilution of black votes by spreading them out among several districts in any place in the house-enacted map?

MR. TYSON: Object to form.

A. That was not something I looked at in my report of 12/05 in this case.

BY MR. ROSENBERG:

Q. Did you do an analysis anyplace in terms of the senate-enacted plan?

MR. TYSON: Same objection.

A. I didn't do that type of analysis in this report of 12/05.

BY MR. ROSENBERG:

Q. Did you do that analysis anyplace?

A. In the other reports, I have compared the enacted plan to other plans that I've seen.

Q. And when you say "the other reports," again, you're referring to the -- your rebuttal reports in the Grant and Pendergrass cases?

A. I believe so and possibly in the initial reports as well. When I say "initial reports," I produced some information in the preliminary injunction phase that was submitted in the style of a report. If it wasn't a report, it was maybe an affidavit. I'm not sure what the distinction is.

Q. But not in this case?

A. Not in this case.

Q. On page 29, paragraph 33, turning to

house Region 2, you, again, select a single district and compare it with what you call comparable district. And in that case, you're comparing illustrative District 59 -- your illustrative District 59 with enacted District 59. Do you see that?

A. I'm not sure -- 29, okay. Okay, I see. I was looking in the wrong spot, okay.

59 --

Q. And again, what do you mean by "comparable district"?

A. A district that's in the same geographic area.

Q. Were there other comparable districts to District 59 other than enacted District 59?

A. I suppose one could argue that the district to the south -- this is a little hard for me to read, so I can't make out the number here. It's possible there's two districts.

Q. And what are you looking at, Mr. Morgan?

A. I'm looking at page 26, Map 6, house-enacted plan Region 2.

Q. Okay. Maybe we can go by color. I agree with you. I can hardly read this myself.

A. We can zoom in on the electronic copy.

MR. TYSON: And from looking at the computer --

MR. ROSENBERG: Alex is doing that right now.

THE WITNESS: Okay.

MR. TYSON: And looking at this on my screen, Ezra, it looks like District 59 on the enacted plan is a, kind of, lime green color in the middle of Fulton County. Is that what we're looking for, or we're looking for 58?

THE WITNESS: No, no. That's correct.

MR. TYSON: Okay.

A. So in my report, I specified 59 to 59 and I suppose another comparable district might be District 58. From my point of view, if you start with the illustrative plan, in the illustrative plan that I drew, District 59, Map 5, page 25, I'm looking at that area, which is District 59. And I chose the comparable district, which is also in green, of 59. It's probably an argument that District 58 could also be in the similar region. And again, starting from the illustrative plan, which is the way that I was looking at this.

BY MR. ROSENBERG:

Q. Did you do an analysis comparing 58 with

59?

A. Well, let me see. I could do that. So the --

MR. TYSON: Just say what you're looking at too.

A. I'm referring to Chart 7 on page 28, and District 58. The African-American percentage is 63. The Reock score is .13, and the Polsby-Popper is .13. And that's comparing to 59 in the illustrative plan, which is African-American percent 88.6; Reock is .41 and the Polsby Popper is .36. So I suppose you could look at District 58 and I think you could make a case that that's in the same geographic area as well.

BY MR. ROSENBERG:

Q. Going back to Region 1 --

A. Okay.

Q. -- is there any -- are there any comparable districts to District 89 in the -- that -- and you compared 90 to 89. Are there any comparable districts that you could have compared your illustrative 90 to?

A. Possibly District 84 in the enacted plan. That has some of the same territory and District 90 in the illustrative plan. And that is on page

22, Chart 4, the African-American-percent voting age is 73.7; the Reock is .25, and the Polsby-Popper is .2.

Q. How about District 90?

A. I think 90 probably corresponds more closely to the illustrative plan 89 on page 19, Map 3.

Q. And why is that?

A. It -- they cover more approximately the same territory.

Q. In turning to page 44 -- page 41, paragraph 44, in your senate comparisons, you chose to compare in your report District 55 with enacted District 10; is that correct?

A. Yes.

Q. And again, why did you believe those were comparable?

A. Because I'm looking at the area in southern DeKalb, which is in the illustrative version of District 55, and the enacted District 10 has that same area of southern DeKalb.

Q. Well, it also has some of Henry County, doesn't it?

A. Yeah. It has a big section of Henry County. It follows the county line and stripes

south into Henry County.

Q. Let's go to your ultimate conclusion on page 48, page 42, where you say, My review of the enacted house and senate plans combined withdrawing the blind illustrative plans demonstrates the tendency that racial considerations had an effect on district composition and district shapes in the enacted plans. What does the word "tendency" mean in your conclusion?

A. That particularly in the areas of high concentration of African-Americans, the enacted plan -- again, DeKalb is the easiest one I'd go back to, to point to. But it takes that area of high concentration and it pies it out into other areas with lower concentration, District 10, 44, 42, 41, 55, and 43 all are -- have that same core of DeKalb County African-American population.

Q. To your knowledge, did the people who drew the Georgia maps take partisan considerations into account in their drawing of the districts?

A. I don't know.

Q. If those who are involved with drawing maps have testified that partisan considerations were taken into consideration when drawing some of

the maps, would you have a basis to disagree with them?

A. I don't have any basis to disagree or confirm that.

Q. And in fact, according to your analysis in your rebuttal report, the enacted maps created more Republican districts; isn't that correct?

A. More than what?

Q. More than -- well, certainly more than the illustrative plans of Dr. Duchin?

A. Oh, clearly. She had many more Democratic-leaning districts than the enacted plan.

Q. Assuming that legislators wanted to create more Republican districts, do you think it is more likely that they would move populations based on race to create more performing black districts or more likely that they would move populations based on race in order to create fewer performing black districts?

MR. TYSON: Object to form.

A. I really have no idea. There's many possibilities to achieve that hypothetical goal that you're postulating.

BY MR. ROSENBERG:

Q. Does your analysis rule out the possibility that if legislators wanted to create more Republican districts that they would do that by moving populations based on race in order to create fewer performing black districts?

A. I didn't perform any kind of political analysis, other than in the rebuttal report, where I tallied the number of districts in the enacted plan and compared them to those of Dr. Duchin.

Q. I'd like to turn to Dr. Duchin's rebuttal report, which is Exhibit 4, and specifically the chart on Section 1.2, page 3. Do you see that?

A. Yes.

Q. Do you dispute any of Dr. Duchin's calculations in this chart?

A. I -- her definition of effective opportunity was not apparent to me from this report, but my understanding is that it's contained elsewhere in her other report.

Q. So you don't have a basis because you don't recall how she defined it in the other report. Is that what you're saying?

A. My understanding is that it's related to winning or losing a series of statewide races and that somehow that imputes effectiveness --

effective opportunities for minority candidates.

Q. And that was in her original report. Is that your understanding?

A. That's my understanding. There were some charts along that line that I saw.

Q. And you did not respond to that portion of her report in your -- strike that.

This is -- that you did not respond to the -- her effectiveness analysis that was set forth in her original report in your rebuttal report; is that correct?

A. No. I didn't set out to make an analysis along those lines, but I did -- I did, in my report, show some summary information with racial demographics, splits, and political information and compactness.

Q. And other than your inability to address the effective opportunity column here, do you dispute any other portion of Dr. Duchin's charge as set forth in Section 1.2 on page 3 of her rebuttal report?

A. Well, I wouldn't characterize it as an inability. I did not set out to analyze that portion of her report, so I can't say that I was unable to do that.

Q. Other than you're not responding to the effective opportunity column for the reasons you just said, do you have any other disputes with any of the calculations of Dr. Duchin in the chart on Section 1.2 of her rebuttal report?

A. The chart itself I believe to be a summary of information that was contained in other reports. However, I've not independently confirmed her assertion about the majority black-Hispanic citizen voting-age population of the districts that I drew in my illustrative plans.

Q. Other than that, any other issues with that chart?

A. Again, it appears to be a summary of racial data, and then the effective opportunity, which I discussed, is based on her definitions from a previous report.

Q. Let's go to your rebuttal report, which is marked as Exhibit Number 2. And on paragraph 5, you say, I have been asked to review the congressional, house of Representatives and State senate plans considered and adopted by the Georgia General Assembly and compare them to the proposed congressional, house of Representatives and State

senate plans considered and adapted by the Georgia General Assembly and compare them to the proposed congressional house and senate plans drawn by Dr. Moon Duchin and offer opinions regarding my analysis. Do you see that?

A. Yes.

Q. And in the next paragraph, paragraph 6, on page 3, you say, As a result of this analysis, it is my opinion that each of the plans submitted in Dr. Duchin's report and the unity plans has a significant increase in Democratic performance when compared to the enacted plans. Did I read that correctly?

A. Yes.

Q. Are there any opinions, other than that set forth in paragraph 6 in your rebuttal report, that you intend to provide at trial that you have reached as a result of your review of Dr. Duchin's report?

A. In reviewing her reports, the information I have provided in my report is that that you read in paragraph 6, and that is what's included in my report.

Q. Did you review Dr. Duchin's data that was supplied with her original report?

A. I reviewed the block assignment file data that I uploaded into my Maptitude report. I looked at her report, and I looked at some of the data that was in that report. But primarily for my analysis, I used the block assignment files that she provided for the 10 plans referenced in the reports.

Q. You note that you were provided with election data files used by the Georgia General Assembly. You say that in paragraph 8 of this report -- I mean, I'm sorry -- paragraph -- is it 7, I guess -- 6 -- oh, I'm sorry.

Well, let me just ask the question: Were you provided with -- Okay. Now, I've got it -- in paragraph 4, you say you were provided with election data files used by the Georgia General Assembly during the redistricting process. What files were those?

A. Those were given to me by counsel. They were part of the data that was uploaded into Maptitude for me to draw plans and to analyze other plans.

Q. And can you describe what that data consisted of?

A. I believe they were election results for

elections from 2018 and 2020.

Q. And election results, you said?

A. Yes.

Q. In 2018 and 2020. Did you have access to more elections than -- so you did have access to more elections than just the Trump-Biden and the PSC elections in 2020; is that correct?

A. Yes.

Q. In your tables that begin on page 5, you talk about county splits. You don't talk about the number of pieces that counties were split into. Do you think that county pieces is relevant to assessing whether redistricting was done in accordance with traditional districting principles?

A. It's another data point that can be discussed. I would say that it's -- again, it's just another piece of data. Sometimes I find it interesting because some map drawers will look at the county splits and, for example, remove a county split but then introduce another county division in a county that's already been split. So I think that gets to your point that there can be a difference or is a difference between a split county and the number of splits of a county.

Q. And if there were more splits -- strike that.

The number of splits would indicate even more deviations from traditional districting principles than simply the number of counties that were split, correct?

A. No. I wouldn't --

MR. TYSON: Object to form.

A. I wouldn't agree with that. I think it really depends on the metrics that the legislature or the governing body is used to looking at. In my experience, the county split metric is something that's fairly simple and easy to explain and understand. When you get to these other types of splits, it can be more complicated and a little more difficult to explain.

BY MR. ROSENBERG:

Q. By the way, are there any noncontiguous counties in Georgia?

A. My understanding is that there are some, yes.

Q. Did you take that into consideration in calculating your county splits?

A. I ran the reports that came from Maptitude, so I'd have to look at that and see how

that affects the calculations.

Q. And we already talked a little bit about voting precinct splits on these tables; that's based on the VTD data, correct?

A. Yes. It's based on the data that I was given by counsel that was represented to me as the data that was used in the legislative process, and it's based on the VTDs or precincts that were in place at the time of redistricting.

Q. And again, you did not calculate the number of pieces that precincts were split into; is that correct?

A. That's not true. In the report, I think some of that information is given. Like, you can extract it from some of the Maptitude reports. I didn't bring it up into the body of the report, but I believe some of that information is provided in the appendices in the reports.

Q. Now, you analyzed the number of districts won by Biden and by Trump and the number of districts won by Bryant and Shaw in the PSC election, right?

A. Yes.

Q. Why did you decide to use those two elections for purposes of your comparison?

A. Well, in my experience, when I work with legislators for purposes of drawing plans that they would use for elections, the legislators and stakeholders often look at the presidential result. That is almost always in my experience an important race to them. As far as the public service commissioner, generally, those are seen to be a partisan election with lesser-known candidates.

And in my experience, public service commissioners and similar statewide elections for lower offices are useful indicators of partisan strength. So I chose that election and the presidential.

Q. Do you know how close the Bryant and Shaw election was?

A. I'd have to look at the data, but I believe that Shaw won. I think it was close.

Q. Did you run any comparisons using more than just those two elections?

A. No. Those are the two that I chose. I thought presidential made sense, and I thought that the statewide public service commissioner made sense.

Q. And was that your decision?

A. Yes.
Q. Did you consider analyzing the districts on the basis of effectiveness for black voters?
A. No. That was not any type of analysis that I was -- considered doing.
Q. Do you have an opinion as to whether you analyzed -- as to whether -- if you did analyze the districts on the basis of effectiveness for black voters, whether you'd get similar numbers to the number of districts in your charts that were won by Biden?
A. I don't understand. The number of districts won by Biden are the number of districts won by Biden. It wouldn't change.
Q. I understand. I'm not saying -- ask you whether the number of districts won by Biden would change. I asked you whether your opinion -- as to whether if you analyzed the districts on the basis of effectiveness of black voters, whether that would produce numbers similar to the number of districts in your charts that were won by Biden?
MR. TYSON: Object to form.
A. I have no idea.
BY MR. ROSENBERG:
Q. Did you do any analyses of the

demonstrative districts in Dr. Duchin's first report that were coalition districts?

A. Well, in the sense that they were contained in her entire plan, I did the analyses that I reported in my report.

THE WITNESS: If there's no pending question, can I take a break, please?

MR. ROSENBERG: Sure. How long would you like, Mr. Morgan?

THE WITNESS: Six to eight minutes.

MR. ROSENBERG: You got it. You're very precise.

THE VIDEOGRAPHER: Stand by. The time is 2:22 p.m. We are off video record.

(Recess)

THE VIDEOGRAPHER: The time is 2:33 p.m. We are back on video record.

BY MR. ROSENBERG:

Q. Hi, Mr. Morgan. I -- going back to your charts on pages 5 through -- I believe it's 13 or so of your rebuttal report. In each of those charts, you compare Dr. Duchin's plans with the enacted plans on the basis of various percentages of APB over 18; is that correct?

A. Yes.

Q. Why did you undertake that comparison?
A. In the preliminary injunction hearing, I had provided similar information. And then also in my illustrative report of 12/05, I had provided information using breakdowns similar to that.
Q. Again, when you talk about the preliminary injunction, you're talking about the preliminary injunction in the Grant and Pendergrass case; is that correct?
A. Yes. Sorry for not clarifying that.
Q. And when you talk about your 12/05 report, again, that's a report from those cases; is that correct?
A. No, that's in this case here, the illustrative plan. I think you made it Exhibit 1 in today's deposition.
Q. Oh, I see. So you're referring back to that plan in terms -- that report in terms of your having referred to percentages of APB over 18.
A. Yes, that's correct. And for example, Chart 1 in that exhibit, it shows the breakdowns from 90 percent, 80 to 90, 70 to 80, et cetera.
Q. And when you're saying "Chart 1," you're now looking at your rebuttal report?
A. No. I'm looking at the Exhibit 1, my

initial report of 12/05.

Q. On page 17?

A. 17.

Q. Yeah, okay.

MR. TYSON: And, Ezra --

MR. ROSENBERG: Well -- yeah?

MR. TYSON: Just to clarify, I know we've referenced Grant and Pendergrass. The legislative plan preliminary injunctions were Alpha Phi Alpha and Grant, Pendergrass related to congressional. So it was really all three of those that were the preliminary injunction.

Exhibit 1 in Mr. Morgan's report here is offered in Alpha, in Grant, and in Georgia NAACP because all of those relate to legislative districts. So just so the record's clear on, kind of, which cases each piece relates to. I thought we should probably clarify that.

MR. ROSENBERG: Okay, thank you.

BY MR. ROSENBERG:

Q. How does the comparison in Chart 1 through Chart 10 in your rebuttal report relate to your overall conclusion in the rebuttal report as set forth in paragraph 6 of your rebuttal report?

A. Well, as I stated, I ran maps to do the

reports and I provided the information from those reports. And in my conclusion, I observed what I did about the increase in Democratic performance. So to the extent that that's the conclusion, that's the conclusion. But I did the entire analysis by running all of these reports.

Q. I understand. What is it about the data that's set forth as to 18-plus APB, according to the different percentages on those charts that relates, if at all, to your overall conclusion?

A. Well, during the process of analyzing Dr. Duchin's plans and comparing them to the enacted plans, I did have the information on the AP black percentages. And I noticed that in her report and then subsequently in my report when I looked at the political information I did notice that there was an increase in Democratic performance, although most of her report was dealing a lot with the racial component of districts.

Q. What is the relevance -- your understanding of the relevance of whether or not the districts relate to Democratic performance to this case?

A. The -- I would say that there's some

information that I reported on the performance, and it could be useful in this case to the court to have that information.

Q. Was it your idea to look for that information to support that conclusion?

MR. TYSON: And I'll just object to the extent that calls for conversations with counsel and drafts of your report. If there's a non-privileged answer you can give, you can give it.

A. Yes. I chose to look at the political information.

BY MR. ROSENBERG:

Q. And why did you choose to look at the political information?

MR. TYSON: Same objection.

A. Okay. I thought it would be useful to have that information before the court.

BY MR. ROSENBERG:

Q. Why did you think it would be useful to have that information before the court?

A. I found it interesting. In my experience, in my line of work, I think that's an interesting thing to look at to see the political performance of plans.

Q. Why did you think it's interesting to see the political performance of plans in connection with any of the issues in this case?

A. Again, that's something that I noticed. When I looked at the data, I noticed that there was an increase in Democratic performance.

Q. And what relevance is that issue to this case in your opinion?

MR. TYSON: I'll object to form.

A. I'm not sure what relevance the court will place on it, but I think it's useful information to have.

BY MR. ROSENBERG:

Q. What relevance do you place on it?

MR. TYSON: Object to form.

A. From my point of view, I think it's interesting that while a lot of issues discussed seem to be racial, the political aspect seems relevant as well.

BY MR. ROSENBERG:

Q. By the way, did you do an effectiveness analysis of any of the districts in Dr. Duchin's report?

MR. TYSON: Object to form.

A. It's not in my report, and I didn't do

that.
BY MR. ROSENBERG:
Q. Did you do any analysis to determine how many of the districts are majority-minority districts when taking into account Hispanic populations?
A. No. That information is not in my report.
Q. Are you offering an opinion that partisanship motivated the drawing of the enacted plans?
A. I didn't say that in my report.
Q. So you are not offering such an opinion?
A. It's not in my report. I'm not currently offering that opinion. I -- It's -- I haven't analyzed it in that context.
Q. Now, did you review the portion of Dr. Duchin's report that discussed the Gina Wright deposition?
A. Yes. I read through that.
Q. And just so for the record -- hold on one second. I'd like to make sure I get this correct.
MR. DAVIS: Since we're going back to the rebuttal report, Mr. Morgan's rebuttal report, I just wanted to state for the record that a

corrected rebuttal report is in the marked exhibit files marked as 4 corrected, and it has all the pages that Mr. Tyson indicated.

Thank you for letting us know that, Mr. Tyson?

MR. TYSON: Great. Thank you for making that correction.

BY MR. ROSENBERG:

Q. Now -- and I'm looking at pages 6, 7, 8, 9 and 10 of Dr. Duchin's report. Did you review this -- that portion of the report?

A. I read through it.

Q. And you read through it for the first time yesterday or before that?

A. Yesterday, primarily.

Q. Do you have an understanding of the analysis that Dr. Duchin undertook in this portion of her supplemental report?

A. I read through the report. I don't know what to say about the analysis.

Q. And when you say you don't know what to say about the analysis, does that mean you really don't know what to say about the analysis so you cannot say anything about the analysis?

A. Well, I didn't analyze the enacted plan

or Dr. Duchin's plans in the way that -- the type of analysis that she has done.

Q. Do you intend to offer any opinions at trial on this analysis?

A. I don't know. I don't have anything in my report. And at this time, I don't have anything to say about it.

Q. Have you drawn any conclusions as to what you might need to know in order to say something about it?

A. I would probably want to look in more detail at the plans that she offers and the enacted plans, and that level of detail I didn't look at for my report. So I don't know if that would contemplate a rebuttal to the rebuttal report or if that's even possible. But I didn't have access to her rebuttal report to do any kind of analysis.

MR. ROSENBERG: Okay. Well, I'm going to ask for a short break right now. I might be just about done with my questioning, but I wanted to take a break and -- and I don't know if Mr. Genberg has some questions, but why don't we take about a ten-minute break right now.

MR. TYSON: Okay.

THE VIDEOGRAPHER: Stand by. The time is 2:44 p.m. We are off video record.

(Recess)

THE VIDEOGRAPHER: The time is 2:58 p.m. we are back on video record.

MR. ROSENBERG: I just want to clear up one thing. I'm not sure if it was something you said, Brian, or Mr. Morgan, where you referred to the reports in other cases as being an exhibit and the report in this case, and we do not have a record of that. I wanted to make sure if I misheard that.

MR. TYSON: No. Just to make it clear, Ezra, Exhibit 1, Mr. Morgan's principal report in the case, you see that captions has both Alpha, Grant, and Georgia NAACP on it. It was -- the same Exhibit 1 from Georgia NAACP was also filed in the Alpha and the Grant cases. That's all I was trying to say.

MR. ROSENBERG: By Exhibit 1, you mean his CV?

THE WITNESS: No.

MR. TYSON: Exhibit 1 --

THE WITNESS: In the deposition. You -- I think you designated this deposition, my initial

report, as Exhibit 1.

MR. TYSON: Right.

MR. DAVIS: You saying that -- what he's saying what's labeled Exhibit 1 in the Exhibit Share, he's saying is marked as Exhibit 1 in the Exhibit Share, which is his opening report. The caption is for Alpha Phi Alpha, Grant, and Georgia NAACP; is that right?

MR. TYSON: That's correct. And this report was filed in all three of those cases. So that was the only thing I was trying to make clear.

MR. ROSENBERG: Okay, fine. Thank you very much. And I have no further questions of Mr. Morgan. Thank you very much for your time today.

THE WITNESS: Thank you.

THE VIDEOGRAPHER: Any follow-ups?

MR. TYSON: Did Mr. Genberg have questions?

MR. ROSENBERG: I believe he does not.

MR. GENBERG: I do not.

MR. TYSON: I don't have questions either, so that will complete all the people who could have questions today.

THE VIDEOGRAPHER: The time is 2:59 p.m. We are off video record.

(Deposition concluded at 2:59 p.m.)

(Signature reserved)

CERTIFICATE

STATE OF GEORGIA:
COUNTY OF FULTON:

I hereby certify that the foregoing transcript was taken down, as stated in the caption, and the colloquies, questions and answers were reduced to typewriting under my direction; that the transcript is a true and correct record of the evidence given upon said proceeding.

I further certify that I am not a relative or employee or attorney of any party, nor am I financially interested in the outcome of this action.

I have no relationship of interest in this matter which would disqualify me from maintaining my obligation of impartiality in compliance with the Code of Professional Ethics.

I have no direct contract with any party in this action and my compensation is based solely on the terms of my subcontractor agreement.

Nothing in the arrangements made for this proceeding impacts my absolute commitment to serve all parties as an impartial officer of the court.

This the 20th day of March 2023.

Valerie Almand, CRR, RPR, CRC, B-531

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TO: Bryan Tyson, Esquire
Re: Signature of Deponent John B. Morgan
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Sworn to and subscribed before me this ___ day of _____, _____.

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE ABOVE RULES ARE CURRENT AS OF APRIL 1, 2019. PLEASE REFER TO THE APPLICABLE FEDERAL RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

VERITEXT LEGAL SOLUTIONS
COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted fashion to authenticated parties who are permitted to access the material. Our data is hosted in a Tier 4 SSAE 16 certified facility.

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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF GEORGIA
ATLANTA DIVISION

ALPHA PHI ALPHA FRATERNITY INC., *et al.*, *Plaintiffs*, v. BRAD RAFFENSPERGER, *Defendant*.	CIVIL ACTION FILE NO. 1:21-CV-05337-SCJ
ANNIE LOIS GRANT, *et al.*, *Plaintiffs*, v. BRAD RAFFENSPERGER, *et al.*, *Defendants*.	CIVIL ACTION FILE NO. 1:22-CV-00122-SCJ
GEORGIA STATE CONFERENCE OF THE NAACP, *et al*. *Plaintiffs*, v. STATE OF GEORGIA, *et al.*, *Defendants*.	Case No. 1:21-CV-5338-ELB-SCJ-SDG

EXHIBIT
1

EXPERT REPORT OF JOHN B. MORGAN

Pursuant to 28 U.S.C. § 1746, Federal Rule 26 (a)(2)(B), and Federal Rules of Evidence 702 and 703, I, JOHN B. MORGAN, make the following declaration:

INTRODUCTION

1. My name is John B. Morgan. I am over the age of 21 years, and I am under no legal disability which would prevent me from giving this declaration. If called to testify, I would testify under oath to these facts and opinions.

2. I hold a B.A. in History from the University of Chicago. As detailed in my CV, attached as Exhibit 1, I have extensive experience over many years in the field of redistricting. I have worked on redistricting plans in the redistricting efforts following the 1990 Census, the 2000 Census, the 2010 Census and the 2020 Census. I have testified as an expert witness on demographics and redistricting.

3. I am being compensated at a rate of $325 per hour for my services in this case.

4. The redistricting geographic information system (GIS) software package used for this analysis is Maptitude for Redistricting 2021 from Caliper Corporation. The redistricting software was loaded with the census PL94-171 data from the Census Bureau and the census geography for Georgia. I was also provided with election data files used by the Georgia General Assembly during the

redistricting process. The full suite of census geography was available, including counties, places, voting districts, water bodies, and roads, as well as census blocks, which are the lowest level of geography for which the Census Bureau reports population counts. Census blocks are generally bounded by visible features, such as roads, streams, and railroads and they can range in size from a city block in urban and suburban areas to many square miles in rural areas.

SCOPE AND DATA

5. I have been asked to review the House of Representatives and State Senate plans considered and adopted by the Georgia General Assembly. I was asked to draw a "blind" plan that did not consider race or incumbency or past redistricting plans for Georgia. This plan did consider other traditional redistricting principles. Using my expertise, I proceeded to draw a plan for the House and then a plan for the Senate. I then compared the illustrative plans to the enacted plans and drew conclusions about the impact of racial considerations on the enacted plans.

6. In preparing this analysis, I was given the block-equivalency files of the 2021 adopted plans and incumbent databases used by the Georgia General Assembly during the redistricting process. The incumbent databases list the address locations and districts of the Representatives and Senators serving prior to the 2022 elections under the existing House (2015-enacted) and Senate (2014-enacted) plans.

I was also given the redistricting guidelines used by the Georgia General Assembly during the redistricting process.

7. I loaded the 2021 House and 2021 Senate plans enacted by the Georgia General Assembly into the Maptitude for Redistricting software using the block-equivalency files provided. I loaded the incumbent databases provided.

8. Using the Maptitude for Redistricting software, I created district summary files for the 2021 adopted plans. These summary files listed information for each district such as: the deviation from ideal district size, total population, and percentages for black population, any-part Black voting age population.

REDISTRICTING PROCESS AND SOFTWARE

9. The mapping software is a significant tool in the redistricting process. How does the geographic information system (GIS) software work to help the map drawer? At its core, there is a geographic hierarchy and a corresponding data hierarchy. It can be said that the data is attached to geographic units. Starting with a state, the state is subdivided into non-overlapping geographic units of counties (or parishes, in Louisiana and boroughs in Alaska). In some states, counties are subdivided into non-overlapping geographic units of townships or municipalities. (This type of subdivision of counties is typical in New England, mid-Atlantic and

midwestern states.) The federal government, via the Bureau of the Census, generally adopts the state-established boundaries for counties, parishes, and boroughs.

10. Below the level of the county there are towns, townships, and cities - these county subdivisions are generally referred to by the Census Bureau using the term minor civil division (MCD). (The Census Bureau also generally adopts state-established boundaries for incorporated and unincorporated places, which might not fit into the hierarchy.) Where the state does not have these county subdivisions, the Census Bureau generally establishes a county subdivision (MCD) for the state. The Census Bureau establishes the boundaries of smaller units such as census tracts, census block groups and census blocks.

11. Thus, the Census Bureau creates a complete geographic hierarchy coverage of each state, which can be envisioned this way:

state > county > MCD > census tract > census block group > census block

However, multiple hierarchies can be established within a state for different administrative needs such as schools, taxing authorities, voting, transportation, environmental concerns, etc.

12. Here is school hierarchy concept:

State > county > high school attendance area > intermediate school attendance area > elementary school attendance area

13. Here is an election administration hierarchy concept:

State > county > voting precinct > voter

14. In my experience, the practical hierarchy for redistricting in Georgia is:

State > county > voting precinct > census block

15. While there are in fact county subdivisions in Georgia, these are not commonly used in Georgia redistricting in my experience. Each feature of the hierarchy carries data along with it. The data can include a great deal of information. It could be economic – state funding for education purposes, business related – the number of Waffle House restaurants in a county or zip code, or perhaps agricultural – cultivated acres within a county. In the case of redistricting, the data attached to the layers is primarily population and demographic data from the Census Bureau and in many cases election and voter registration data as well.

16. In a GIS redistricting program, the geographic features within the hierarchy as well as other geographic features are displayed as layers on a map. The map layers are like stacked transparencies for use on an old-style overhead projector (such as might be used to show the various bodily systems – vascular, muscular, skeletal, etc.). The 159 counties in Georgia are a simple example of a map layer. Below the level of the county there are the voting precincts, which is a layer on the map. There are layers for interstate highways, for railroads, streets and roads, for

rivers and water areas, Native American tribal lands, school attendance areas and census blocks. In the current era, additional layers can be used such as topographic and hydrographic features as well as practical information such as Google maps and Google satellite maps. Residency data can be included as layers, such as incumbent addresses. Map drawers will display various pieces of information from those layers as they work to create redistricting maps.

17. In the redistricting process, map drawers consider many factors when drawing districts and must face trade-offs when seeking to balance conflicting considerations. In my experience, some of these factors are referred to as traditional redistricting principles, such as population equality, following civic boundaries, compactness and contiguity, incumbency and preserving existing districts. In his ruling in the *Alpha Phi Alpha* and *Grant* cases, Judge Jones recognized some of these traditional redistricting principles: "maintaining communities of interest and traditional boundaries, geographical compactness, contiguity, and protection of incumbents." (Page 55)

18. Counties, incorporated towns and cities, as well as unincorporated municipalities and voting precincts are examples of traditional boundaries. In my experience, communities of interest can have many definitions. Communities of interest often include things based on socio-economic factors, transportation

corridors, watersheds, mountain and valley communities, urban, suburban and rural areas, and school attendance zones. Geographic features can also define some communities of interest, such as the Okefenokee swamp, coastal Georgia, and the Appalachian Mountains. Communities of interest can include military areas like Fort Benning in Columbus and university areas like the University of Georgia in Athens.

19. In my experience, protecting incumbents, including preserving cores of districts is a traditional redistricting principle. Continuity of district representation is a traditional redistricting factor. Voters and residents establish relationships with their elected representatives. In the House of Burgesses, in the colony of Virginia, Thomas Jefferson was the delegate from Albemarle County. Today, the member elected from that county could be said to hold Thomas Jefferson's seat in the Virginia House of Delegates. A significant root of representative democracy is the concept of a constituency– where a representative is elected from a geographic area to represent constituents. In my experience, some legislators and members of the public refer to geography when talking about districts, such as the Macon seat, Savannah senate seat, the Conyers seat, the Statesboro seat, etc. New England states such as Vermont and Massachusetts still name their legislative seats after their

constituencies – the Addison Senate District, the Washington Senate District, the Cape and Islands District, 3rd Essex District, etc.

20. It may be easy to look at a district shape and say that it looks compact. This occurs when district shapes approximate idealized geometric shapes like circles, squares, and ovals, while also having few or no branches or tendrils projecting out. Most compactness tests compare one shape to another. A redistricting program usually provides several compactness tests within the software. In this analysis, I used to the Reock and Polsby-Popper compactness tests, which are commonly used in my experience and are available in the Maptitude for Redistricting software. The Maptitude for Redistricting User's Manual 2021 defines the compactness tests as follows:

> *Reock Test*
>
> *The Reock test is an area-based measure that compares each district to a circle, which is considered to be the most compact shape possible. For each district, the Reock test computes the ratio of the area of the district to the area of the minimum enclosing circle for the district. The measure is always between 0 and 1, with 1 being the most compact. The Reock test computes one number for each district and the minimum, maximum, mean and standard*

deviation for the plan. See [Reock 1961] and [Young 1988]. – Maptitude for Redistricting user's manual 2021

Polsby-Popper Test

The Polsby-Popper test computes the ratio of the district area to the area of a circle with the same perimeter: 4πArea/(Perimeter2). The measure is always between 0 and 1, with 1 being the most compact. The Polsby-Popper test computes one number for each district and the minimum, maximum, mean and standard deviation for the plan. See [Cox 1929], [Polsby and Popper 1991], and [Niemi, Grofman, Carlucci, and Hofeller 1990].

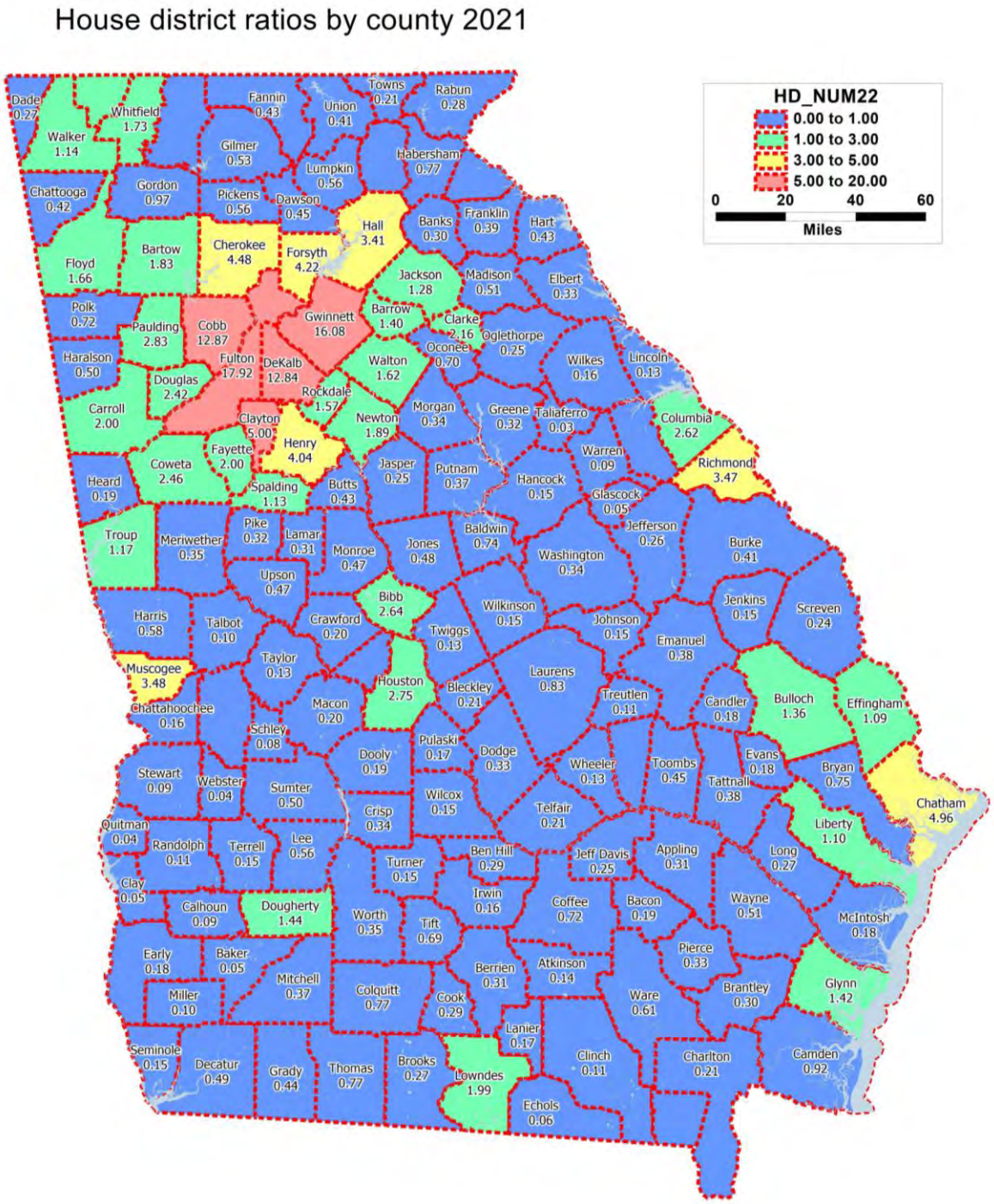
HOUSE ILLUSTRATIVE PLAN

21. To start the districting process, I looked at population distribution across Georgia. The 2020 census shows that total population for Georgia is 10,711,908. Looking at the situation for the House first, the number of single-member house districts in Georgia is 180. Dividing the total census population (10,711,908) by the number of house districts (180) yields 59,510.6. Rounding up, the ideal population for a Georgia House district is 59,511.

22. To better understand the distribution of the population within Georgia, the population for each county was displayed on a county map in the Maptitude redistricting program as well as displayed on a spreadsheet. The Georgia county

with the highest 2020 census population is Fulton County at 1,066,710 people and the county with the lowest population is Taliaferro County with 1,559 people. Dividing the county populations by the ideal district size (59,511) yields the ratio of state house seats per county. Using this method, the ratio of house seats in the largest county, Fulton County is 17.92 and the ratio of house seats in the smallest county, Taliaferro County is 0.03. Fulton County has population enough for almost 18 state house seats and Taliaferro County is three one-hundredths of a single state house seat.

Map 1 - House district ratios



23. The enacted state house plan has a relative deviation of -1.40% to +1.34% of the ideal population. For purposes of drafting the House Illustrative Plan, I used an overall deviation range of -1.50% to +1.50%.

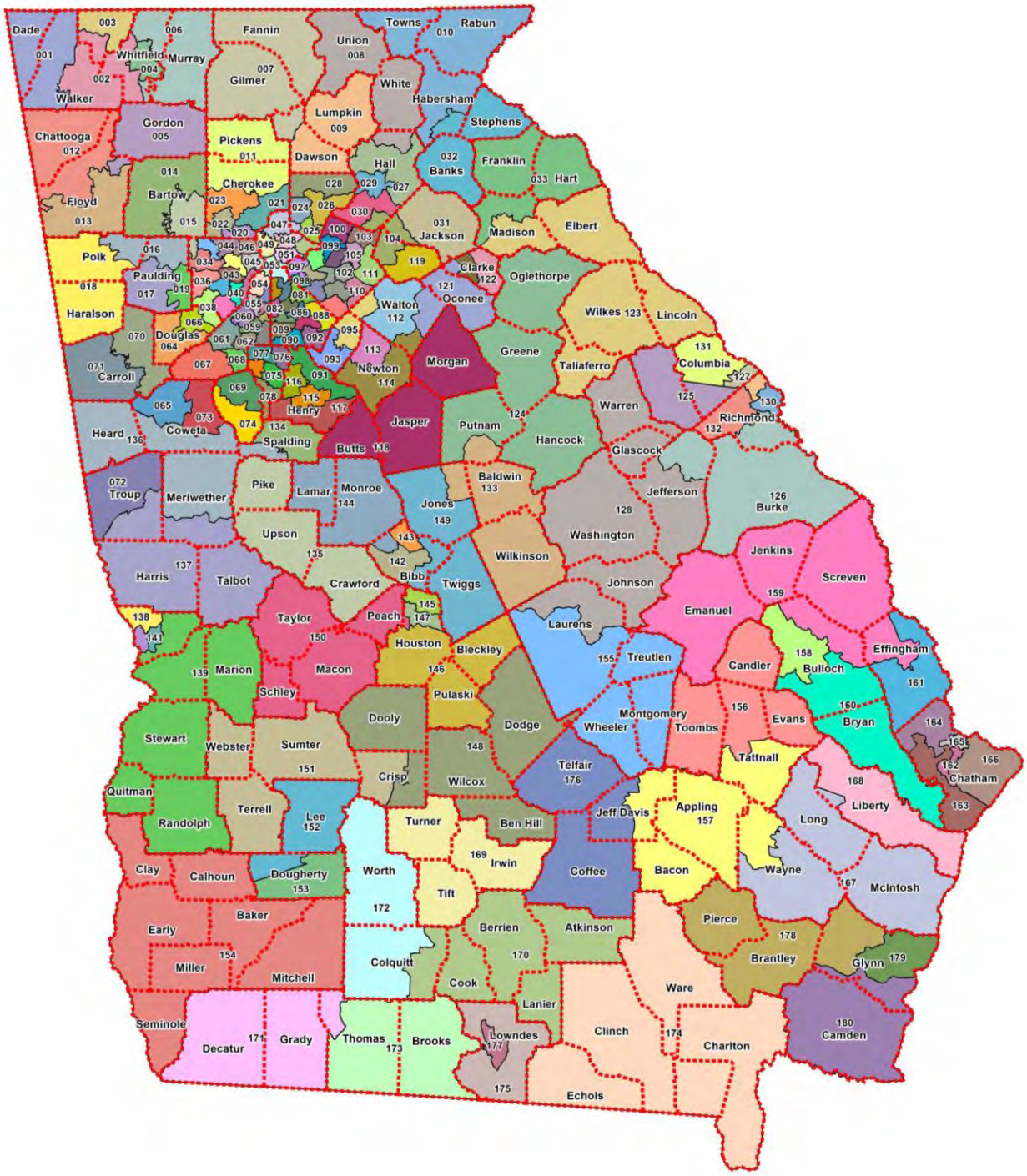
24. To provide additional context for communities of interest, I looked at the map layer for cities as well as incorporated and unincorporated places. I attempted to balance keeping counties and voting districts whole and drawing compact districts with the necessity of staying within the population deviation. During the drawing process, I did not use any racial data, incumbency information or the boundaries of the previous districts.

25. I started drawing some districts in the northwestern Georgia then proceeded into the metro Atlanta area. Having looked at the ratios of the HDs per county, I was aware that some counties could be subdivided evenly into districts within the population deviation (such as Henry and Fayette). Other counties, (such as Walker or Spalding) had a little more population than a House district, so those counties could be kept relatively intact while assigning the surplus population to a nearby seat. I drew some districts in coastal Georgia, southwest Georgia, then central Georgia and completed the districts in metro Atlanta and the rest of the state.

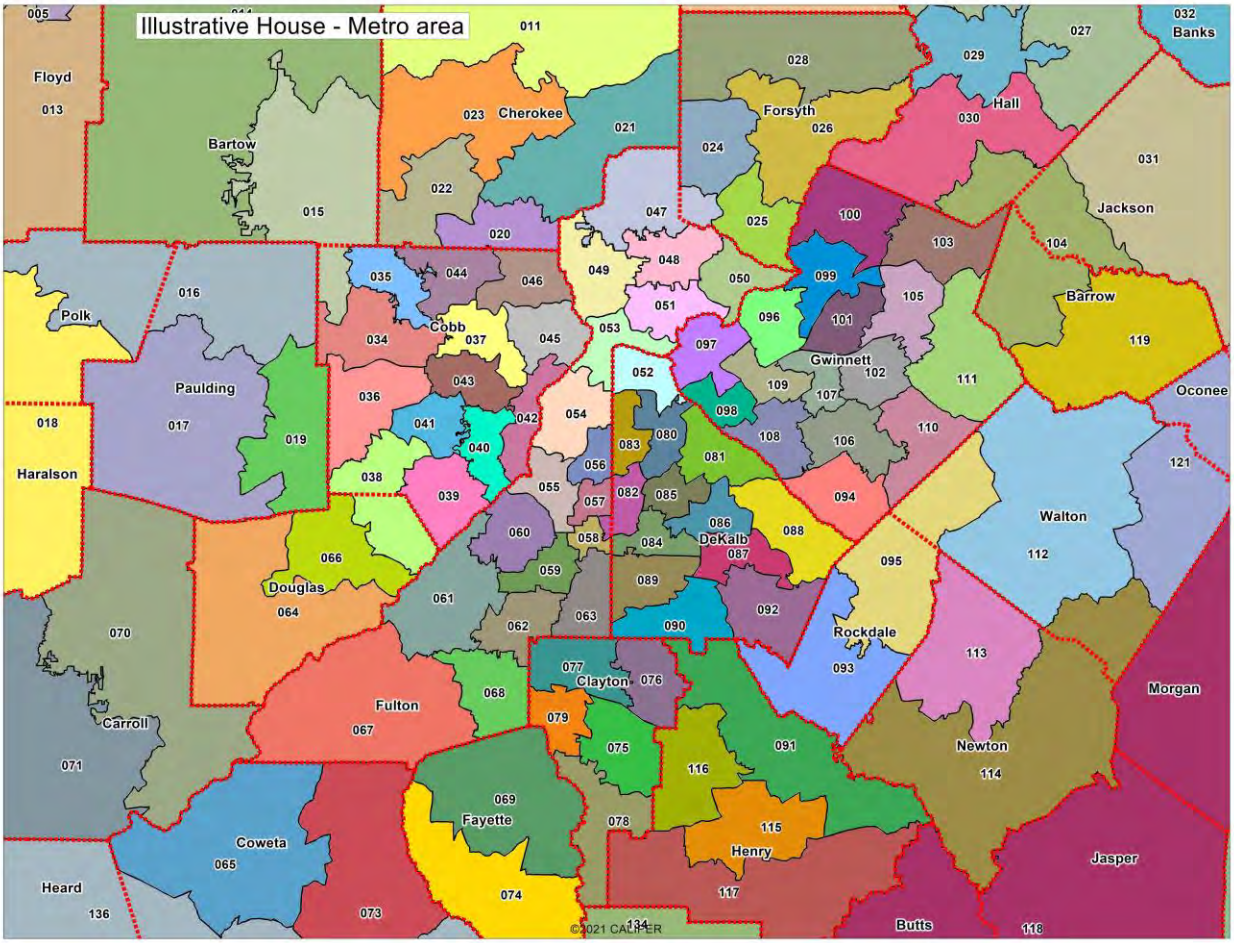
26. After completing the House Illustrative Plan, I looked at the House Enacted Plan and re-numbered the districts in the House Illustrative Plan, such that the district numbers would be similar to the House Enacted Plan.

Map 2 - House Illustrative Plan

House Illustrative - Statewide



Map 3 Metro Atlanta inset of House Illustrative Plan



HOUSE PLAN ANALYSIS

27. After completing the House Illustrative Plan, I copied the plan and added in the census racial data. I ran a series of reports to compare the House Illustrative Plan and the House Enacted Plan on several metrics. Those metrics included - county splits, voting precinct splits, compactness scores, paired

incumbents and the number of majority 18+AP Black districts. Copies of these reports for House plans are attached as exhibits to this report.

Chart 1- House Illustrative Plan and House Enacted Plan comparisons

Plan metrics	**House Ilustr.**	**House Enacted**
County splits	54	69
Voting precinct splits	106	184
Mean compactness - Reock	0.45	0.39
Mean compactness - Polsby Popper	0.33	0.28
# Paired incumbents	74	20
# Seats majority 18+_AP_Blk%	35	49
# Seats 18+_AP_Blk% is: over 90%	6	0
# Seats 18+_AP_Blk% is: 80% to 90%	4	0
# Seats 18+_AP_Blk% is: 70% to 80%	5	11
# Seats 18+_AP_Blk% is: 60% to 70%	9	15
# Seats 18+_AP_Blk% is: 50% to 60%	11	23

House Region 1 Analysis

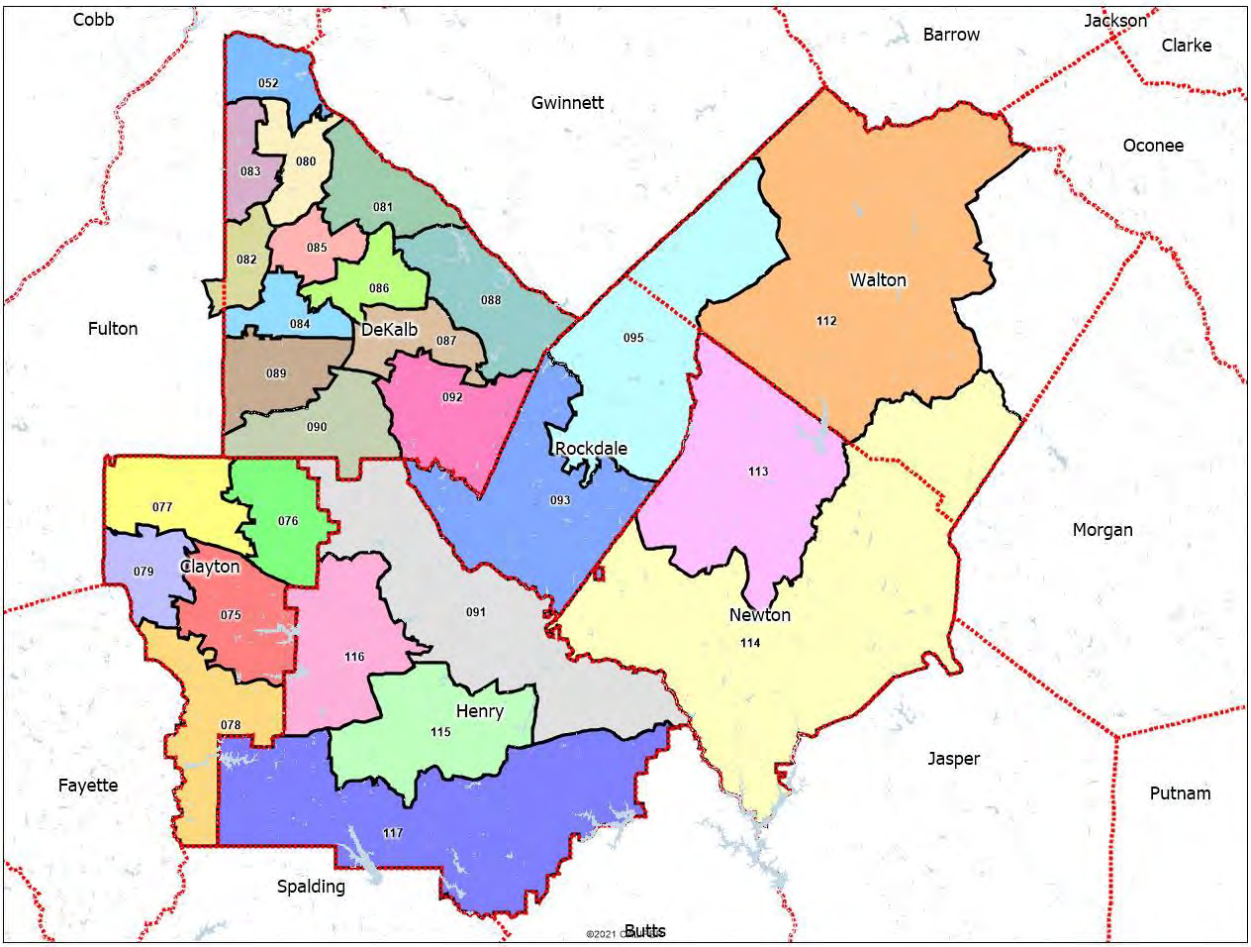
28. For further analysis, I looked at two regions of roughly similar geography to compare the House Illustrative Plan to the House Enacted Plan. Region 1 consists primarily of DeKalb, Clayton, Henry, Rockdale, Newton, and Walton counties. Below are maps of the House districts in region 1 for both the

House Illustrative Plan and the House Enacted Plan. Looking at the districts in the House Illustrative Plan, the districts look compact and only cross county lines in a limited way. By contrast, looking at the districts in the House Enacted Plan, the districts look elongated, and they cross county lines in a number of places. For example, in the House Illustrative Plan only one district crosses out of DeKalb County, whereas in the House Enacted Plan, seven districts cross out of DeKalb County. A review of the mean compactness scores for this region confirms what is visible to the eye. The mean compactness scores for districts in region 1 show that the House Illustrative Plan is more compact as a whole than the House Enacted Plan in this region.

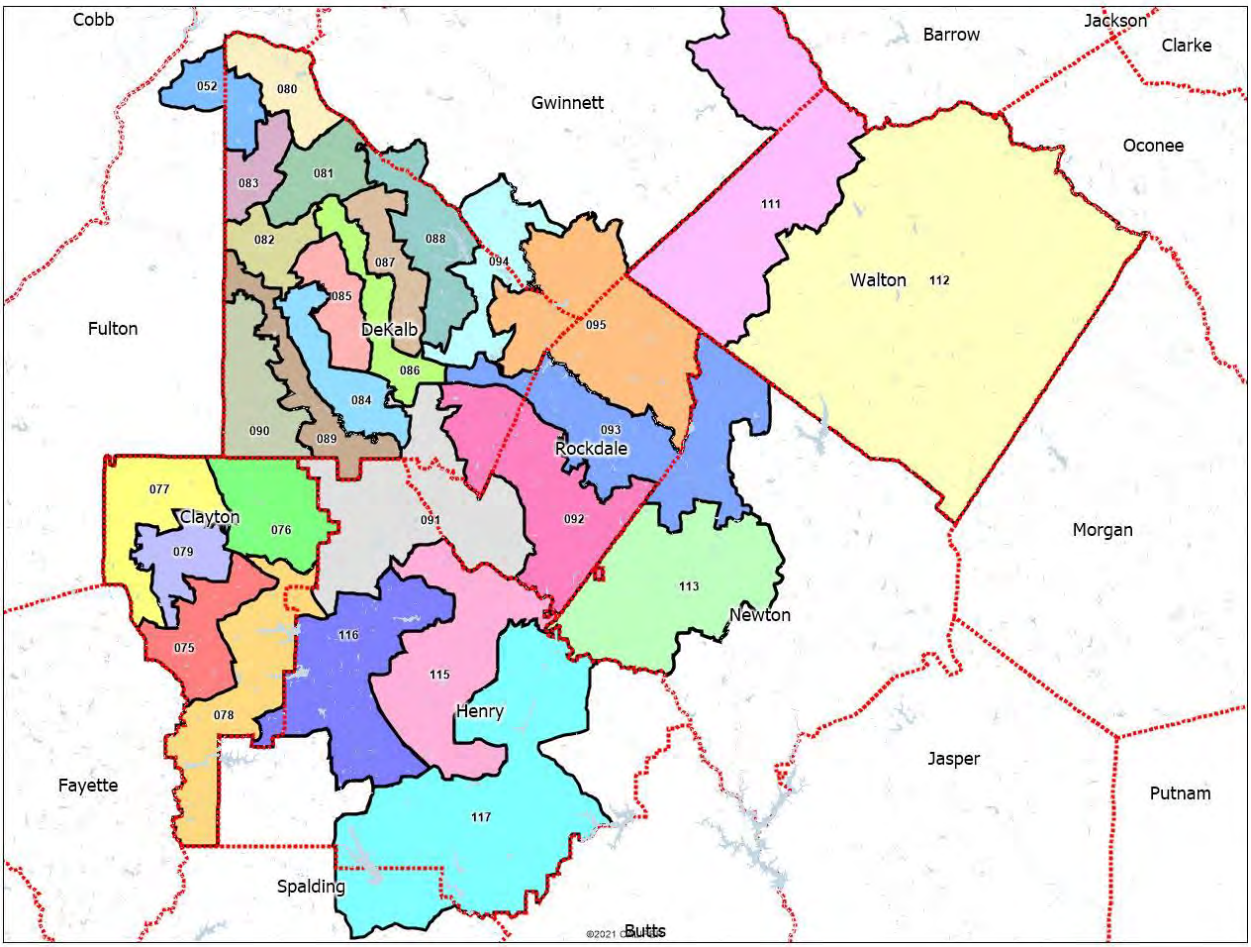
Chart 2 – Mean compactness scores in House region 1

Region 1 compactness scores	**House Ilustr.**	**House Enacted**
Mean compactness - Reock	0.42	0.38
Mean compactness - Polsby Popper	0.33	0.27

Map 3– House Illustrative Plan region 1



Map 4– House Enacted Plan region 1



29. The contrast in compactness leads one to ask why these maps of the region are so different. While there may be many causes, reviewing the compactness of the districts along with the 18+AP Black percentages allows for an analysis of the impact of racial considerations. Below is the data for the House Illustrative Districts and the House Enacted Districts in region 1.

Chart 3 – Districts in House Illustrative Plan region 1

District	[% Black]	[% 18+_AP_Blk]	Reock	Polsby-Popper
052	11.8%	13.9%	0.43	0.38
075	64.7%	66.2%	0.52	0.36
076	69.0%	71.3%	0.52	0.41
077	60.5%	62.6%	0.42	0.35
078	77.1%	78.9%	0.3	0.21
079	77.9%	80.7%	0.56	0.36
080	13.6%	16.1%	0.43	0.25
081	34.9%	36.6%	0.39	0.41
082	12.6%	14.7%	0.36	0.37
083	12.1%	14.6%	0.38	0.36
084	34.9%	37.6%	0.37	0.23
085	36.5%	36.3%	0.54	0.36
086	66.2%	67.9%	0.44	0.31
087	88.3%	91.3%	0.38	0.28
088	83.4%	86.0%	0.41	0.39
089	75.7%	76.6%	0.42	0.39
090	92.2%	94.9%	0.4	0.4
091	42.2%	43.1%	0.21	0.18
092	91.7%	94.3%	0.51	0.37
093	57.4%	58.2%	0.47	0.2
095	43.5%	43.5%	0.32	0.3
112	17.2%	17.4%	0.59	0.42
113	55.4%	55.9%	0.47	0.41
114	35.9%	36.9%	0.37	0.22
115	57.0%	57.4%	0.45	0.38
116	58.9%	59.8%	0.49	0.37
117	38.2%	38.8%	0.26	0.24

Chart 4 – Districts in House Enacted Plan region 1

District	[% Black]	[% 18+_AP_Blk]	Reock	Polsby-Popper
052	13.9%	16.0%	0.48	0.35
075	72.3%	74.4%	0.42	0.28
076	65.0%	67.2%	0.53	0.51
077	73.4%	76.1%	0.4	0.21
078	70.3%	71.6%	0.21	0.19
079	69.1%	71.6%	0.5	0.21
080	12.0%	14.2%	0.38	0.42
081	19.1%	21.8%	0.47	0.4
082	14.7%	16.8%	0.49	0.3
083	12.5%	15.1%	0.34	0.36
084	70.5%	73.7%	0.25	0.2
085	60.9%	62.7%	0.36	0.32
086	72.4%	75.1%	0.17	0.17
087	70.9%	73.1%	0.26	0.24
088	61.4%	63.4%	0.26	0.2
089	60.3%	62.5%	0.14	0.1
090	57.7%	58.5%	0.36	0.29
091	68.6%	70.0%	0.45	0.2
092	68.3%	68.8%	0.36	0.2
093	64.0%	65.4%	0.26	0.11
094	66.8%	69.0%	0.31	0.15
095	65.9%	67.2%	0.44	0.25
111	22.1%	22.3%	0.33	0.29
112	19.1%	19.2%	0.62	0.52
113	58.3%	59.5%	0.5	0.32
115	52.1%	52.1%	0.44	0.23
116	57.6%	58.1%	0.41	0.28
117	36.4%	36.6%	0.41	0.28

30. Looking at some specific districts shows that the compactness of the those districts is lowered by apparent efforts to create more majority black districts.

In the House Illustrative Plan, District 090 is in southern DeKalb County. This district has a Reock compactness score of .4 and a Polsby-Popper compactness score of .4 and the district is 94.9% 18+AP Black. In the House Enacted Plan, a comparable district in the region is District 089, in southern DeKalb County. This district has a Reock compactness score of .14 and a Polsby-Popper compactness score of .1 and the district is 62.5% 18+AP Black. This demonstrates that drawing a more compact district in southern DeKalb County yields a very high black percentage. The black percentage is lowered only by elongating the district to include lower concentrations of black population. This allows the black population to be redistributed and to create other majority black districts. Looking at the individual district data in region 1, the House Enacted Plan has more majority black districts and they are less compact than the districts in the House Illustrative Plan. In my opinion, the creation of additional black majority districts in region 1 lead to lower compactness scores in this region.

House Region 2 Analysis

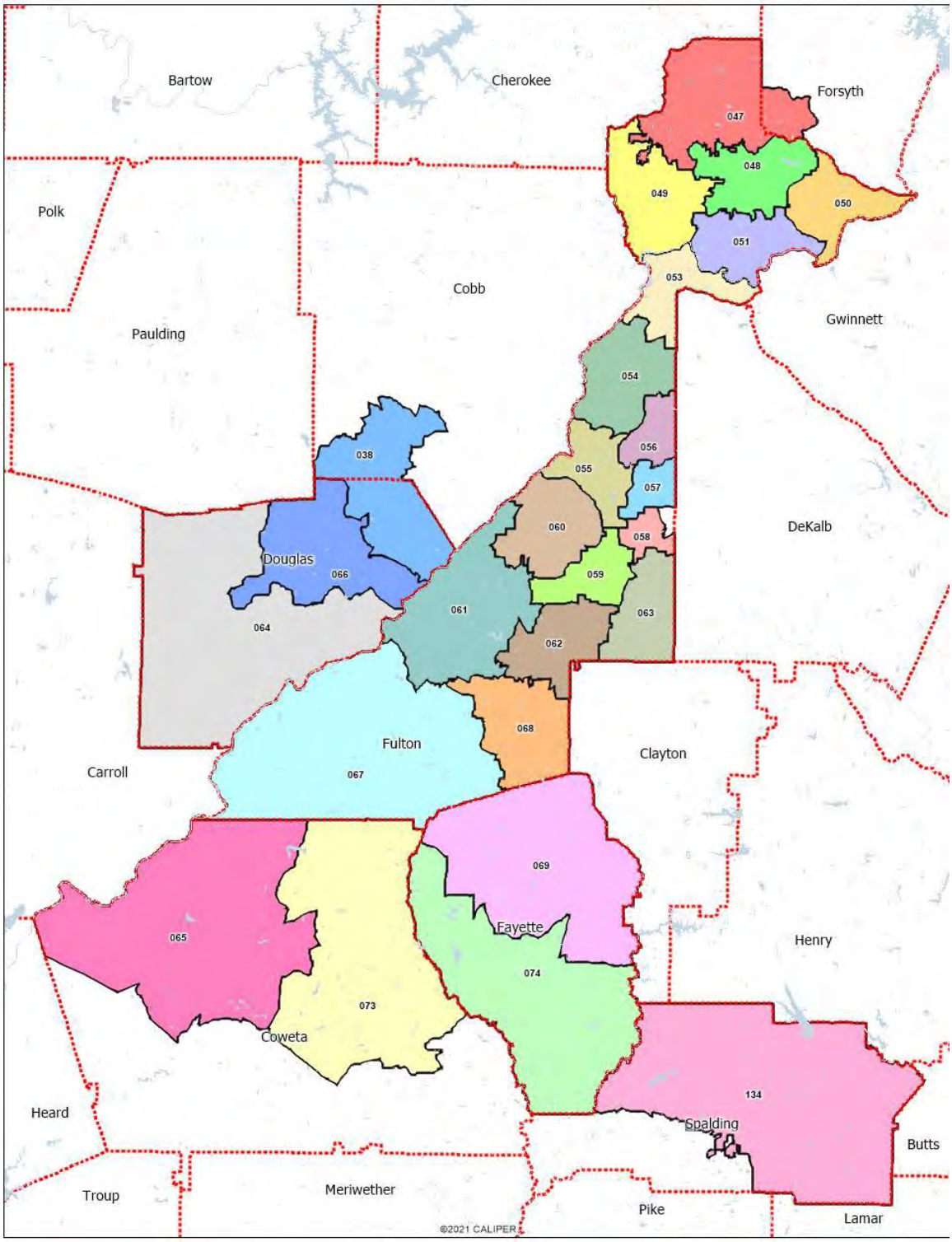
31. I analyzed another region of roughly similar geography to compare the House illustrative plan to the House enacted plan. Region 2 consists primarily of Fulton, Douglas, Coweta, Fayette, and Spalding counties. Region 2 maps of the House districts for both the House Illustrative Plan and the House Enacted Plan are

below. Similar to region 1, the districts in region 2 of the House Illustrative Plan look compact and only cross county lines in a limited way. However, the districts in the House Enacted Plan look elongated and they cross county lines in many places. For example, in the House Illustrative Plan, two districts cross out of Fulton County, whereas in the House Enacted Plan, nine districts cross out of Fulton County. The mean compactness scores for districts in region 2 confirm that the House Illustrative Plan is more compact as a whole than the House Enacted Plan in region 2.

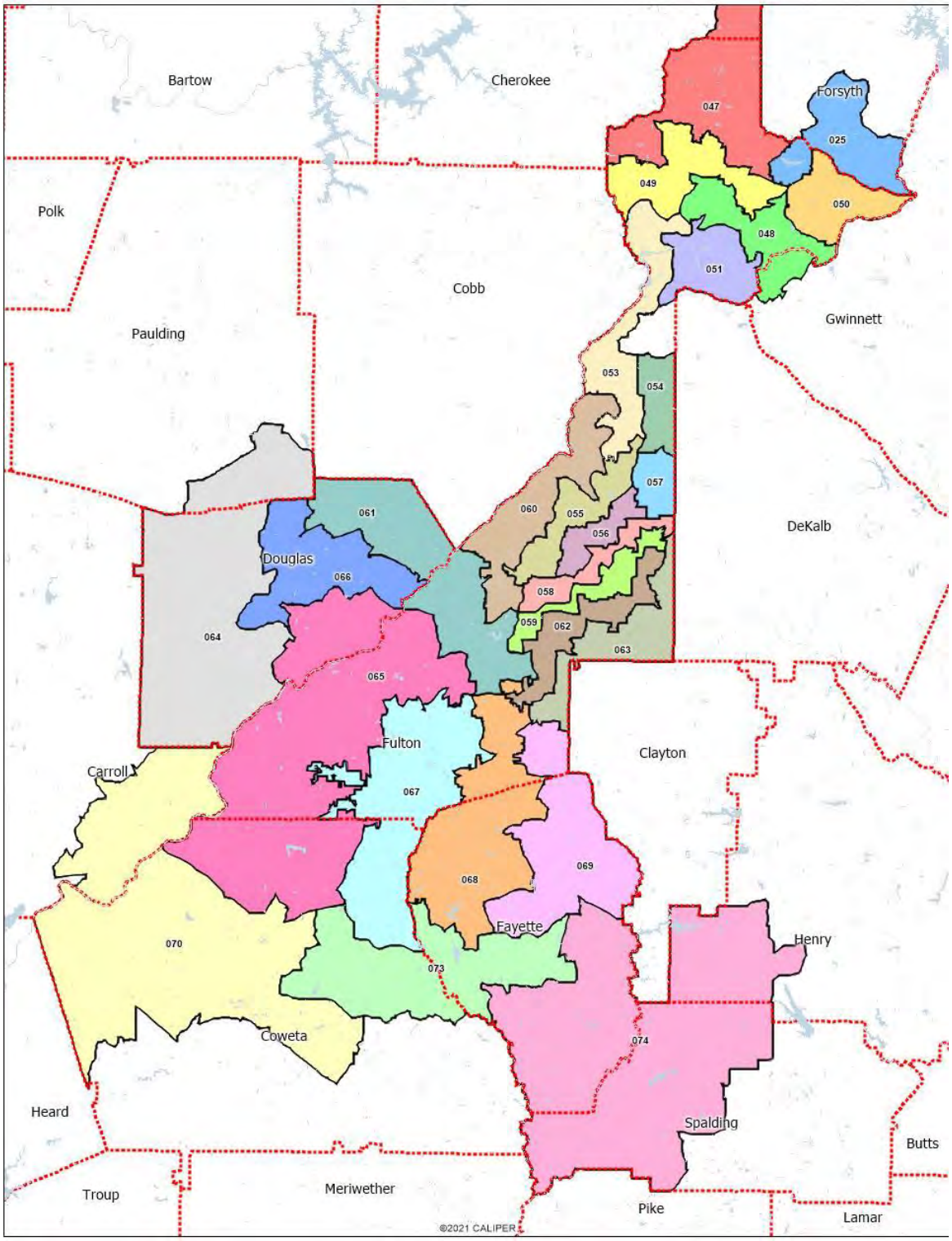
Chart 5 – Mean compactness scores in House region 2

Region 2 compactness scores	**House Ilustr.**	**House Enacted**
Mean compactness - Reock	0.47	0.32
Mean compactness - Polsby Popper	0.35	0.23

Map 5– House Illustrative Plan region 2



Map 6– House Enacted Plan region 2



32. Similar to House region 1, the maps in region 2 show a contrast between the House Illustrative Plan and the House Enacted Plan. Likewise, while there may be many causes, the compactness of the districts along with the 18+AP Black percentages allows for an analysis of the impact of racial considerations. Below is the data for the House Illustrative Plan districts and the House Enacted Plan districts in region 2.

Chart 6 – Districts in House Illustrative Plan region 2

District	[% Black]	[% 18+_AP_Blk]	Reock	Polsby-Popper
038	56.1%	57.3%	0.46	0.29
047	9.7%	11.1%	0.5	0.21
048	10.1%	11.4%	0.49	0.18
049	9.6%	10.9%	0.51	0.23
050	11.2%	12.3%	0.41	0.37
051	13.2%	14.5%	0.42	0.31
053	25.0%	26.5%	0.33	0.25
054	10.5%	12.7%	0.62	0.5
055	26.0%	29.0%	0.43	0.36
056	16.2%	18.5%	0.44	0.51
057	13.3%	15.2%	0.43	0.49
058	39.3%	40.1%	0.57	0.32
059	86.9%	88.6%	0.41	0.36
060	89.8%	92.1%	0.7	0.43
061	93.3%	95.6%	0.42	0.27
062	79.5%	81.6%	0.46	0.26
063	63.7%	63.8%	0.46	0.49
064	40.5%	41.0%	0.46	0.36
065	28.8%	28.5%	0.54	0.44
066	53.4%	53.9%	0.4	0.31
067	77.4%	78.6%	0.46	0.47

068	90.6%	92.9%	0.48	0.36
069	41.2%	42.1%	0.53	0.44
073	10.0%	10.9%	0.54	0.38
074	8.6%	9.3%	0.35	0.27
134	36.5%	35.4%	0.48	0.33

Chart 7 – Districts in House Enacted Plan region 2

District	[% Black]	[% 18+_AP_Blk]	Reock	Polsby-Popper
025	5.1%	5.9%	0.39	0.31
047	9.6%	10.7%	0.29	0.21
048	10.4%	11.8%	0.34	0.19
049	7.3%	8.4%	0.3	0.15
050	11.3%	12.4%	0.42	0.46
051	22.4%	23.7%	0.54	0.36
053	12.6%	14.5%	0.16	0.14
054	13.3%	15.5%	0.37	0.45
055	55.0%	55.4%	0.18	0.16
056	46.9%	45.5%	0.26	0.23
057	15.9%	18.1%	0.57	0.59
058	63.7%	63.0%	0.13	0.13
059	70.3%	70.1%	0.12	0.11
060	62.3%	63.9%	0.19	0.15
061	72.3%	74.3%	0.25	0.2
062	70.9%	72.3%	0.16	0.1
063	68.6%	69.3%	0.16	0.14
064	29.9%	30.7%	0.37	0.36
065	60.7%	62.0%	0.46	0.17
066	52.9%	53.4%	0.36	0.25
067	57.7%	58.9%	0.36	0.12
068	55.2%	55.8%	0.32	0.17
069	62.6%	63.6%	0.4	0.25
070	28.0%	27.8%	0.45	0.23
073	11.5%	12.1%	0.28	0.2
074	25.5%	25.5%	0.5	0.25

33. Looking at some specific districts shows that the compactness of the districts is impacted by the efforts to create more majority black districts. In the House Illustrative Plan, District 059 is in Fulton County, just north of East Point. This district has a Reock compactness score of .41 and a Polsby-Popper compactness score of .36 and the district is 88.6% 18+AP Black. In the House Enacted Plan, a comparable district in the region is District 059, in Fulton County, stretching from north of East Point to just south of Midtown. This district has a Reock compactness score of .12 and a Polsby-Popper compactness score of .11 and the district is 70.1% 18+AP Black. This demonstrates that drawing a more compact district in Fulton County can yield a district with very high black percentages. The black percentage is lowered only by elongating the district to include lower concentrations of black population. This allows the black population to be redistributed and to create other majority black districts.

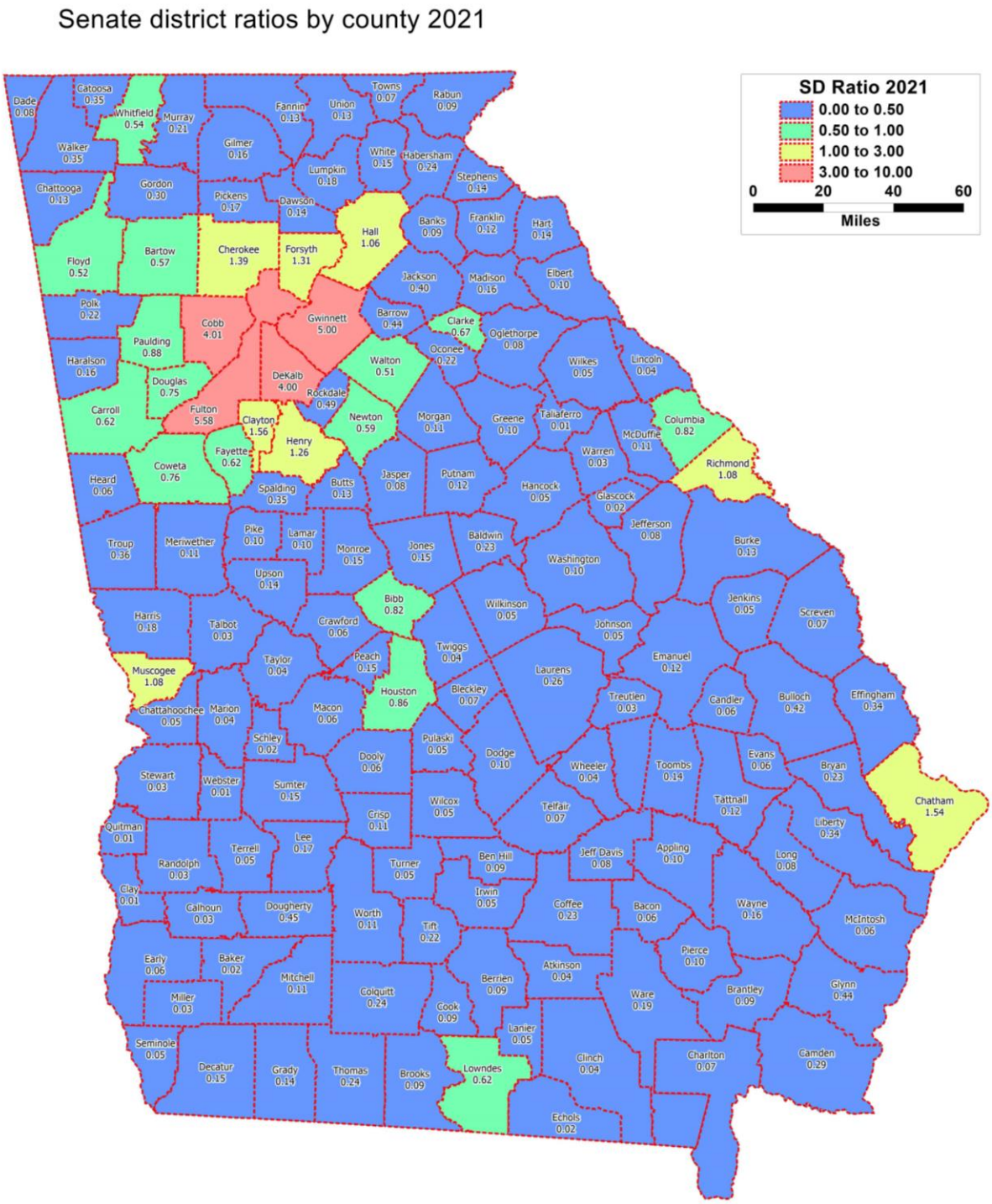
34. Looking at the individual district data in region 2, the House Enacted plan has more majority black districts and they are less compact than the districts in the House Illustrative Plan. In my opinion, the creation of additional black majority districts in region 2 lead to lower compactness scores in this region.

SENATE ILLUSTRATIVE PLAN

35. The 2020 census shows that total population for Georgia is 10,711,908. Looking at the situation for the Senate the number of single-member senate districts in Georgia is 56. Dividing the total census population (10,711,908) by the number of senate districts (56) yields 191,284.1. Rounding down, the ideal population for a Georgia Senate district is 191,284.

36. I used the same general process for drawing the Senate Illustrative Plan as I did to draw the House Illustrative Plan. Dividing the county populations by the ideal district size (191,284) yields the ratio of state senate seats per county. Using this method, the ratio of senate seats in the largest county, Fulton County is 5.58 and the ratio of senate seats in the smallest county, Taliaferro County is 0.01. Fulton County has population enough for just over 5 and a half state senate seats and Taliaferro County is one one-hundredths of a single state senate seat.

Map 7 - Senate district ratios



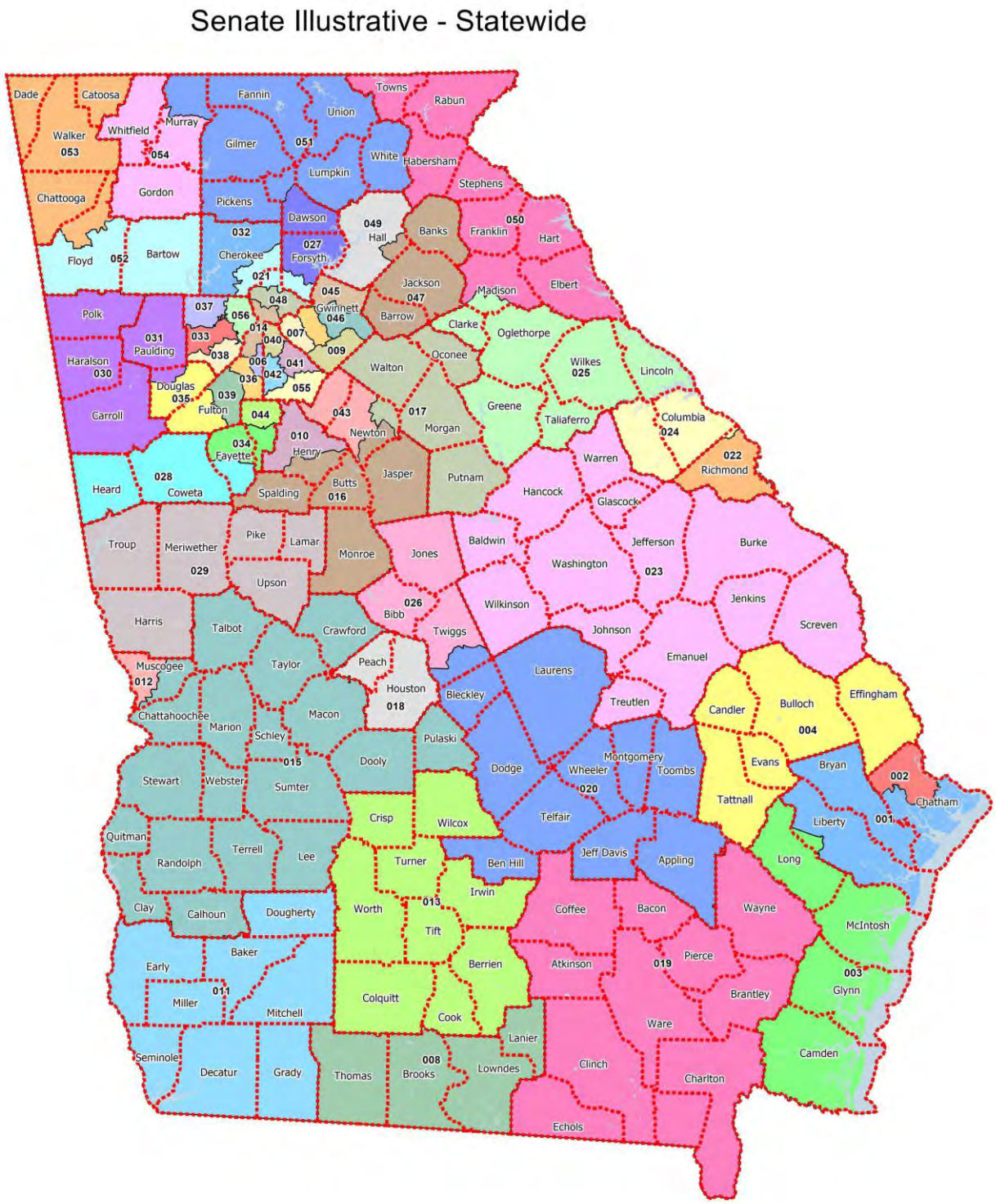
37. The Senate Enacted Plan has a relative deviation of -1.03% to + 0.98% of the ideal population. For purposes of drafting the Senate Illustrative Plan, I used an overall deviation range of -1.0% to +1.0%.

38. Like the process used for drawing the House Illustrative Plan, I looked at the map layer for cities as well as incorporated and unincorporated places and I attempted to balance keeping counties and voting districts whole and drawing compact districts with the necessity of staying within the population deviation. During the drawing process, I did not use any racial data, incumbency information or the boundaries of the previous districts.

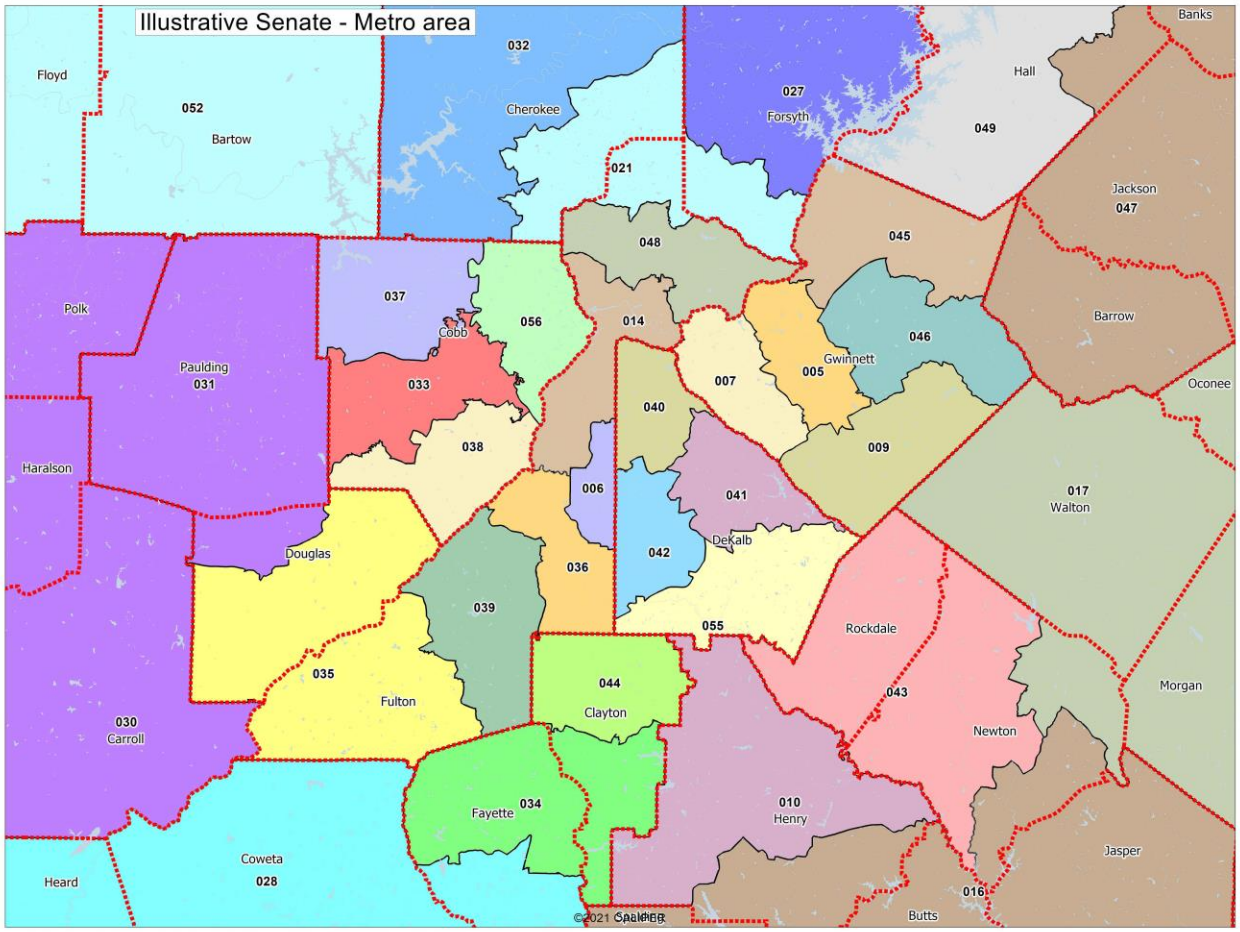
39. I started drawing some districts in southern and southwestern Georgia then proceeded to coastal and central Georgia. Having looked at the ratios of the SDs per county, I was aware that some counties could be subdivided evenly into districts within the population deviation (such as DeKalb and Cobb). Other counties (such as Richmond and Muskogee) had a little more population than a Senate district, so those counties could be kept relatively intact while assigning the surplus population to a nearby seat. I drew districts in metro Atlanta, northwest Georgia, then completed the districts around metro Atlanta and the remainder of the state.

40. After completing the Senate Illustrative Plan, I looked at the Senate Enacted Plan and re-numbered the districts in the Senate Illustrative Plan, such that the district numbers would be similar to the Senate Enacted Plan.

Map 8 - Senate Illustrative Plan



Map 9 - Metro Atlanta inset of Senate Illustrative Plan



SENATE PLAN ANALYSIS

41. After completing the Senate Illustrative Plan, I copied the plan and added in the Census racial data. I ran a series of reports to compare the Senate Illustrative Plan and the Senate Enacted Plan on several metrics. Those metrics included - county splits, voting precinct splits, compactness scores, paired

incumbents, and the number of majority 18+AP Black districts. Copies of these reports for Senate plans are attached as exhibits to this report.

Chart 8- Senate Illustrative Plan and Senate Enacted Plan comparisons

Plan metrics	**Senate Ilustr.**	**Senate Enacted**
County splits	21	29
Voting precinct splits	15	47
Mean compactness - Reock	0.46	0.42
Mean compactness - Polsby Popper	0.36	0.29
# Paired incumbents	17	4
# Seats majority 18+_AP_Blk%	11	14
# Seats 18+_AP_Blk% is over 90%	2	0
# Seats 18+_AP_Blk% is: 80% to 90%	0	0
# Seats 18+_AP_Blk% is: 70% to 80%	1	3
# Seats 18+_AP_Blk% is: 60% to 70%	3	6
# Seats 18+_AP_Blk% is: 50% to 60%	5	5

Senate Metro Region Analysis

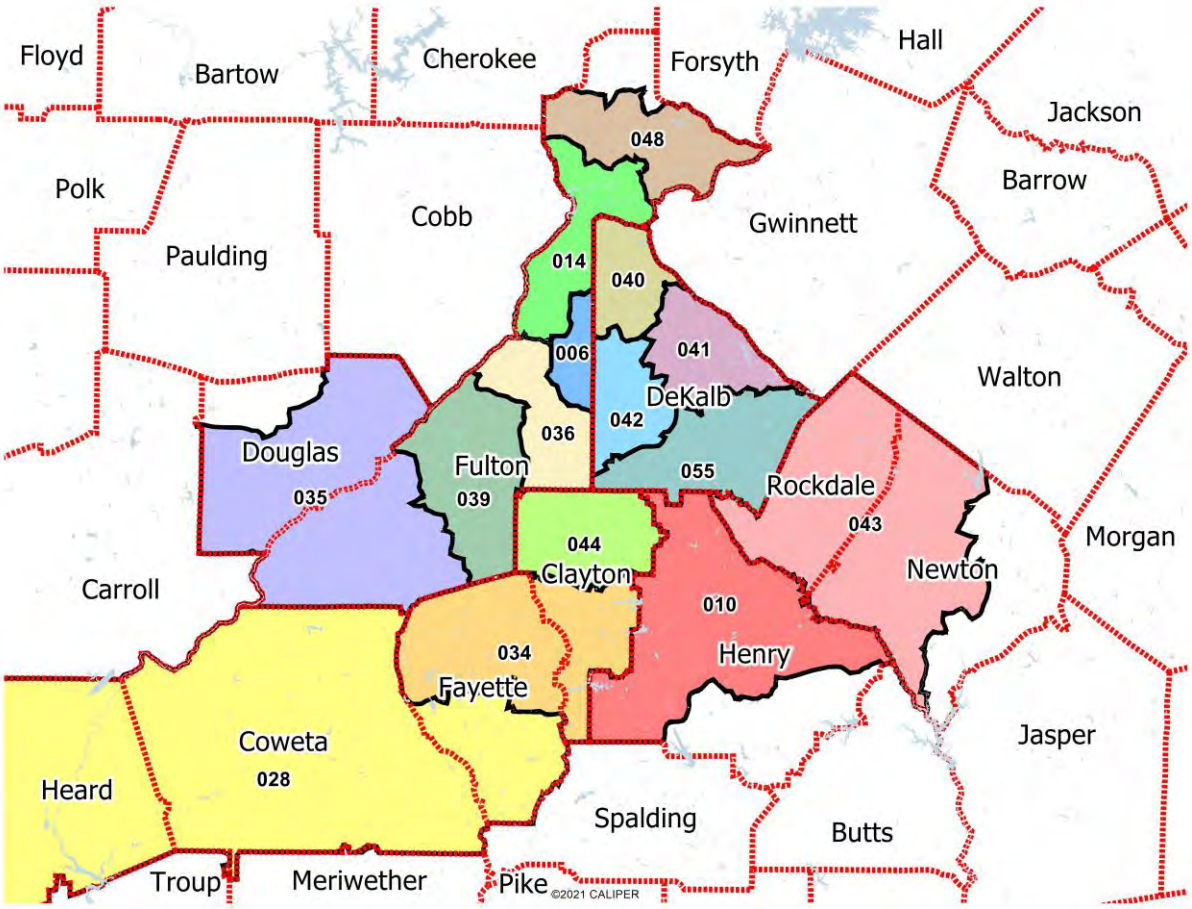
42. Similar to the analysis for the House plans, I looked a region of roughly similar geography to compare the Senate Illustrative Plan to the Senate Enacted Plan. The senate metro region consists primarily of Douglas, Fulton, Coweta, DeKalb, Clayton, Fayette, Henry, Rockdale, and Newton counties. Below are maps of the

Senate districts in the senate metro region for both the Senate Illustrative Plan and the Senate Enacted Plan. Looking at the districts in the Senate Illustrative Plan, the districts look compact and only cross county lines in a limited way. By contrast, looking at the districts in the Senate Enacted Plan, the districts look elongated, and they cross county lines in a number of places. For example, in the Senate Illustrative Plan, the DeKalb senate districts are entirely contained within DeKalb County, whereas in the Senate Enacted Plan, six districts cross out of DeKalb County. A review of the mean compactness scores for this senate metro region confirms what is visible to the eye. The mean compactness scores for districts in senate metro region show that Senate Illustrative Plan is more compact as a whole the Senate Enacted Plan in this region.

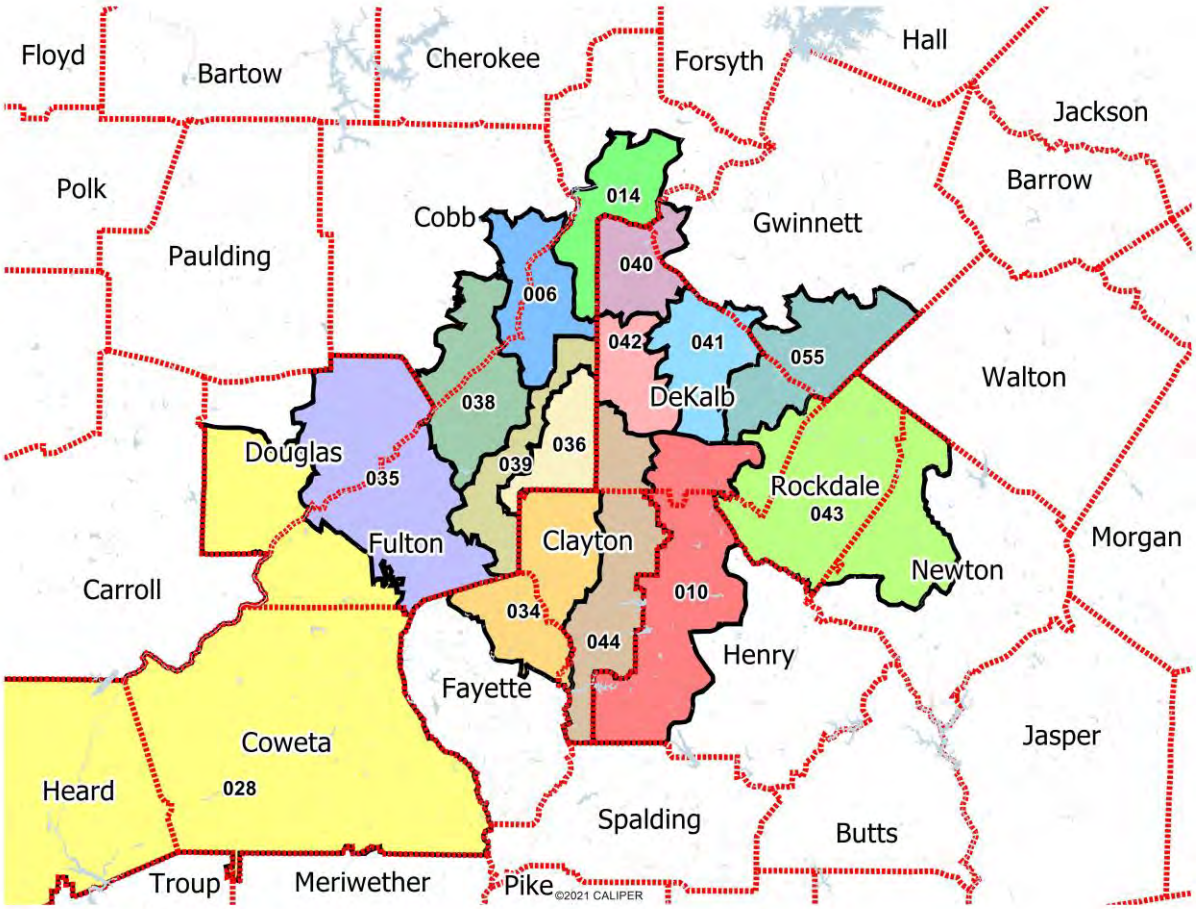
Chart 9 – Mean compactness scores in the senate metro region

Sen Metro Region compactness scores	**Senate Ilustr.**	**Senate Enacted**
Mean compactness - Reock	0.42	0.39
Mean compactness - Polsby Popper	0.37	0.26

Map – Senate illustrative Metro Region



Map – Senate enacted Metro Region



43. Like the analysis for the House regions, the maps for the senate metro region show a contrast between the Senate Illustrative Plan and the Senate Enacted Plan. While there may be many causes, reviewing the compactness of the districts along with the 18+AP Black percentages allows for an analysis of the impact of racial considerations. Below is the data for the Senate Illustrative Districts and the Senate Enacted Districts in the senate metro region.

Chart 10 – Districts in the Senate Illustrative Plan senate metro region

District	[% Black]	[% 18+_AP_Blk]	Reock	Polsby-Popper
006	19.9%	21.6%	0.33	0.45
010	51.6%	52.2%	0.38	0.27
014	15.6%	17.5%	0.32	0.23
028	15.2%	15.8%	0.37	0.34
034	55.0%	56.0%	0.49	0.36
035	59.3%	60.2%	0.58	0.41
036	68.4%	69.8%	0.42	0.37
039	89.7%	92.0%	0.47	0.45
040	13.9%	16.4%	0.54	0.46
041	59.3%	60.9%	0.39	0.35
042	39.1%	40.8%	0.45	0.42
043	55.0%	55.8%	0.47	0.33
044	68.1%	70.5%	0.59	0.52
048	10.2%	11.5%	0.31	0.28
055	90.9%	93.7%	0.32	0.34

Chart 11 – Districts in the Senate Enacted Plan senate metro region

District	[% Black]	[% 18+_AP_Blk]	Reock	Polsby-Popper
006	21.9%	23.9%	0.41	0.24
010	69.7%	71.5%	0.28	0.23
014	17.2%	19.0%	0.27	0.24
028	19.1%	19.5%	0.45	0.25
034	67.5%	69.5%	0.45	0.34
035	70.6%	71.9%	0.47	0.26
036	51.9%	51.3%	0.32	0.3
038	63.4%	65.3%	0.36	0.21
039	61.0%	60.7%	0.17	0.13
040	16.8%	19.2%	0.51	0.34
041	61.0%	62.6%	0.51	0.3
042	28.5%	30.8%	0.48	0.32

043	63.4%	64.3%	0.64	0.35
044	69.9%	71.3%	0.18	0.19
055	63.9%	66.0%	0.34	0.27

44. Looking at some specific districts shows that the compactness of the districts is impacted by the efforts to create more majority black districts. In the Senate Illustrative Plan, District 055 is in southern DeKalb County. This district has a Reock compactness score of .32 and a Polsby-Popper compactness score of .34 and the district is 93.7% 18+AP Black. In the enacted plan, a comparable district in the region is District 010, in southern DeKalb County and Henry County. This district has a Reock compactness score of .28 and a Polsby-Popper compactness score of .23 and the district is 71.5% 18+AP Black. This demonstrates that drawing a more compact district in southern DeKalb County yields a very high black percentage. The black percentage is lowered only by elongating the district to include lower concentrations of black population. This allows the black population to be redistributed and to create other majority black districts.

45. Looking at another district in the region, In the Senate Illustrative Plan, District 039 is in Fulton County. This district has a Reock compactness score of .47 and a Polsby-Popper compactness score of .45 and the district is 92.0% 18+AP Black. In the enacted plan, a comparable district in the region is District 039, in

Fulton County. This district has a Reock compactness score of .17 and a Polsby-Popper compactness score of .13 and the district is 60.7% 18+AP Black. This demonstrates that drawing a more compact district in Fulton County can yield a very high black percentage. The black percentage is lowered only by elongating the district to include lower concentrations of black population. This allows the black population to be redistributed and to create other majority black districts.

46. Looking at the individual district data in the senate metro region, the Senate Enacted Plan has more majority black districts and they are less compact than the districts in the Senate Illustrative Plan. In my opinion, the creation of an additional black majority district in the region lead to lower compactness scores in this region.

CONCLUSION

47. As described above, I reviewed the enacted House and Senate plans and I drew a "blind" plan that did not consider race or incumbency or past redistricting plans for Georgia, while still considering traditional redistricting principles.

48. My review of the enacted house and senate plans combined with drawing the blind illustrative plans demonstrates the tendency that racial considerations had an effect on district composition and district shapes in the enacted plans.

I reserve the right to continue to supplement my declaration based on additional facts, testimony, and/or materials.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury of the laws of the United States that the foregoing is true and correct according to the best of my knowledge, information, and belief.

This 5th day of December, 2022.

JOHN B. MORGAN

Exhibit 1

JOHN B. MORGAN

Curriculum Vitae

Redistricting Background and Experience

- Performed redistricting work in 20 states, in the areas of map drawing, problem-solving and redistricting software operation.
- Performed demographic and election analysis work in 40 states, for both statewide and legislative candidates

2021-2022 Redistricting Cycle

- Mapping expert for Michigan Independent Citizens Redistricting Commission
- Mapping expert for Virginia Redistricting Commission
- Mapping expert for New Jersey Congressional Redistricting Commission
- Mapping expert for New Jersey Legislative Redistricting Commission
- Staff analyst for New Mexico Senate Republican caucus – Dec. 2021 special session
- Mapping consultant to Indiana State Senate Republican caucus
- Mapping consultant to redistricting commissioners in Atlantic County, New Jersey
- Drafted county commission districts for Sampson County, North Carolina
- Drafted wards for town of Brownsburg, Indiana

2011-2012 Redistricting Cycle

- Served as a consultant for:
    - Connecticut Redistricting Commission
    - Ohio Reapportionment Board
    - New Jersey Legislative Redistricting Commission
    - New Jersey Congressional Redistricting Commission
    - Pennsylvania Legislative Reapportionment Commission
- Drafted Wake County, North Carolina school board districts
- Drafted county commission districts in Sampson and Craven counties in North Carolina and Atlantic County in New Jersey
- Worked with redistricting commissions in Atlantic and Essex counties, New Jersey.
- Worked on statewide congressional, legislative, and local plans in the following states: Connecticut, Indiana, Kansas, Missouri, New Jersey, New Mexico, North Carolina, Ohio, Pennsylvania, South Carolina, and Virginia
- Plans drafted by Morgan adopted in whole or part by the following states: Connecticut, Indiana, New Jersey, New Mexico, North Carolina, South Carolina, Virginia.

2001-2002 Redistricting Cycle

- Worked on statewide congressional and legislative redistricting plans in the following states: Florida, Georgia, Indiana, Iowa, New Jersey, North Carolina, Pennsylvania, Rhode Island, and Virginia.
- Dealt with redistricting issues as a member of the Majority Leader's legislative staff in Virginia House of Delegates. Drafted alternate plans for use by the minority parties in

Rhode Island. Drafted alternate plans for use by legislative leadership in considering plans drawn by redistricting commission staff in Iowa.

1991-1992 Redistricting Cycle

- Worked on statewide congressional and legislative redistricting plans in the following states: Florida, Illinois, Indiana, Michigan, New Jersey, New York, Pennsylvania, Wisconsin.
- Focused primarily on Voting Rights Act issues with Black, Hispanic and Asian communities.
- Federal court incorporated portion of legislative plan drafted in part by Morgan for Wisconsin into final decree, finding the configuration superior to other plans in its treatment of minority voters.

Expert Experience and Trial Testimony

- Recognized as an expert in demographics and redistricting in *Egolf v. Duran*, New Mexico First Judicial District Court, Case No. D-101-CV-2011-02942, which dealt with New Mexico's legislative plans.
- In *Egolf v. Duran*, the Court adopted a House redistricting plan principally drafted by Morgan.
- Filed expert reports in *Georgia State Conference of NAACP v. Fayette County Board of Commissioners.*
- Filed expert reports and expert testimony in *Page v. Board of Elections*, Eastern District of Virginia; provided expert testimony at trial.
- Testified at trial in *Bethune Hill v. Virginia Board of Elections* and *Vesilind v. Virginia Board of Elections.*
- Filed expert report in *Georgia NAACP v. Gwinnett County.*
- Filed expert reports and expert testimony *Alpha Phi Alpha v. Raffensperger; Grant v. Raffensperger; and Pendergrass v. Raffensperger*

Education

- Bachelor of Arts degree in History from the University of Chicago
- Graduated with honors.
- Bachelor's Honors thesis on "The Net Effects of Gerrymandering 1896-1932."
- Demographic study on LaSalle, Illinois was published in *The History of the Illinois and Michigan Canal, Volume Five.*

Employment

- President of Applied Research Coordinates, a consulting firm specializing in political and demographic analysis and its application to elections and redistricting, 2007 to present
- Redistricting consultant for many legislatures and commissions: 1991, 2001, 2011, 2021
- Executive Director, GOPAC (Hon. J.C. Watts, Chairman), 2004-2007
- Vice-President of Applied Research Coordinates, 1999-2004
- National Field Director, GOPAC (Rep. John Shadegg, Chairman) 1995-1999
- Research Analyst, Applied Research Coordinates 1991-1995
- Research Analyst, Republican National Committee 1988-1989, summer

Exhibit 2

User:
Plan Name: **GA_House2021**
Plan Type:

Population Summary

Population Summary

GA_House2021

District	Population	Deviation	% Devn.	[% 18+_AP_Blk]	[% Black]
001	59,666	155	0.26%	4.2%	3.94%
002	59,773	262	0.44%	3.15%	2.68%
003	60,199	688	1.16%	3.35%	2.9%
004	59,070	-441	-0.74%	5.38%	4.41%
005	58,837	-674	-1.13%	4.6%	3.88%
006	59,712	201	0.34%	1.51%	1.07%
007	59,081	-430	-0.72%	0.62%	0.4%
008	59,244	-267	-0.45%	1.43%	1.16%
009	59,474	-37	-0.06%	1.57%	1.05%
010	59,519	8	0.01%	3.73%	3.03%
011	58,792	-719	-1.21%	1.85%	1.61%
012	59,300	-211	-0.35%	9.68%	8.68%
013	59,150	-361	-0.61%	19.18%	18.92%
014	59,135	-376	-0.63%	6.85%	5.98%
015	59,213	-298	-0.50%	14.19%	13.85%
016	59,402	-109	-0.18%	11.69%	11.36%
017	59,120	-391	-0.66%	23.02%	22.54%
018	59,335	-176	-0.30%	7.98%	7.19%
019	58,955	-556	-0.93%	24.15%	23.95%
020	60,107	596	1.00%	9.25%	8.34%
021	59,529	18	0.03%	5.06%	4.37%
022	59,460	-51	-0.09%	15.1%	14.31%
023	59,048	-463	-0.78%	6.5%	5.81%
024	59,011	-500	-0.84%	7%	6.14%
025	59,414	-97	-0.16%	5.9%	5.06%
026	59,248	-263	-0.44%	4.01%	3.41%

User:
Plan Name: **GA_House2021**
Plan Type:

Population Summary

Population Summary

GA_House2021

District	Population	Deviation	% Devn.	[% 18+_AP_Blk]	[% Black]
027	58,795	-716	-1.20%	3.69%	3.31%
028	58,972	-539	-0.91%	3.93%	3.49%
029	59,200	-311	-0.52%	13.59%	12.45%
030	59,266	-245	-0.41%	8.1%	7.56%
031	59,901	390	0.66%	7.57%	6.83%
032	59,145	-366	-0.62%	7.96%	7.33%
033	59,187	-324	-0.54%	11.2%	11.02%
034	59,875	364	0.61%	15.67%	14.73%
035	59,889	378	0.64%	28.4%	27.13%
036	59,994	483	0.81%	16.98%	16.26%
037	59,176	-335	-0.56%	28.18%	26.57%
038	59,317	-194	-0.33%	54.23%	53.68%
039	59,381	-130	-0.22%	55.29%	52.84%
040	59,044	-467	-0.78%	32.98%	31.39%
041	60,122	611	1.03%	39.35%	37%
042	59,620	109	0.18%	33.7%	31.87%
043	59,464	-47	-0.08%	26.53%	24.83%
044	60,002	491	0.83%	12.05%	11.23%
045	59,738	227	0.38%	5.28%	4.24%
046	59,108	-403	-0.68%	8.07%	6.93%
047	59,126	-385	-0.65%	10.72%	9.59%
048	59,003	-508	-0.85%	11.79%	10.38%
049	59,153	-358	-0.60%	8.42%	7.33%
050	59,523	12	0.02%	12.4%	11.3%
051	58,952	-559	-0.94%	23.68%	22.42%
052	59,811	300	0.50%	15.99%	13.94%

User:
Plan Name: **GA_House2021**
Plan Type:

Population Summary

Population Summary

GA_House2021

District	Population	Deviation	% Devn.	[% 18+_AP_Blk]	[% Black]
053	59,953	442	0.74%	14.53%	12.59%
054	60,083	572	0.96%	15.47%	13.25%
055	59,971	460	0.77%	55.38%	55.03%
056	58,929	-582	-0.98%	45.48%	46.85%
057	59,969	458	0.77%	18.06%	15.89%
058	59,057	-454	-0.76%	63.04%	63.71%
059	59,434	-77	-0.13%	70.09%	70.27%
060	59,709	198	0.33%	63.88%	62.26%
061	59,302	-209	-0.35%	74.29%	72.27%
062	59,450	-61	-0.10%	72.26%	70.86%
063	59,381	-130	-0.22%	69.33%	68.64%
064	58,986	-525	-0.88%	30.72%	29.91%
065	59,464	-47	-0.08%	61.98%	60.74%
066	59,047	-464	-0.78%	53.41%	52.9%
067	59,135	-376	-0.63%	58.92%	57.71%
068	59,477	-34	-0.06%	55.75%	55.2%
069	58,682	-829	-1.39%	63.56%	62.55%
070	59,121	-390	-0.66%	27.83%	27.99%
071	59,538	27	0.05%	19.92%	19.16%
072	59,660	149	0.25%	20.86%	19.64%
073	60,036	525	0.88%	12.11%	11.47%
074	58,956	-555	-0.93%	25.52%	25.53%
075	59,743	232	0.39%	74.4%	72.26%
076	59,759	248	0.42%	67.23%	64.99%
077	59,242	-269	-0.45%	76.13%	73.39%
078	59,044	-467	-0.78%	71.58%	70.32%

User:
Plan Name: **GA_House2021**
Plan Type:

Population Summary

Population Summary

GA_House2021

District	Population	Deviation	% Devn.	[% 18+_AP_Blk]	[% Black]
079	59,500	-11	-0.02%	71.59%	69.08%
080	59,461	-50	-0.08%	14.18%	12%
081	59,007	-504	-0.85%	21.83%	19.09%
082	59,724	213	0.36%	16.83%	14.66%
083	59,416	-95	-0.16%	15.12%	12.45%
084	59,862	351	0.59%	73.66%	70.46%
085	59,373	-138	-0.23%	62.71%	60.9%
086	59,205	-306	-0.51%	75.05%	72.44%
087	59,709	198	0.33%	73.08%	70.92%
088	59,689	178	0.30%	63.35%	61.41%
089	59,866	355	0.60%	62.54%	60.27%
090	59,812	301	0.51%	58.49%	57.69%
091	60,050	539	0.91%	70.04%	68.63%
092	60,273	762	1.28%	68.79%	68.31%
093	60,118	607	1.02%	65.36%	64.04%
094	59,211	-300	-0.50%	69.04%	66.81%
095	60,030	519	0.87%	67.15%	65.91%
096	59,515	4	0.01%	23%	21.31%
097	59,072	-439	-0.74%	26.77%	25.79%
098	59,998	487	0.82%	23.25%	20.23%
099	59,850	339	0.57%	14.71%	13.8%
100	60,030	519	0.87%	10.01%	9.19%
101	59,938	427	0.72%	24.19%	22.9%
102	58,959	-552	-0.93%	37.62%	37.16%
103	60,197	686	1.15%	16.79%	15.52%
104	59,362	-149	-0.25%	17.03%	15.96%

User:
Plan Name: **GA_House2021**
Plan Type:

Population Summary

Population Summary

GA_House2021

District	Population	Deviation	% Devn.	[% 18+_AP_Blk]	[% Black]
105	59,344	-167	-0.28%	29.05%	28.45%
106	59,112	-399	-0.67%	36.27%	36.27%
107	59,702	191	0.32%	29.63%	28.16%
108	59,577	66	0.11%	18.35%	17.71%
109	59,630	119	0.20%	32.51%	30.16%
110	59,951	440	0.74%	47.19%	46.58%
111	60,009	498	0.84%	22.29%	22.08%
112	59,349	-162	-0.27%	19.21%	19.06%
113	60,053	542	0.91%	59.53%	58.29%
114	59,867	356	0.60%	24.74%	24.16%
115	60,174	663	1.11%	52.13%	52.13%
116	59,913	402	0.68%	58.12%	57.58%
117	60,130	619	1.04%	36.61%	36.43%
118	59,987	476	0.80%	23.6%	22.72%
119	58,947	-564	-0.95%	13.49%	12.73%
120	58,982	-529	-0.89%	14.28%	13.65%
121	59,127	-384	-0.65%	9.56%	8.8%
122	59,632	121	0.20%	28.42%	30.85%
123	59,282	-229	-0.38%	24.28%	23.91%
124	59,221	-290	-0.49%	25.58%	26.18%
125	60,137	626	1.05%	23.68%	22.24%
126	59,260	-251	-0.42%	54.47%	54.3%
127	58,678	-833	-1.40%	18.52%	17.46%
128	58,864	-647	-1.09%	50.41%	51.11%
129	58,829	-682	-1.15%	54.87%	55.5%
130	59,203	-308	-0.52%	59.91%	60.84%

User:
Plan Name: **GA_House2021**
Plan Type:

Population Summary

Population Summary

GA_House2021

District	Population	Deviation	% Devn.	[% 18+_AP_Blk]	[% Black]
131	58,890	-621	-1.04%	17.62%	16.38%
132	59,142	-369	-0.62%	52.34%	52.48%
133	59,202	-309	-0.52%	36.76%	37.23%
134	59,396	-115	-0.19%	33.57%	34.39%
135	60,063	552	0.93%	23.75%	22.95%
136	59,298	-213	-0.36%	28.67%	28.15%
137	59,551	40	0.07%	52.13%	51.92%
138	58,912	-599	-1.01%	19.32%	18.92%
139	59,010	-501	-0.84%	20.27%	19.63%
140	59,294	-217	-0.36%	57.63%	56.56%
141	59,019	-492	-0.83%	57.46%	55.6%
142	59,608	97	0.16%	59.52%	61.09%
143	59,469	-42	-0.07%	60.79%	62%
144	59,232	-279	-0.47%	29.32%	29.49%
145	59,863	352	0.59%	35.67%	36%
146	60,203	692	1.16%	27.61%	27.04%
147	59,178	-333	-0.56%	30.12%	29.91%
148	59,984	473	0.79%	34.02%	34.09%
149	58,893	-618	-1.04%	32.15%	31.8%
150	59,276	-235	-0.39%	53.56%	53.5%
151	60,059	548	0.92%	42.41%	42.45%
152	60,134	623	1.05%	26.06%	25.98%
153	59,299	-212	-0.36%	67.95%	69.44%
154	59,994	483	0.81%	54.82%	55.77%
155	58,759	-752	-1.26%	35.85%	36.36%
156	59,444	-67	-0.11%	30.25%	29.97%

User:
Plan Name: **GA_House2021**
Plan Type:

Population Summary

Population Summary

GA_House2021

District	Population	Deviation	% Devn.	[% 18+_AP_Blk]	[% Black]
157	59,957	446	0.75%	24.67%	23.82%
158	59,440	-71	-0.12%	31.19%	31.67%
159	59,895	384	0.65%	24.5%	24.02%
160	59,935	424	0.71%	22.6%	22.04%
161	60,097	586	0.98%	27.14%	26.27%
162	60,308	797	1.34%	43.73%	43.95%
163	60,123	612	1.03%	45.49%	46.54%
164	60,101	590	0.99%	23.47%	22.55%
165	59,978	467	0.78%	50.33%	52.86%
166	60,242	731	1.23%	5.67%	5.04%
167	59,493	-18	-0.03%	22.28%	21.4%
168	60,147	636	1.07%	46.26%	44.49%
169	59,138	-373	-0.63%	29.04%	29.04%
170	60,116	605	1.02%	24.22%	24.56%
171	59,237	-274	-0.46%	39.6%	40%
172	59,961	450	0.76%	23.32%	23.41%
173	59,743	232	0.39%	36.27%	36.4%
174	59,852	341	0.57%	17.37%	17.42%
175	59,993	482	0.81%	24.17%	23.98%
176	59,470	-41	-0.07%	22.68%	21.96%
177	59,992	481	0.81%	53.88%	55.26%
178	59,877	366	0.62%	14.79%	14.59%
179	59,356	-155	-0.26%	27.03%	28.66%
180	59,412	-99	-0.17%	18.21%	17.31%

Total Population: 10,711,908

User:
Plan Name: **GA_House2021**
Plan Type:

Population Summary

Population Summary

GA_House2021

District	Population	Deviation	% Devn.	[% 18+_AP_Blk]	[% Black]
Ideal District Population:	59,511				
Summary Statistics:					
Population Range:		58,678 to 60,308			
Ratio Range:		0.03			
Absolute Range:		-833 to 797			
Absolute Overall Range:		1630			
Relative Range:		-1.40% to 1.34%			
Relative Overall Range:		2.74%			
Absolute Mean Deviation:		363.71			
Relative Mean Deviation:		0.61%			
Standard Deviation:		417.67			

Exhibit 3

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Number of subdivisions not split:

County	90
Voting District	2,514

Number of subdivisions split into more than one district:

County	69
Voting District	184

Number of splits involving no population:

County	0
Voting District	16

Split Counts

County

Cases where an area is split among 2 Districts: 34
Cases where an area is split among 3 Districts: 9
Cases where an area is split among 4 Districts: 12
Cases where an area is split among 5 Districts: 4
Cases where an area is split among 6 Districts: 3
Cases where an area is split among 7 Districts: 2
Cases where an area is split among 9 Districts: 1
Cases where an area is split among 14 Districts: 1
Cases where an area is split among 17 Districts: 1
Cases where an area is split among 21 Districts: 1
Cases where an area is split among 22 Districts: 1

Voting District

Cases where an area is split among 2 Districts: 175
Cases where an area is split among 3 Districts: 10

County	Voting District	District	Population
Split Counties:			
Appling GA		157	12,825
Appling GA		178	5,619

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Baldwin GA	128	5,158
Baldwin GA	133	38,641
Barrow GA	104	24,245
Barrow GA	119	54,736
Barrow GA	120	4,524
Bartow GA	014	49,688
Bartow GA	015	59,213
Ben Hill GA	148	5,115
Ben Hill GA	156	12,079
Bibb GA	142	59,608
Bibb GA	143	59,469
Bibb GA	144	33,948
Bibb GA	145	4,321
Bryan GA	160	11,008
Bryan GA	164	21,420
Bryan GA	166	12,310
Bulloch GA	158	19,285
Bulloch GA	159	12,887
Bulloch GA	160	48,927
Carroll GA	018	18,789
Carroll GA	070	2,854
Carroll GA	071	59,538
Carroll GA	072	37,967
Catoosa GA	002	7,673
Catoosa GA	003	60,199
Chatham GA	161	28,269
Chatham GA	162	60,308
Chatham GA	163	60,123
Chatham GA	164	38,681
Chatham GA	165	59,978
Chatham GA	166	47,932

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Cherokee GA	011	6,557
Cherokee GA	014	9,447
Cherokee GA	020	60,107
Cherokee GA	021	59,529
Cherokee GA	022	30,874
Cherokee GA	023	59,048
Cherokee GA	044	21,989
Cherokee GA	046	15,178
Cherokee GA	047	3,891
Clarke GA	120	30,095
Clarke GA	121	26,478
Clarke GA	122	59,632
Clarke GA	124	12,466
Clayton GA	075	59,743
Clayton GA	076	59,759
Clayton GA	077	59,242
Clayton GA	078	55,197
Clayton GA	079	59,500
Clayton GA	116	4,154
Cobb GA	022	28,586
Cobb GA	034	59,875
Cobb GA	035	59,889
Cobb GA	036	59,994
Cobb GA	037	59,176
Cobb GA	038	59,317
Cobb GA	039	59,381
Cobb GA	040	59,044
Cobb GA	041	60,122
Cobb GA	042	59,620
Cobb GA	043	59,464
Cobb GA	044	38,013

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Cobb GA	045	59,738
Cobb GA	046	43,930
Coffee GA	169	33,736
Coffee GA	176	9,356
Columbia GA	123	2,205
Columbia GA	125	55,389
Columbia GA	127	39,526
Columbia GA	131	58,890
Cook GA	170	7,342
Cook GA	172	9,887
Coweta GA	065	13,008
Coweta GA	067	17,272
Coweta GA	070	56,267
Coweta GA	073	31,608
Coweta GA	136	28,003
Dawson GA	007	2,409
Dawson GA	009	24,389
DeKalb GA	052	28,300
DeKalb GA	080	59,461
DeKalb GA	081	59,007
DeKalb GA	082	59,724
DeKalb GA	083	59,416
DeKalb GA	084	59,862
DeKalb GA	085	59,373
DeKalb GA	086	59,205
DeKalb GA	087	59,709
DeKalb GA	088	47,844
DeKalb GA	089	59,866
DeKalb GA	090	59,812
DeKalb GA	091	19,700
DeKalb GA	092	15,607

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

DeKalb GA	093	11,690
DeKalb GA	094	31,207
DeKalb GA	095	14,599
Dougherty GA	151	6,268
Dougherty GA	152	6,187
Dougherty GA	153	59,299
Dougherty GA	154	14,036
Douglas GA	061	30,206
Douglas GA	064	35,576
Douglas GA	065	19,408
Douglas GA	066	59,047
Effingham GA	159	32,941
Effingham GA	161	31,828
Fayette GA	068	29,719
Fayette GA	069	37,303
Fayette GA	073	28,428
Fayette GA	074	23,744
Floyd GA	005	5,099
Floyd GA	012	34,335
Floyd GA	013	59,150
Forsyth GA	011	19,019
Forsyth GA	024	59,011
Forsyth GA	025	46,134
Forsyth GA	026	59,248
Forsyth GA	028	50,864
Forsyth GA	100	17,007
Fulton GA	025	13,280
Fulton GA	047	55,235
Fulton GA	048	43,976
Fulton GA	049	59,153
Fulton GA	050	59,523

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Fulton GA	051	58,952
Fulton GA	052	31,511
Fulton GA	053	59,953
Fulton GA	054	60,083
Fulton GA	055	59,971
Fulton GA	056	58,929
Fulton GA	057	59,969
Fulton GA	058	59,057
Fulton GA	059	59,434
Fulton GA	060	59,709
Fulton GA	061	29,096
Fulton GA	062	59,450
Fulton GA	063	59,381
Fulton GA	065	27,048
Fulton GA	067	41,863
Fulton GA	068	29,758
Fulton GA	069	21,379
Glynn GA	167	20,499
Glynn GA	179	59,356
Glynn GA	180	4,644
Gordon GA	005	53,738
Gordon GA	006	3,806
Grady GA	171	8,115
Grady GA	173	18,121
Gwinnett GA	030	8,620
Gwinnett GA	048	15,027
Gwinnett GA	088	11,845
Gwinnett GA	094	28,004
Gwinnett GA	095	34,221
Gwinnett GA	096	59,515
Gwinnett GA	097	59,072

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Gwinnett GA	098	59,998
Gwinnett GA	099	59,850
Gwinnett GA	100	35,204
Gwinnett GA	101	59,938
Gwinnett GA	102	58,959
Gwinnett GA	103	51,691
Gwinnett GA	104	35,117
Gwinnett GA	105	59,344
Gwinnett GA	106	59,112
Gwinnett GA	107	59,702
Gwinnett GA	108	59,577
Gwinnett GA	109	59,630
Gwinnett GA	110	59,951
Gwinnett GA	111	22,685
Habersham GA	010	42,636
Habersham GA	032	3,395
Hall GA	027	54,508
Hall GA	028	8,108
Hall GA	029	59,200
Hall GA	030	50,646
Hall GA	031	14,349
Hall GA	100	7,819
Hall GA	103	8,506
Harris GA	138	21,634
Harris GA	139	13,034
Henry GA	074	18,397
Henry GA	078	3,847
Henry GA	091	35,569
Henry GA	115	60,174
Henry GA	116	55,759
Henry GA	117	54,737

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Henry GA	118	12,229
Houston GA	145	28,132
Houston GA	146	60,203
Houston GA	147	59,178
Houston GA	148	16,120
Jackson GA	031	45,552
Jackson GA	032	10,931
Jackson GA	119	4,211
Jackson GA	120	15,213
Jasper GA	114	2,855
Jasper GA	118	11,733
Jones GA	133	20,561
Jones GA	144	7,786
Lamar GA	134	5,026
Lamar GA	135	13,474
Liberty GA	167	5,109
Liberty GA	168	60,147
Lowndes GA	174	9,770
Lowndes GA	175	43,692
Lowndes GA	176	4,797
Lowndes GA	177	59,992
Lumpkin GA	009	29,201
Lumpkin GA	027	4,287
Madison GA	033	9,935
Madison GA	123	20,185
McDuffie GA	125	4,748
McDuffie GA	128	16,884
Meriwether GA	136	13,382
Meriwether GA	137	7,231
Monroe GA	134	9,272
Monroe GA	144	17,498

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Monroe GA	145	1,187
Muscogee GA	137	30,443
Muscogee GA	138	12,190
Muscogee GA	139	45,976
Muscogee GA	140	59,294
Muscogee GA	141	59,019
Newton GA	093	15,515
Newton GA	113	60,053
Newton GA	114	36,915
Oconee GA	120	9,150
Oconee GA	121	32,649
Paulding GA	016	16,549
Paulding GA	017	59,120
Paulding GA	018	10,627
Paulding GA	019	58,955
Paulding GA	064	23,410
Peach GA	145	14,093
Peach GA	150	13,888
Putnam GA	118	10,591
Putnam GA	124	11,456
Richmond GA	126	25,990
Richmond GA	127	19,152
Richmond GA	129	58,829
Richmond GA	130	59,203
Richmond GA	132	43,433
Rockdale GA	091	4,781
Rockdale GA	092	44,666
Rockdale GA	093	32,913
Rockdale GA	095	11,210
Spalding GA	074	16,815
Spalding GA	117	5,393

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Spalding GA		134	45,098
Sumter GA		150	14,282
Sumter GA		151	15,334
Tattnall GA		156	1,263
Tattnall GA		157	21,579
Telfair GA		149	9,486
Telfair GA		156	2,991
Thomas GA		172	4,176
Thomas GA		173	41,622
Tift GA		169	6,730
Tift GA		170	34,614
Troup GA		072	10,281
Troup GA		136	17,913
Troup GA		137	16,144
Troup GA		138	25,088
Walker GA		001	43,415
Walker GA		002	24,239
Walton GA		111	37,324
Walton GA		112	59,349
Ware GA		174	9,097
Ware GA		176	27,154
Wayne GA		167	6,742
Wayne GA		178	23,402
White GA		008	22,119
White GA		009	5,884
Whitfield GA		002	27,861
Whitfield GA		004	59,070
Whitfield GA		006	15,933
Split VTDs:			
Barrow GA	16	104	1,708
Barrow GA	16	119	8,060

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Bartow GA	CASSVILLE	014	15,558
Bartow GA	CASSVILLE	015	1,047
Bartow GA	WHITE	014	3,335
Bartow GA	WHITE	015	211
Ben Hill GA	WEST	148	5,115
Ben Hill GA	WEST	156	5,229
Bibb GA	HOWARD 1	142	2,326
Bibb GA	HOWARD 1	144	3,617
Bibb GA	HOWARD 2	142	2,369
Bibb GA	HOWARD 2	144	3,076
Bibb GA	HOWARD 3	142	0
Bibb GA	HOWARD 3	144	12,654
Bibb GA	WARRIOR 2	142	4,426
Bibb GA	WARRIOR 2	145	852
Bryan GA	DANIELSIDING	164	1,268
Bryan GA	DANIELSIDING	166	1,741
Bryan GA	HWY 144 EAST	164	4,552
Bryan GA	HWY 144 EAST	166	4,707
Bryan GA	J.F.GREGORY PARK	164	3,489
Bryan GA	J.F.GREGORY PARK	166	144
Bulloch GA	CHURCH	158	3,764
Bulloch GA	CHURCH	159	5,869
Carroll GA	BONNER	071	410
Carroll GA	BONNER	072	5,554
Chatham GA	CRUSADER COMMUNITY CENTER	162	2,134
Chatham GA	CRUSADER COMMUNITY CENTER	166	1,493
Chatham GA	GEORGETOWN ELEMENTAR	164	5,562

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Chatham GA	GEORGETOWN ELEMENTAR	166	0
Chatham GA	GRACE UNITED METHODIST CHURCH	163	2,064
Chatham GA	GRACE UNITED METHODIST CHURCH	165	397
Chatham GA	ROTHWELL BAPTIST CHURCH	161	5,335
Chatham GA	ROTHWELL BAPTIST CHURCH	164	4,987
Chatham GA	THE LIGHT CHURCH	162	1,177
Chatham GA	THE LIGHT CHURCH	163	1,109
Chatham GA	WINDSOR FOREST BAPTIST CHURCH SCHOOL	163	785
Chatham GA	WINDSOR FOREST BAPTIST CHURCH SCHOOL	166	1,890
Cherokee GA	CARMEL	020	5,626
Cherokee GA	CARMEL	022	1,222
Cherokee GA	CARMEL	044	0
Cherokee GA	FREEHOME	021	3,200
Cherokee GA	FREEHOME	047	3,891
Cherokee GA	HOLLY SPRINGS	021	2,250
Cherokee GA	HOLLY SPRINGS	023	2,578
Clarke GA	1A	122	2,758
Clarke GA	1A	124	2,286
Clarke GA	4B	121	7,082
Clarke GA	4B	122	5,589
Clarke GA	7C	120	1,922
Clarke GA	7C	121	3,184
Clayton GA	LOVEJOY 1	075	5,018

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Clayton GA	LOVEJOY 1	078	601
Clayton GA	LOVEJOY 3	078	9,099
Clayton GA	LOVEJOY 3	116	4,154
Clayton GA	MORROW 4	076	1,911
Clayton GA	MORROW 4	078	1,316
Cobb GA	Acworth 1B	035	7,322
Cobb GA	Acworth 1B	036	142
Cobb GA	Baker 01	022	5,226
Cobb GA	Baker 01	035	1,996
Cobb GA	Bells Ferry 03	022	4,918
Cobb GA	Bells Ferry 03	044	3,763
Cobb GA	Dobbins 01	042	11,055
Cobb GA	Dobbins 01	043	2,346
Cobb GA	Elizabeth 01	034	700
Cobb GA	Elizabeth 01	037	5,170
Cobb GA	Elizabeth 04	037	2,031
Cobb GA	Elizabeth 04	043	2,387
Cobb GA	Kennesaw 1A	022	599
Cobb GA	Kennesaw 1A	035	3,844
Cobb GA	Kennesaw 3A	022	0
Cobb GA	Kennesaw 3A	034	871
Cobb GA	Kennesaw 3A	035	8,631
Cobb GA	Lassiter 01	044	2,121
Cobb GA	Lassiter 01	046	2,600
Cobb GA	Lindley 01	039	5,678
Cobb GA	Lindley 01	040	582
Cobb GA	Mableton 01	038	1,589
Cobb GA	Mableton 01	039	5,513
Cobb GA	Mableton 02	038	256
Cobb GA	Mableton 02	039	5,427
Cobb GA	Marietta 1A	037	3,349

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Cobb GA	Marietta 1A	043	6,645
Cobb GA	Marietta 2A	034	1,664
Cobb GA	Marietta 2A	037	811
Cobb GA	Marietta 5A	037	2,877
Cobb GA	Marietta 5A	043	1,457
Cobb GA	Marietta 6A	037	1,532
Cobb GA	Marietta 6A	043	3,022
Cobb GA	Marietta 7A	042	1,494
Cobb GA	Marietta 7A	043	5,417
Cobb GA	North Cobb 01	035	2,611
Cobb GA	North Cobb 01	036	559
Cobb GA	Norton Park 01	041	1,955
Cobb GA	Norton Park 01	042	5,846
Cobb GA	Oregon 03	037	6,683
Cobb GA	Oregon 03	041	6,305
Cobb GA	Pine Mountain 02	034	3,976
Cobb GA	Pine Mountain 02	035	0
Cobb GA	Smyrna 1A	040	1,292
Cobb GA	Smyrna 1A	042	5,341
Cobb GA	Smyrna 4A	040	6,599
Cobb GA	Smyrna 4A	042	1,609
Cobb GA	Smyrna 7A	039	905
Cobb GA	Smyrna 7A	040	7,690
Coffee GA	DOUGLAS	169	19,642
Coffee GA	DOUGLAS	176	8,929
Columbia GA	PATRIOTS PARK	125	326
Columbia GA	PATRIOTS PARK	131	5,958
Coweta GA	JEFFERSON PARKWAY	070	12,590
Coweta GA	JEFFERSON PARKWAY	073	1,521
DeKalb GA	Cedar Grove Middle	089	2,204
DeKalb GA	Cedar Grove Middle	090	316

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

DeKalb GA	Clarkston	085	5,454
DeKalb GA	Clarkston	086	9,300
DeKalb GA	Dresden Elem (CHA)	081	5,398
DeKalb GA	Dresden Elem (CHA)	083	7,691
DeKalb GA	Freedom Middle	086	1,002
DeKalb GA	Freedom Middle	087	3,088
DeKalb GA	Glennwood (DEC)	082	2,059
DeKalb GA	Glennwood (DEC)	084	1,221
DeKalb GA	Glenwood Road	085	1,698
DeKalb GA	Glenwood Road	086	1,064
DeKalb GA	Memorial South	086	2,226
DeKalb GA	Memorial South	087	2,547
DeKalb GA	Panola Road	086	3,296
DeKalb GA	Panola Road	094	460
DeKalb GA	Redan Middle	087	1,419
DeKalb GA	Redan Middle	088	1,633
DeKalb GA	Rockbridge Road	094	3,736
DeKalb GA	Rockbridge Road	095	1,104
DeKalb GA	Snapfinger Road South	084	920
DeKalb GA	Snapfinger Road South	091	1,271
DeKalb GA	Stone Mill Elem	087	1,863
DeKalb GA	Stone Mill Elem	088	4,069
DeKalb GA	Stone Mountain Champion (STO)	087	1,338
DeKalb GA	Stone Mountain Champion (STO)	088	2,865
DeKalb GA	Stone Mountain Middle (TUC)	087	656
DeKalb GA	Stone Mountain Middle (TUC)	088	3,960
DeKalb GA	Tucker Library (TUC)	081	2,394

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

DeKalb GA	Tucker Library (TUC)	088	1,635
Dougherty GA	DARTON COLLEGE	151	4,018
Dougherty GA	DARTON COLLEGE	153	2,465
Dougherty GA	MT ZION CENTER	153	1,245
Dougherty GA	MT ZION CENTER	154	3,972
Effingham GA	4B	159	1,960
Effingham GA	4B	161	959
Fayette GA	ABERDEEN	068	983
Fayette GA	ABERDEEN	073	1,392
Fayette GA	BRAELINN	073	605
Fayette GA	BRAELINN	074	1,646
Fayette GA	STARRSMILL	073	1,932
Fayette GA	STARRSMILL	074	2,452
Floyd GA	ALTO PARK	012	1,576
Floyd GA	ALTO PARK	013	3,847
Floyd GA	MT ALTO NORTH	012	1,080
Floyd GA	MT ALTO NORTH	013	4,509
Forsyth GA	BROWNS BRIDGE	026	10,116
Forsyth GA	BROWNS BRIDGE	028	2,801
Forsyth GA	CONCORD	011	7,687
Forsyth GA	CONCORD	028	7,982
Forsyth GA	CUMMING	026	4,666
Forsyth GA	CUMMING	028	2,410
Forsyth GA	HEARDSVILLE	011	11,332
Forsyth GA	HEARDSVILLE	024	1,335
Forsyth GA	HEARDSVILLE	028	333
Forsyth GA	OTWELL	024	3,988
Forsyth GA	OTWELL	026	6,597
Forsyth GA	OTWELL	028	7,875
Forsyth GA	POLO	024	9,868
Forsyth GA	POLO	025	0

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Forsyth GA	POLO	026	15,990
Forsyth GA	SOUTH FORSYTH	025	10,064
Forsyth GA	SOUTH FORSYTH	100	11,887
Forsyth GA	WINDERMERE	026	11,718
Forsyth GA	WINDERMERE	100	5,120
Fulton GA	08C	053	1,524
Fulton GA	08C	060	335
Fulton GA	09K	055	3,033
Fulton GA	09K	060	4,105
Fulton GA	10D	055	1,756
Fulton GA	10D	060	4,311
Fulton GA	11C	055	340
Fulton GA	11C	060	3,418
Fulton GA	AP022	048	862
Fulton GA	AP022	049	2,505
Fulton GA	AP07B	047	1,250
Fulton GA	AP07B	049	1,304
Fulton GA	AP14	048	4,109
Fulton GA	AP14	049	281
Fulton GA	EP01B	059	2,393
Fulton GA	EP01B	062	2,049
Fulton GA	JC19	048	3,608
Fulton GA	JC19	051	1,792
Fulton GA	ML012	047	501
Fulton GA	ML012	049	123
Fulton GA	ML01B	047	284
Fulton GA	ML01B	049	61
Fulton GA	RW03	051	1,292
Fulton GA	RW03	053	6,066
Fulton GA	RW09	047	2,971
Fulton GA	RW09	049	4,750

User:
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Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Fulton GA	SC02	060	220
Fulton GA	SC02	061	773
Fulton GA	SC05B	061	1,575
Fulton GA	SC05B	065	2,978
Fulton GA	SC07A	065	1,028
Fulton GA	SC07A	067	7,728
Fulton GA	SC08B	062	92
Fulton GA	SC08B	068	5,255
Fulton GA	SC13	065	2,858
Fulton GA	SC13	067	1,176
Fulton GA	UC02A	065	1,070
Fulton GA	UC02A	067	13,013
Gwinnett GA	BAYCREEK A	106	934
Gwinnett GA	BAYCREEK A	110	2,651
Gwinnett GA	BAYCREEK D	102	3,729
Gwinnett GA	BAYCREEK D	110	2,597
Gwinnett GA	BERKSHIRE H	098	2,475
Gwinnett GA	BERKSHIRE H	108	1,991
Gwinnett GA	CATES J	094	955
Gwinnett GA	CATES J	108	4,255
Gwinnett GA	DULUTH F	096	7,245
Gwinnett GA	DULUTH F	107	5,149
Gwinnett GA	DULUTH G	096	1,426
Gwinnett GA	DULUTH G	099	3,389
Gwinnett GA	DUNCANS D	030	8,620
Gwinnett GA	DUNCANS D	104	1,575
Gwinnett GA	LAWRENCEVILLE F	102	2,073
Gwinnett GA	LAWRENCEVILLE F	105	3,924
Gwinnett GA	LAWRENCEVILLE M	102	4,231
Gwinnett GA	LAWRENCEVILLE M	105	7,770
Gwinnett GA	MARTINS H	107	8,164

User:
Plan Name: **GA_House2021**
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Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Gwinnett GA	MARTINS H	109	892
Gwinnett GA	PINCKNEYVILLE W	096	5,745
Gwinnett GA	PINCKNEYVILLE W	097	2,561
Gwinnett GA	PUCKETTS E	103	1,506
Gwinnett GA	PUCKETTS E	105	7,421
Gwinnett GA	SUGAR HILL D	100	2,158
Gwinnett GA	SUGAR HILL D	103	6,421
Gwinnett GA	SUWANEE F	099	3,224
Gwinnett GA	SUWANEE F	103	2,836
Habersham GA	HABERSHAM SOUTH	010	8,687
Habersham GA	HABERSHAM SOUTH	032	1,972
Hall GA	WILSON	028	3,803
Hall GA	WILSON	029	4,979
Henry GA	FLIPPEN	115	0
Henry GA	FLIPPEN	116	5,686
Henry GA	HICKORY FLAT	115	7,135
Henry GA	HICKORY FLAT	116	17
Henry GA	LOWES	116	5,233
Henry GA	LOWES	117	8,688
Henry GA	RED OAK	078	3,847
Henry GA	RED OAK	116	3,999
Henry GA	STOCKBRIDGE CENTRAL	078	0
Henry GA	STOCKBRIDGE CENTRAL	091	7,453
Henry GA	SWAN LAKE	091	3,240
Henry GA	SWAN LAKE	115	1,518
Houston GA	CENT	145	69
Houston GA	CENT	147	11,815
Houston GA	FMMS	146	9,734
Houston GA	FMMS	147	3,595
Houston GA	HHPC	145	8,748
Houston GA	HHPC	147	6,643

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Houston GA	MCMS	146	3,947
Houston GA	MCMS	147	9,547
Houston GA	RECR	145	15,867
Houston GA	RECR	146	0
Houston GA	RECR	147	1,931
Houston GA	ROZR	146	13,202
Houston GA	ROZR	148	7,640
Houston GA	VHS	146	5,586
Houston GA	VHS	148	4,039
Jackson GA	North Jackson	031	4,513
Jackson GA	North Jackson	032	10,931
Jackson GA	North Jackson	120	3,803
Jackson GA	West Jackson	031	16,656
Jackson GA	West Jackson	119	4,211
Jones GA	CLINTON	133	384
Jones GA	CLINTON	144	2,481
Lamar GA	MILNER	134	3,043
Lamar GA	MILNER	135	2,725
Liberty GA	BUTTON GWINNETT	167	5,109
Liberty GA	BUTTON GWINNETT	168	4,344
Lowndes GA	NORTHSIDE	175	8,373
Lowndes GA	NORTHSIDE	177	37,217
Lowndes GA	RAINWATER	175	6,400
Lowndes GA	RAINWATER	177	8,754
Lowndes GA	S LOWNDES	174	1,951
Lowndes GA	S LOWNDES	175	3,755
Lowndes GA	TRINITY	175	9,620
Lowndes GA	TRINITY	176	4,797
Lowndes GA	TRINITY	177	6,930
Lumpkin GA	DAHLONEGA	009	29,201
Lumpkin GA	DAHLONEGA	027	4,287

User:
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Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Muscogee GA	CUSSETA RD	140	5,391
Muscogee GA	CUSSETA RD	141	5,010
Muscogee GA	EPWORTH UMC	139	3,363
Muscogee GA	EPWORTH UMC	140	4,560
Muscogee GA	FORT/WADDELL	137	5,599
Muscogee GA	FORT/WADDELL	141	6,645
Muscogee GA	OUR LADY OF LOURDES	140	13,744
Muscogee GA	OUR LADY OF LOURDES	141	32
Muscogee GA	ROTHSCHILD	137	8,327
Muscogee GA	ROTHSCHILD	141	3,143
Muscogee GA	ST ANDREWS/MIDLAND	139	5,899
Muscogee GA	ST ANDREWS/MIDLAND	141	5,582
Newton GA	CEDAR SHOALS	093	1,206
Newton GA	CEDAR SHOALS	113	3,687
Newton GA	FAIRVIEW	093	856
Newton GA	FAIRVIEW	113	3,443
Newton GA	TOWN	093	1,668
Newton GA	TOWN	113	5,075
Paulding GA	AUSTIN MIDDLE SCHOOL	018	916
Paulding GA	AUSTIN MIDDLE SCHOOL	064	9,977
Paulding GA	BURNT HICKORY PARK	016	8,392
Paulding GA	BURNT HICKORY PARK	017	16
Paulding GA	CARL SCOGGINS MID SC	017	517
Paulding GA	CARL SCOGGINS MID SC	018	7,991
Paulding GA	CARL SCOGGINS MID SC	019	1,240
Paulding GA	HIRAM HIGH SCHOOL	017	0
Paulding GA	HIRAM HIGH SCHOOL	019	16,110
Paulding GA	SARA RAGSDALE ELM SC	017	5,972
Paulding GA	SARA RAGSDALE ELM SC	018	1,720
Paulding GA	SHELTON ELEMENTARY SCHOOL	016	8,152

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Paulding GA	SHELTON ELEMENTARY SCHOOL	017	12,810
Paulding GA	SHELTON ELEMENTARY SCHOOL	019	5,455
Paulding GA	WATSON GOVERNMENT COMPLEX	016	5
Paulding GA	WATSON GOVERNMENT COMPLEX	017	17,525
Richmond GA	109	129	954
Richmond GA	109	130	886
Richmond GA	301	127	2,362
Richmond GA	301	129	894
Richmond GA	402	126	0
Richmond GA	402	132	9,711
Richmond GA	503	129	3,260
Richmond GA	503	132	2,535
Richmond GA	702	127	586
Richmond GA	702	129	2,007
Richmond GA	703	127	1,164
Richmond GA	703	129	6,148
Richmond GA	803	126	0
Richmond GA	803	132	2,432
Richmond GA	807	126	2,403
Richmond GA	807	132	0
Rockdale GA	MILSTEAD	093	6,444
Rockdale GA	MILSTEAD	095	0
Rockdale GA	OLD TOWNE	093	10,095
Rockdale GA	OLD TOWNE	095	872
Rockdale GA	ROCKDALE	092	6,218
Rockdale GA	ROCKDALE	093	79
Spalding GA	CARVER FIRE STATION	074	235

User:
Plan Name: **GA_House2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House2021

Spalding GA	CARVER FIRE STATION	134	2,835
Spalding GA	GARY REID FIRE STATION	074	2,075
Spalding GA	GARY REID FIRE STATION	134	4,817
Spalding GA	UGA CAMPUS	074	787
Spalding GA	UGA CAMPUS	134	5,290
Sumter GA	GSW CONF CENTER	150	4,568
Sumter GA	GSW CONF CENTER	151	1,549
Sumter GA	REES PARK	150	5,179
Sumter GA	REES PARK	151	447
Troup GA	MOUNTVILLE	136	2,068
Troup GA	MOUNTVILLE	137	497
Walton GA	BROKEN ARROW	111	2,993
Walton GA	BROKEN ARROW	112	3,003
Ware GA	100	174	2,672
Ware GA	100	176	3,692
Ware GA	200A	174	0
Ware GA	200A	176	4,133
Ware GA	304	174	0
Ware GA	304	176	2,107
Ware GA	400	174	2,506
Ware GA	400	176	2,526
Wayne GA	OGLETHORPE	167	1,928
Wayne GA	OGLETHORPE	178	637
Whitfield GA	2A	002	3,864
Whitfield GA	2A	004	1,000
Whitfield GA	PLEASANT GROVE	002	6,210
Whitfield GA	PLEASANT GROVE	006	2,122

Exhibit 4

User:
Plan Name: **GA_House2021**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

	Reock	Polsby-Popper
Sum	N/A	N/A
Min	0.12	0.10
Max	0.66	0.59
Mean	0.39	0.28
Std. Dev.	0.11	0.10

District	Reock	Polsby-Popper
001	0.53	0.45
002	0.53	0.24
003	0.50	0.41
004	0.37	0.21
005	0.43	0.25
006	0.45	0.26
007	0.62	0.50
008	0.46	0.27
009	0.47	0.30
010	0.34	0.30
011	0.31	0.26
012	0.47	0.31
013	0.47	0.19

User:
Plan Name: GA_House2021
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

014	0.32	0.23
015	0.55	0.33
016	0.31	0.35
017	0.28	0.21
018	0.41	0.25
019	0.26	0.26
020	0.46	0.45
021	0.26	0.27
022	0.28	0.22
023	0.40	0.19
024	0.35	0.30
025	0.39	0.31
026	0.27	0.26
027	0.60	0.34
028	0.38	0.35
029	0.34	0.21
030	0.43	0.30
031	0.44	0.25
032	0.39	0.33

User:
Plan Name: GA_House2021
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

033	0.49	0.37
034	0.45	0.33
035	0.32	0.24
036	0.32	0.23
037	0.45	0.28
038	0.59	0.58
039	0.59	0.40
040	0.49	0.29
041	0.60	0.40
042	0.40	0.21
043	0.42	0.22
044	0.31	0.29
045	0.41	0.32
046	0.55	0.47
047	0.29	0.21
048	0.34	0.19
049	0.30	0.15
050	0.42	0.46
051	0.54	0.36

User:
Plan Name: GA_House2021
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

052	0.48	0.35
053	0.16	0.14
054	0.37	0.45
055	0.18	0.16
056	0.26	0.23
057	0.57	0.59
058	0.13	0.13
059	0.12	0.11
060	0.19	0.15
061	0.25	0.20
062	0.16	0.10
063	0.16	0.14
064	0.37	0.36
065	0.46	0.17
066	0.36	0.25
067	0.36	0.12
068	0.32	0.17
069	0.40	0.25
070	0.45	0.23

User:
Plan Name: GA_House2021
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

071	0.44	0.35
072	0.42	0.23
073	0.28	0.20
074	0.50	0.25
075	0.42	0.28
076	0.53	0.51
077	0.40	0.21
078	0.21	0.19
079	0.50	0.21
080	0.38	0.42
081	0.47	0.40
082	0.49	0.30
083	0.34	0.36
084	0.25	0.20
085	0.36	0.32
086	0.17	0.17
087	0.26	0.24
088	0.26	0.20
089	0.14	0.10

User:
Plan Name: GA_House2021
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

090	0.36	0.29
091	0.45	0.20
092	0.36	0.20
093	0.26	0.11
094	0.31	0.15
095	0.44	0.25
096	0.18	0.21
097	0.28	0.24
098	0.42	0.52
099	0.36	0.29
100	0.34	0.29
101	0.53	0.46
102	0.56	0.35
103	0.33	0.24
104	0.28	0.25
105	0.34	0.28
106	0.66	0.50
107	0.51	0.32
108	0.43	0.32

User:
Plan Name: GA_House2021
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

109	0.39	0.28
110	0.36	0.33
111	0.33	0.29
112	0.62	0.52
113	0.50	0.32
114	0.51	0.28
115	0.44	0.23
116	0.41	0.28
117	0.41	0.28
118	0.35	0.22
119	0.39	0.21
120	0.44	0.25
121	0.43	0.30
122	0.48	0.43
123	0.30	0.18
124	0.44	0.23
125	0.41	0.17
126	0.52	0.41
127	0.35	0.20

User:
Plan Name: GA_House2021
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

128	0.60	0.32
129	0.48	0.25
130	0.51	0.25
131	0.38	0.28
132	0.27	0.30
133	0.55	0.42
134	0.33	0.23
135	0.57	0.42
136	0.54	0.26
137	0.33	0.16
138	0.33	0.20
139	0.28	0.23
140	0.29	0.19
141	0.26	0.20
142	0.35	0.23
143	0.50	0.30
144	0.51	0.32
145	0.38	0.19
146	0.26	0.19

User:
Plan Name: GA_House2021
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

147	0.33	0.26
148	0.44	0.24
149	0.32	0.22
150	0.44	0.28
151	0.53	0.22
152	0.40	0.30
153	0.30	0.30
154	0.41	0.33
155	0.49	0.48
156	0.23	0.20
157	0.32	0.19
158	0.48	0.33
159	0.34	0.22
160	0.49	0.37
161	0.51	0.31
162	0.37	0.21
163	0.27	0.18
164	0.30	0.17
165	0.23	0.16

User:
Plan Name: **GA_House2021**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House2021

166	0.43	0.36
167	0.42	0.19
168	0.24	0.26
169	0.28	0.23
170	0.53	0.34
171	0.35	0.37
172	0.44	0.32
173	0.57	0.38
174	0.41	0.24
175	0.47	0.37
176	0.34	0.16
177	0.43	0.34
178	0.48	0.22
179	0.45	0.42
180	0.61	0.40

Measures of Compactness Summary

Reock	The measure is always between 0 and 1, with 1 being the most compact.
Polsby-Popper	The measure is always between 0 and 1, with 1 being the most compact.

Exhibit 5

User:
Plan Name: GA_House2021
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House2021

District	Name	Party	Previous District
001	Michael Cameron	R	1
002	Steve Tarvin	R	2
003	Dewayne Hill	R	3
004	Kasey Carpenter	R	4
005	Matt Barton	R	5
006	Jason Ridley	R	6
007	David Ralston	R	7
008	Norman Gunter	R	8
009	Will Wade	R	9
010	Victor Anderson	R	10
011	Rick Jasperse	R	11
012	James Lumsden	R	12
013	Katie Dempsey	R	13
014	Mitchell scoggins	R	14
015	Matthew Gambill	R	15
016	Trey Kelley	R	16
017	Martin Momtahan	R	17
018	Tyler Smith	R	18
019	Micah Gravley	R	67
019	Joseph Gullett	R	19
020	Charlice Byrd	R	20
021	Brad Thomas	R	21
021	Wes Cantrell	R	22
022	Ed Setzler	R	35
023	Mandi Ballinger	R	23
024	Sheri Gilligan	R	24
025	Todd Jones	R	25

User:
Plan Name: **GA_House2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House2021

District	Name	Party	Previous District
026	Lauren McDonald	R	26
027	Lee Hawkins	R	27
028			
029	Matt Dubnik	R	29
030			
031	Emory Dunahoo Jr	R	30
031	Thomas Benton	R	31
032	Chris Erwin	R	28
033	Alan Powell	R	32
034	Devan Seabaugh	R	34
035			
036	Ginny Ehrhart	R	36
037	Mary Frances Williams	D	37
038	David Wilkerson	D	38
039	Erica Thomas	D	39
040	Erick Allen	D	40
041	Michael Smith	D	41
042	Teri Anulewicz	D	42
043			
044	Donald Parsons	R	44
045	Sharon Cooper	R	43
045	Matthew Dollar	R	45
046	John Carson	R	46
047	Jan Jones	R	47
048	Mary Robichaux	D	48
049	Charles Martin	R	49
050	Angelika Kausche	D	50
051	Josh McLauren	D	51

User:
Plan Name: **GA_House2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House2021

District	Name	Party	Previous District
052	Shea Roberts	D	52
053			
054	Betsy Holland	D	54
055	Marie Metze	D	55
056	Mesha Mainor	D	56
057	Stacy Evans	D	57
058	Park Cannon	D	58
059			
060	Sheila Jones	D	53
061	Roger Bruce	D	61
062	William Boddie	D	62
062	David Dreyer	D	59
063	Kim Schofield	D	60
064			
065	Mandisha Thomas	D	65
066	Kimberly Alexander	D	66
067	Philip Singleton	R	71
068	Derrick Jackson	D	64
069	Debra Bazemore	D	63
070	Lynn Smith	R	70
071	James Collins	R	68
072	Randy Nix	R	69
073	Josh Bonner	R	72
074	Mathiak	R	73
075	Mike Glanton	D	75
076	Sandra Scott	D	76
077	Rhonda Burnough	D	77

User:
Plan Name: **GA_House2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House2021

District	Name	Party	Previous District
078	Demetrius Douglas	D	78
079	Yasmine Neal	D	74
080	Mike Wilensky	D	79
081	Scott Holcomb	D	81
082	Mary Margaret Oliver	D	82
083	Matthew Wilson	D	80
084	Renitta Shannon	D	84
085	Karla Drenner	D	85
086	Zulma Lopez	D	86
087	Viola Davis	D	87
088	Billy Mitchell	D	88
089	Becky Evans	D	83
090	Bee Nguyen	D	89
091	Angela Moore	D	90
092	Rhonda Taylor	D	91
093	Doreen Carter	D	92
094	Karen Bennett	D	94
095	Dar'shun Kendrick	D	93
096	Pedro Marin	D	96
097	Beth Moore	D	95
098	Marvin Lim	D	99
099			
100	Bonnie Rich	R	97
101	Gregg Kennard	D	102
102			
103	Timothy Barr	R	103
104	Chuck Efstration	R	104

User:
Plan Name: **GA_House2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House2021

District	Name	Party	Previous District
105	Donna McLeod	D	105
106	Rebecca Mitchell	D	106
106	Shelly Hutchinson	D	107
107	Sam Park	D	101
108	Jasmine Clark	D	108
109	Dewey McClain	D	100
110			
111	Tom Kirby	R	114
112	Bruce Williamson III	R	115
113	Sharon Henderson	D	113
114	Dave Belton	R	112
115	Regina Lewis-Ward	D	109
116	El-Mahdi Holly	D	111
117			
118	Clint Crowe	R	110
118	Susan Holmes	R	129
119	Terry England	R	116
120	Houston Gaines	R	117
121	Marcus Wiedower	R	119
122	Spencer Frye	D	118
123	Rob Leverett	R	33
124	Trey Rhodes	R	120
125	Barry Fleming	R	121
126	Gloria Frazier	D	126
127	Mark Newton	R	123
128	Mack Jackson	D	128
129	Wayne Howard	D	124

User:
Plan Name: **GA_House2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House2021

District	Name	Party	Previous District
130	Shelia Nelson	D	125
131	Jodi Lott	R	122
132	Brian Prince	D	127
133	Rick Williams	R	145
134	David Knight	R	130
135	Beth Camp	R	131
136	David Jenkins	R	132
137	Debbie Buckner	D	137
138	Vance Smith	R	133
139	Richard Smith	R	134
140	Calvin Smyre	D	135
141	Carolyn Hugley	D	136
142	Miriam Paris	D	142
143	James Beverly	D	143
144	Dale Washburn	R	141
145	Robert Dickey	R	140
146	Shaw Blackmon	R	146
147	Heath Clark	R	147
148	Noel Williams	R	148
149	Danny Mathis	R	144
149	Robert Pruitt	R	149
150	Patty Bentley	D	139
151	Mike Cheokas	R	138
152	Bill Yearta	R	152
153	CaMia Hopson-Jackson	D	153
154	Gerald Greene	R	151
154	Winfred Dukes	D	154

User:
Plan Name: **GA_House2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House2021

District	Name	Party	Previous District
155	Matt Hatchett	R	150
156	Leesa Hagan	R	156
157	William (Bill) Werkheiser	R	157
158	Larry (Butch) Parrish	R	158
159	Jon Burns	R	159
160	Jan Tankersley	R	160
161	Bill Hitchens	R	161
162	Carl Gilliard	D	162
163	Derek Mallow	D	163
164	Ron Stephens	R	164
165			
166	Jesse Petrea	R	166
167	Buddy Deloach	R	167
168	Al Williams	D	168
169	Clay Pirkle	R	155
170	Penny Houston	R	170
171	Joe Campbell	R	171
172	Sam Waston	R	172
173	Darlene Taylor	R	173
174	John Corbett	R	174
175	John LaHood	R	175
176	James Burchett	R	176
176	Dominic LaRiccia	R	169
177	Dexter Sharper	D	177
178	Steven Meeks	R	178
179	Don Hogan	R	179
180	Steven Sainz	R	180

User:
Plan Name: **GA_House2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House2021

District	Name	Party	Previous District

Number of Incumbents in District with more than one Incumbent:	20	
Number of Districts with No Incumbent:	12	
Number of Districts with Incumbents of more than one party:	1	
Number of Districts with Paired Democrats:	2	
Number of Districts with Paired Republicans:	7	

Exhibit 6

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_House_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
001	59,039	-472	-0.79%	3.29%	3.47%
002	58,675	-836	-1.40%	2.9%	3.56%
003	58,630	-881	-1.48%	2.91%	3.38%
004	58,727	-784	-1.32%	4.95%	5.88%
005	60,386	875	1.47%	3.69%	4.4%
006	59,543	32	0.05%	1.11%	1.53%
007	59,081	-430	-0.72%	0.4%	0.62%
008	58,899	-612	-1.03%	1.11%	1.43%
009	58,881	-630	-1.06%	1.09%	1.61%
010	60,028	517	0.87%	2.37%	2.92%
011	60,160	649	1.09%	1.64%	2.04%
012	60,318	807	1.36%	11.65%	12.54%
013	60,389	878	1.48%	15.54%	15.71%
014	59,240	-271	-0.46%	7.22%	8.21%
015	60,106	595	1.00%	13.73%	14.05%
016	60,354	843	1.42%	16.36%	16.82%
017	60,388	877	1.47%	20.66%	21.13%
018	60,334	823	1.38%	7.31%	7.78%
019	60,357	846	1.42%	28.26%	28.56%
020	60,073	562	0.94%	9.53%	10.4%
021	60,072	561	0.94%	4.17%	4.73%
022	59,853	342	0.57%	7.56%	8.25%
023	59,678	167	0.28%	7.29%	8.06%
024	59,040	-471	-0.79%	4.53%	5.11%
025	58,971	-540	-0.91%	4.03%	4.6%
026	59,842	331	0.56%	3.4%	3.93%

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_House_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
027	58,790	-721	-1.21%	4.29%	4.81%
028	60,036	525	0.88%	3.44%	3.82%
029	59,510	-1	0.00%	12.13%	13.07%
030	59,003	-508	-0.85%	6.84%	7.53%
031	59,174	-337	-0.57%	7.2%	7.87%
032	60,198	687	1.15%	6.55%	7.2%
033	59,187	-324	-0.54%	11.02%	11.2%
034	60,241	730	1.23%	12.54%	13.22%
035	60,325	814	1.37%	24.52%	25.45%
036	59,989	478	0.80%	35.64%	36.2%
037	59,602	91	0.15%	21.53%	22.97%
038	59,314	-197	-0.33%	56.08%	57.25%
039	60,320	809	1.36%	52.01%	54.49%
040	60,319	808	1.36%	31.32%	33.23%
041	60,349	838	1.41%	34.35%	36.71%
042	60,360	849	1.43%	28.61%	30.17%
043	59,328	-183	-0.31%	32.65%	34.74%
044	60,357	846	1.42%	20.07%	21.67%
045	60,141	630	1.06%	4.63%	5.66%
046	60,371	860	1.45%	7.55%	8.73%
047	60,126	615	1.03%	9.73%	11.12%
048	58,872	-639	-1.07%	10.13%	11.41%
049	59,197	-314	-0.53%	9.64%	10.89%
050	58,866	-645	-1.08%	11.18%	12.27%
051	59,304	-207	-0.35%	13.23%	14.46%
052	59,572	61	0.10%	11.76%	13.92%

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_House_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
053	59,669	158	0.27%	24.97%	26.48%
054	60,013	502	0.84%	10.47%	12.65%
055	59,294	-217	-0.36%	25.98%	28.95%
056	59,224	-287	-0.48%	16.19%	18.45%
057	58,918	-593	-1.00%	13.34%	15.17%
058	58,922	-589	-0.99%	39.34%	40.07%
059	59,625	114	0.19%	86.91%	88.59%
060	59,633	122	0.21%	89.76%	92.09%
061	58,830	-681	-1.14%	93.34%	95.58%
062	59,299	-212	-0.36%	79.5%	81.61%
063	59,690	179	0.30%	63.68%	63.8%
064	59,968	457	0.77%	40.51%	40.97%
065	59,986	475	0.80%	28.76%	28.53%
066	58,957	-554	-0.93%	53.39%	53.91%
067	59,307	-204	-0.34%	77.38%	78.57%
068	59,614	103	0.17%	90.58%	92.87%
069	59,231	-280	-0.47%	41.17%	42.05%
070	60,267	756	1.27%	17.6%	18.37%
071	58,881	-630	-1.06%	19.56%	20.8%
072	58,670	-841	-1.41%	37.81%	37.29%
073	59,254	-257	-0.43%	9.95%	10.94%
074	59,963	452	0.76%	8.63%	9.27%
075	59,928	417	0.70%	64.7%	66.18%
076	58,668	-843	-1.42%	69.01%	71.31%
077	58,671	-840	-1.41%	60.49%	62.59%
078	60,019	508	0.85%	77.06%	78.91%

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_House_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
079	60,309	798	1.34%	77.89%	80.7%
080	59,933	422	0.71%	13.61%	16.08%
081	60,139	628	1.06%	34.86%	36.63%
082	59,079	-432	-0.73%	12.62%	14.69%
083	59,661	150	0.25%	12.08%	14.64%
084	60,268	757	1.27%	34.91%	37.57%
085	59,929	418	0.70%	36.5%	36.26%
086	60,015	504	0.85%	66.16%	67.91%
087	60,376	865	1.45%	88.28%	91.28%
088	60,242	731	1.23%	83.43%	85.98%
089	59,362	-149	-0.25%	75.65%	76.56%
090	58,792	-719	-1.21%	92.2%	94.92%
091	59,992	481	0.81%	42.22%	43.09%
092	58,715	-796	-1.34%	91.67%	94.27%
093	58,635	-876	-1.47%	57.41%	58.17%
094	60,224	713	1.20%	59.67%	61.24%
095	58,739	-772	-1.30%	43.53%	43.45%
096	59,287	-224	-0.38%	20.8%	21.42%
097	60,328	817	1.37%	21.52%	23.4%
098	60,026	515	0.87%	18.83%	21.75%
099	58,882	-629	-1.06%	17.42%	18.56%
100	60,255	744	1.25%	13.98%	15.26%
101	60,170	659	1.11%	22.22%	23.05%
102	59,249	-262	-0.44%	33.78%	34.33%
103	59,928	417	0.70%	17.3%	18.13%
104	59,858	347	0.58%	5.41%	6.12%

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_House_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
105	60,075	564	0.95%	28.24%	29.38%
106	60,181	670	1.13%	28.24%	28.14%
107	58,904	-607	-1.02%	30.44%	32.38%
108	59,834	323	0.54%	19.74%	20.58%
109	60,208	697	1.17%	23.12%	25.26%
110	59,656	145	0.24%	46.56%	47.15%
111	59,855	344	0.58%	37.3%	38.34%
112	59,633	122	0.21%	17.22%	17.35%
113	60,262	751	1.26%	55.35%	55.9%
114	58,946	-565	-0.95%	35.91%	36.86%
115	60,264	753	1.27%	57.03%	57.4%
116	60,094	583	0.98%	58.91%	59.79%
117	60,362	851	1.43%	38.15%	38.84%
118	60,119	608	1.02%	22.32%	23.18%
119	58,945	-566	-0.95%	15.14%	16.01%
120	58,997	-514	-0.86%	20.7%	19.46%
121	58,806	-705	-1.18%	9.04%	10.1%
122	59,178	-333	-0.56%	27.97%	26.17%
123	58,636	-875	-1.47%	24.84%	25.25%
124	59,134	-377	-0.63%	32.08%	31.77%
125	59,211	-300	-0.50%	32.05%	32.78%
126	59,857	346	0.58%	44.6%	44.47%
127	59,739	228	0.38%	14.07%	14.9%
128	59,625	114	0.19%	44.85%	44.81%
129	58,968	-543	-0.91%	41.19%	41.23%
130	59,163	-348	-0.58%	67.97%	66.68%

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_House_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
131	58,692	-819	-1.38%	16.38%	18.08%
132	58,996	-515	-0.87%	62.06%	61.99%
133	59,696	185	0.31%	37.66%	36.75%
134	58,624	-887	-1.49%	36.5%	35.36%
135	58,719	-792	-1.33%	19.78%	20.58%
136	59,465	-46	-0.08%	17.01%	18.1%
137	59,317	-194	-0.33%	22.17%	23.23%
138	59,265	-246	-0.41%	21.27%	21.82%
139	59,725	214	0.36%	37.2%	39.01%
140	60,117	606	1.02%	53.03%	52.97%
141	58,852	-659	-1.11%	68.61%	69.34%
142	59,710	199	0.33%	62.64%	61.25%
143	60,111	600	1.01%	44.46%	43.12%
144	58,959	-552	-0.93%	27%	27.5%
145	59,307	-204	-0.34%	41.99%	41.36%
146	58,750	-761	-1.28%	26.52%	26.7%
147	60,350	839	1.41%	27.6%	28.18%
148	59,705	194	0.33%	35.32%	35.74%
149	59,760	249	0.42%	44.18%	44.44%
150	60,090	579	0.97%	40.85%	42.06%
151	58,665	-846	-1.42%	51.71%	50.4%
152	58,793	-718	-1.21%	37.41%	37.05%
153	60,160	649	1.09%	75.41%	74.8%
154	59,053	-458	-0.77%	45.26%	44.59%
155	59,636	125	0.21%	35.26%	35.15%
156	58,668	-843	-1.42%	25.4%	25.02%

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_House_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
157	58,631	-880	-1.48%	19.08%	19.59%
158	58,693	-818	-1.37%	34.23%	33.26%
159	59,312	-199	-0.33%	31.56%	31.62%
160	58,625	-886	-1.49%	13.28%	14.45%
161	59,485	-26	-0.04%	13.29%	13.96%
162	58,800	-711	-1.19%	40.09%	39.39%
163	58,995	-516	-0.87%	43.85%	43.81%
164	58,702	-809	-1.36%	33.33%	33.72%
165	59,846	335	0.56%	57.18%	53.94%
166	58,948	-563	-0.95%	10.32%	10.68%
167	58,650	-861	-1.45%	26.55%	27.41%
168	58,674	-837	-1.41%	43.59%	45.79%
169	60,016	505	0.85%	30.04%	29.38%
170	59,948	437	0.73%	17.43%	17.77%
171	58,992	-519	-0.87%	34.78%	34.59%
172	60,286	775	1.30%	24.89%	24.67%
173	58,710	-801	-1.35%	35.97%	35.39%
174	59,215	-296	-0.50%	26.2%	26.06%
175	58,647	-864	-1.45%	23.31%	23.71%
176	59,479	-32	-0.05%	28.69%	29.29%
177	59,604	93	0.16%	51.61%	50.36%
178	58,721	-790	-1.33%	9.1%	9.49%
179	58,871	-640	-1.08%	28.73%	27.08%
180	59,412	-99	-0.17%	17.31%	18.21%

Total Population: 10,711,908

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_House_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
Ideal District Population:	59,511				
Summary Statistics:					
Population Range:		58,624 to 60,389			
Ratio Range:		0.03			
Absolute Range:		-887 to 878			
Absolute Overall Range:		1765			
Relative Range:		-1.49% to 1.48%			
Relative Overall Range:		2.97%			
Absolute Mean Deviation:		525.27			
Relative Mean Deviation:		0.88%			
Standard Deviation:		584.15			

Exhibit 7

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Number of subdivisions not split:	
County	105
Voting District	2,592
Number of subdivisions split into more than one district:	
County	54
Voting District	106
Number of splits involving no population:	
County	0
Voting District	5

Split Counts

County

Cases where an area is split among 2 Districts: 30
Cases where an area is split among 3 Districts: 9
Cases where an area is split among 4 Districts: 6
Cases where an area is split among 5 Districts: 4
Cases where an area is split among 6 Districts: 1
Cases where an area is split among 13 Districts: 1
Cases where an area is split among 14 Districts: 1
Cases where an area is split among 16 Districts: 1
Cases where an area is split among 19 Districts: 1

Voting District

Cases where an area is split among 2 Districts: 103
Cases where an area is split among 3 Districts: 3

County	Voting District	District	Population
Split Counties:			
Barrow GA		104	24,560
Barrow GA		119	58,945
Bartow GA		014	59,240

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Bartow GA	015	49,661
Bibb GA	142	59,710
Bibb GA	143	60,111
Bibb GA	144	12,502
Bibb GA	149	25,023
Bulloch GA	158	58,693
Bulloch GA	159	8,519
Bulloch GA	160	13,887
Carroll GA	070	60,267
Carroll GA	071	58,881
Catoosa GA	002	9,242
Catoosa GA	003	58,630
Chatham GA	162	58,800
Chatham GA	163	58,995
Chatham GA	164	58,702
Chatham GA	165	59,846
Chatham GA	166	58,948
Cherokee GA	011	26,944
Cherokee GA	020	60,073
Cherokee GA	021	60,072
Cherokee GA	022	59,853
Cherokee GA	023	59,678
Clarke GA	120	58,997
Clarke GA	121	10,496
Clarke GA	122	59,178
Clayton GA	075	59,928
Clayton GA	076	58,668
Clayton GA	077	58,671
Clayton GA	078	60,019
Clayton GA	079	60,309
Cobb GA	015	10,445

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Cobb GA	034	60,241
Cobb GA	035	60,325
Cobb GA	036	59,989
Cobb GA	037	59,602
Cobb GA	038	34,002
Cobb GA	039	60,320
Cobb GA	040	60,319
Cobb GA	041	60,349
Cobb GA	042	60,360
Cobb GA	043	59,328
Cobb GA	044	60,357
Cobb GA	045	60,141
Cobb GA	046	60,371
Colquitt GA	170	6,396
Colquitt GA	172	39,502
Columbia GA	125	37,579
Columbia GA	127	59,739
Columbia GA	131	58,692
Coweta GA	065	59,986
Coweta GA	073	59,254
Coweta GA	136	26,918
Crisp GA	148	2,612
Crisp GA	151	17,516
Dawson GA	007	2,409
Dawson GA	009	24,389
DeKalb GA	052	59,572
DeKalb GA	080	59,933
DeKalb GA	081	60,139
DeKalb GA	082	47,378
DeKalb GA	083	59,661
DeKalb GA	084	60,268

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

DeKalb GA	085	59,929
DeKalb GA	086	60,015
DeKalb GA	087	60,376
DeKalb GA	088	60,242
DeKalb GA	089	59,362
DeKalb GA	090	58,792
DeKalb GA	092	58,715
Dougherty GA	152	25,630
Dougherty GA	153	60,160
Douglas GA	038	25,312
Douglas GA	064	59,968
Douglas GA	066	58,957
Effingham GA	159	5,284
Effingham GA	161	59,485
Fayette GA	069	59,231
Fayette GA	074	59,963
Floyd GA	005	2,842
Floyd GA	012	35,353
Floyd GA	013	60,389
Forsyth GA	024	59,040
Forsyth GA	025	58,971
Forsyth GA	026	59,842
Forsyth GA	028	60,036
Forsyth GA	047	13,394
Fulton GA	047	46,732
Fulton GA	048	58,872
Fulton GA	049	59,197
Fulton GA	050	58,866
Fulton GA	051	59,304
Fulton GA	053	59,669
Fulton GA	054	60,013

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Fulton GA	055	59,294
Fulton GA	056	59,224
Fulton GA	057	58,918
Fulton GA	058	58,922
Fulton GA	059	59,625
Fulton GA	060	59,633
Fulton GA	061	58,830
Fulton GA	062	59,299
Fulton GA	063	59,690
Fulton GA	067	59,307
Fulton GA	068	59,614
Fulton GA	082	11,701
Glynn GA	178	20,984
Glynn GA	179	58,871
Glynn GA	180	4,644
Gwinnett GA	094	60,224
Gwinnett GA	096	59,287
Gwinnett GA	097	60,328
Gwinnett GA	098	60,026
Gwinnett GA	099	58,882
Gwinnett GA	100	60,255
Gwinnett GA	101	60,170
Gwinnett GA	102	59,249
Gwinnett GA	103	59,928
Gwinnett GA	105	60,075
Gwinnett GA	106	60,181
Gwinnett GA	107	58,904
Gwinnett GA	108	59,834
Gwinnett GA	109	60,208
Gwinnett GA	110	59,656
Gwinnett GA	111	59,855

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Habersham GA	010	30,652
Habersham GA	032	15,379
Hall GA	008	6,264
Hall GA	009	1,004
Hall GA	027	58,790
Hall GA	029	59,510
Hall GA	030	59,003
Hall GA	104	18,565
Henry GA	091	59,992
Henry GA	115	60,264
Henry GA	116	60,094
Henry GA	117	60,362
Houston GA	145	59,307
Houston GA	146	36,312
Houston GA	147	60,350
Houston GA	150	7,664
Jackson GA	031	59,174
Jackson GA	104	16,733
Jeff Davis GA	157	10,869
Jeff Davis GA	176	3,910
Jefferson GA	126	5,781
Jefferson GA	128	9,928
Jones GA	133	1,632
Jones GA	149	26,715
Laurens GA	128	12,421
Laurens GA	155	37,149
Liberty GA	167	6,582
Liberty GA	168	58,674
Lowndes GA	175	58,647
Lowndes GA	177	59,604
Madison GA	033	9,935

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Madison GA	123	20,185
Meriwether GA	136	12,453
Meriwether GA	137	8,160
Muscogee GA	138	59,265
Muscogee GA	139	28,688
Muscogee GA	140	60,117
Muscogee GA	141	58,852
Newton GA	113	60,262
Newton GA	114	52,221
Paulding GA	016	47,916
Paulding GA	017	60,388
Paulding GA	019	60,357
Polk GA	016	12,438
Polk GA	018	30,415
Putnam GA	124	16,659
Putnam GA	133	5,388
Richmond GA	126	29,480
Richmond GA	129	58,968
Richmond GA	130	59,163
Richmond GA	132	58,996
Rockdale GA	093	58,635
Rockdale GA	095	34,935
Spalding GA	134	58,624
Spalding GA	136	8,682
Tattnall GA	156	9,883
Tattnall GA	157	12,959
Thomas GA	171	3,389
Thomas GA	173	42,409
Troup GA	072	58,670
Troup GA	137	10,756
Walker GA	001	42,788

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Walker GA		002	24,866
Walton GA		095	23,804
Walton GA		112	59,633
Walton GA		114	6,725
Walton GA		121	6,511
Wayne GA		157	5,219
Wayne GA		167	24,925
Whitfield GA		002	24,567
Whitfield GA		004	58,727
Whitfield GA		006	19,570
Split VTDs:			
Barrow GA	15	104	4,288
Barrow GA	15	119	639
Bartow GA	CASSVILLE	014	16,566
Bartow GA	CASSVILLE	015	39
Bartow GA	MISSION ROAD	014	5,753
Bartow GA	MISSION ROAD	015	7
Bartow GA	WHITE	014	3,546
Bartow GA	WHITE	015	0
Bartow GA	WOODLAND HIGH	014	2,580
Bartow GA	WOODLAND HIGH	015	25
Bibb GA	GODFREY 1	142	8,749
Bibb GA	GODFREY 1	143	2,185
Bibb GA	HOWARD 1	143	2,433
Bibb GA	HOWARD 1	144	3,510
Bulloch GA	EMIT	158	4,846
Bulloch GA	EMIT	160	718
Carroll GA	BETHANY	070	6,586
Carroll GA	BETHANY	071	0
Carroll GA	BONNER	070	12

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Carroll GA	BONNER	071	5,952
Catoosa GA	POPLAR SPRINGS	002	1,569
Catoosa GA	POPLAR SPRINGS	003	4,254
Cherokee GA	ARNOLD MILL	020	3,220
Cherokee GA	ARNOLD MILL	021	3,319
Clarke GA	4B	120	5,306
Clarke GA	4B	122	7,365
Clayton GA	JONESBORO 3	075	3,279
Clayton GA	JONESBORO 3	078	2,683
Clayton GA	LAKE CITY	076	3,510
Clayton GA	LAKE CITY	077	2,250
Clayton GA	LOVEJOY 1	075	2,162
Clayton GA	LOVEJOY 1	078	3,457
Cobb GA	Acworth 1A	015	167
Cobb GA	Acworth 1A	035	7,322
Cobb GA	Austell 1A	038	5,988
Cobb GA	Austell 1A	039	1,662
Cobb GA	Baker 01	035	141
Cobb GA	Baker 01	044	7,081
Cobb GA	Big Shanty 01	035	1,335
Cobb GA	Big Shanty 01	044	2,262
Cobb GA	Big Shanty 02	035	0
Cobb GA	Big Shanty 02	044	4,109
Cobb GA	Chalker 01	035	0
Cobb GA	Chalker 01	044	11,190
Cobb GA	Dobbins 01	040	489
Cobb GA	Dobbins 01	042	4,335
Cobb GA	Dobbins 01	043	8,577
Cobb GA	Eastside 02	037	3,515
Cobb GA	Eastside 02	045	1,686
Cobb GA	Elizabeth 01	034	1,882

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Cobb GA	Elizabeth 01	037	3,988
Cobb GA	Hayes 01	034	4,655
Cobb GA	Hayes 01	035	307
Cobb GA	Lindley 01	039	4,040
Cobb GA	Lindley 01	040	2,220
Cobb GA	Mableton 03	039	4,044
Cobb GA	Mableton 03	040	25
Cobb GA	Marietta 4C	034	2,494
Cobb GA	Marietta 4C	043	697
Cobb GA	Marietta 5A	037	1,457
Cobb GA	Marietta 5A	043	2,877
Cobb GA	Mount Bethel 04	042	2,827
Cobb GA	Mount Bethel 04	045	951
Cobb GA	Nickajack 01	040	18
Cobb GA	Nickajack 01	042	6,108
Cobb GA	Norton Park 01	040	46
Cobb GA	Norton Park 01	041	7,755
Cobb GA	Oregon 03	041	6,053
Cobb GA	Oregon 03	043	6,935
Cobb GA	Pine Mountain 02	034	3,873
Cobb GA	Pine Mountain 02	035	103
Cobb GA	Powder Springs 2a	036	759
Cobb GA	Powder Springs 2a	038	4,255
Cobb GA	Powers Ferry 01	037	4,963
Cobb GA	Powers Ferry 01	043	464
Cobb GA	Roswell 01	045	3,749
Cobb GA	Roswell 01	046	3,083
Cobb GA	Sewell Mill 03	037	6,598
Cobb GA	Sewell Mill 03	043	339
Cobb GA	Smyrna 1A	040	3,868
Cobb GA	Smyrna 1A	042	2,765

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Cobb GA	Terrell Mill 01	037	4,720
Cobb GA	Terrell Mill 01	043	5,091
Colquitt GA	LEE	170	1,525
Colquitt GA	LEE	172	974
Coweta GA	TURIN	073	2,296
Coweta GA	TURIN	136	3,829
DeKalb GA	Avondale High	084	2,494
DeKalb GA	Avondale High	086	1,356
DeKalb GA	Browns Mill Elem	090	1,893
DeKalb GA	Browns Mill Elem	092	2,815
DeKalb GA	Candler	084	2,055
DeKalb GA	Candler	089	2,007
DeKalb GA	Clairmont Road	082	1,391
DeKalb GA	Clairmont Road	085	3,134
DeKalb GA	Dresden Elem (CHA)	080	8,233
DeKalb GA	Dresden Elem (CHA)	083	4,856
DeKalb GA	Indian Creek	085	3,180
DeKalb GA	Indian Creek	086	3,449
DeKalb GA	Rockbridge Elem	086	5,350
DeKalb GA	Rockbridge Elem	088	39
DeKalb GA	Scott	082	2
DeKalb GA	Scott	085	3,914
DeKalb GA	Stone Mill Elem	081	1,677
DeKalb GA	Stone Mill Elem	088	4,255
DeKalb GA	Stoneview Elem	087	3,045
DeKalb GA	Stoneview Elem	092	690
Floyd GA	ARMUCHEE	012	1,658
Floyd GA	ARMUCHEE	013	439
Floyd GA	WATTERS	005	2,842
Floyd GA	WATTERS	013	2,257
Forsyth GA	BROWNS BRIDGE	026	11,013

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Forsyth GA	BROWNS BRIDGE	028	1,904
Forsyth GA	OTWELL	024	4,187
Forsyth GA	OTWELL	026	14,273
Forsyth GA	POLO	024	24,427
Forsyth GA	POLO	025	950
Forsyth GA	POLO	026	481
Fulton GA	02L1	057	6,106
Fulton GA	02L1	058	3,336
Fulton GA	JC12	050	759
Fulton GA	JC12	051	2,742
Fulton GA	JC15	048	0
Fulton GA	JC15	051	1,457
Fulton GA	SC05B	061	2,953
Fulton GA	SC05B	068	1,600
Fulton GA	SC05E	061	718
Fulton GA	SC05E	068	108
Glynn GA	SE BAPTIST BLDG	178	485
Glynn GA	SE BAPTIST BLDG	179	2,537
Gwinnett GA	BAYCREEK I	102	1,612
Gwinnett GA	BAYCREEK I	111	7,221
Gwinnett GA	BAYCREEK J	106	1,861
Gwinnett GA	BAYCREEK J	110	4,344
Gwinnett GA	BERKSHIRE F	108	3,034
Gwinnett GA	BERKSHIRE F	109	1,369
Gwinnett GA	BERKSHIRE O	106	2,005
Gwinnett GA	BERKSHIRE O	108	1,693
Gwinnett GA	CATES H	094	3,023
Gwinnett GA	CATES H	106	3,241
Gwinnett GA	DULUTH F	096	2,711
Gwinnett GA	DULUTH F	099	4,534
Gwinnett GA	DULUTH F	101	5,149

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Gwinnett GA	DULUTH I	096	5,260
Gwinnett GA	DULUTH I	099	1,744
Gwinnett GA	GOODWINS F	099	1,615
Gwinnett GA	GOODWINS F	101	3,003
Gwinnett GA	LAWRENCEVILLE F	102	1,298
Gwinnett GA	LAWRENCEVILLE F	111	4,699
Gwinnett GA	LAWRENCEVILLE H	101	1,505
Gwinnett GA	LAWRENCEVILLE H	105	4,370
Gwinnett GA	LAWRENCEVILLE M	102	780
Gwinnett GA	LAWRENCEVILLE M	105	11,221
Gwinnett GA	MARTINS B	102	2,334
Gwinnett GA	MARTINS B	107	3,054
Gwinnett GA	PINKCNEYVILLE A	097	7,050
Gwinnett GA	PINKCNEYVILLE A	098	162
Gwinnett GA	PUCKETTS A	100	983
Gwinnett GA	PUCKETTS A	103	7,071
Gwinnett GA	PUCKETTS B	100	967
Gwinnett GA	PUCKETTS B	103	3,519
Habersham GA	MUD CREEK	010	8,120
Habersham GA	MUD CREEK	032	309
Hall GA	BARK CAMP	009	1,004
Hall GA	BARK CAMP	027	7,133
Hall GA	FRIENDSHIP II	030	2,142
Hall GA	FRIENDSHIP II	104	2,278
Hall GA	QUILLIANS	008	1,457
Hall GA	QUILLIANS	027	2,469
Henry GA	COTTON INDIAN	091	6,528
Henry GA	COTTON INDIAN	116	683
Henry GA	HICKORY FLAT	091	1,954
Henry GA	HICKORY FLAT	116	5,198
Henry GA	LOWES	115	6,544

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Henry GA	LOWES	117	7,377
Houston GA	CGTC	146	1,404
Houston GA	CGTC	147	5,845
Houston GA	MCMS	147	5,830
Houston GA	MCMS	150	7,664
Houston GA	TMS	145	940
Houston GA	TMS	147	8,178
Jackson GA	West Jackson	031	4,134
Jackson GA	West Jackson	104	16,733
Jones GA	POPE	133	1,632
Jones GA	POPE	149	844
Liberty GA	HINESVILLE LODGE 271	167	332
Liberty GA	HINESVILLE LODGE 271	168	4,535
Lowndes GA	RAINWATER	175	8,231
Lowndes GA	RAINWATER	177	6,923
Muscogee GA	GENTIAN/REESE @LDS	138	2,092
Muscogee GA	GENTIAN/REESE @LDS	141	7,409
Muscogee GA	OUR LADY OF LOURDES	139	11,384
Muscogee GA	OUR LADY OF LOURDES	140	2,392
Newton GA	CEDAR SHOALS	113	4,657
Newton GA	CEDAR SHOALS	114	236
Paulding GA	BURNT HICKORY PARK	016	8,012
Paulding GA	BURNT HICKORY PARK	017	396
Paulding GA	NEBO ELEMENTARY SCH	017	5,336
Paulding GA	NEBO ELEMENTARY SCH	019	8,660
Polk GA	ROCKMART	016	7,214
Polk GA	ROCKMART	018	2,260
Richmond GA	306	129	4,950
Richmond GA	306	132	1,693
Richmond GA	601	126	6,281
Richmond GA	601	132	447

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_House_ILLUSTRATIVE

Rockdale GA	FLAT SHOALS	093	5,131
Rockdale GA	FLAT SHOALS	095	5
Rockdale GA	ROCKDALE	093	5,457
Rockdale GA	ROCKDALE	095	840
Tattnall GA	SHILOH	156	1,915
Tattnall GA	SHILOH	157	3,161
Troup GA	MOUNTVILLE	072	189
Troup GA	MOUNTVILLE	137	2,376
Whitfield GA	2A	002	358
Whitfield GA	2A	004	4,506

Exhibit 8

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

	Reock	Polsby-Popper
Sum	N/A	N/A
Min	0.21	0.12
Max	0.70	0.62
Mean	0.45	0.33
Std. Dev.	0.09	0.10

District	Reock	Polsby-Popper
001	0.53	0.51
002	0.57	0.29
003	0.49	0.42
004	0.53	0.25
005	0.48	0.39
006	0.53	0.32
007	0.62	0.50
008	0.37	0.24
009	0.46	0.43
010	0.35	0.25
011	0.65	0.47
012	0.54	0.39
013	0.39	0.27
014	0.44	0.20

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

015	0.35	0.14
016	0.33	0.28
017	0.59	0.38
018	0.61	0.51
019	0.42	0.32
020	0.38	0.37
021	0.31	0.33
022	0.44	0.35
023	0.46	0.25
024	0.67	0.62
025	0.47	0.42
026	0.38	0.27
027	0.48	0.20
028	0.34	0.34
029	0.42	0.20
030	0.33	0.28
031	0.64	0.58
032	0.49	0.34
033	0.49	0.37

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

034	0.42	0.21
035	0.34	0.12
036	0.40	0.39
037	0.41	0.24
038	0.46	0.29
039	0.64	0.44
040	0.40	0.15
041	0.58	0.24
042	0.23	0.24
043	0.45	0.29
044	0.44	0.22
045	0.58	0.44
046	0.51	0.46
047	0.50	0.21
048	0.49	0.18
049	0.51	0.23
050	0.41	0.37
051	0.42	0.31
052	0.43	0.38

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

053	0.33	0.25
054	0.62	0.50
055	0.43	0.36
056	0.44	0.51
057	0.43	0.49
058	0.57	0.32
059	0.41	0.36
060	0.70	0.43
061	0.42	0.27
062	0.46	0.26
063	0.46	0.49
064	0.46	0.36
065	0.54	0.44
066	0.40	0.31
067	0.46	0.47
068	0.48	0.36
069	0.53	0.44
070	0.37	0.17
071	0.58	0.29

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

072	0.41	0.49
073	0.54	0.38
074	0.35	0.27
075	0.52	0.36
076	0.52	0.41
077	0.42	0.35
078	0.30	0.21
079	0.56	0.36
080	0.43	0.25
081	0.39	0.41
082	0.36	0.37
083	0.38	0.36
084	0.37	0.23
085	0.54	0.36
086	0.44	0.31
087	0.38	0.28
088	0.41	0.39
089	0.42	0.39
090	0.40	0.40

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

091	0.21	0.18
092	0.51	0.37
093	0.47	0.20
094	0.52	0.47
095	0.32	0.30
096	0.59	0.49
097	0.61	0.38
098	0.43	0.45
099	0.45	0.25
100	0.51	0.34
101	0.39	0.45
102	0.63	0.41
103	0.36	0.34
104	0.50	0.26
105	0.52	0.30
106	0.46	0.26
107	0.48	0.29
108	0.49	0.33
109	0.38	0.38

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

110	0.41	0.35
111	0.53	0.44
112	0.59	0.42
113	0.47	0.41
114	0.37	0.22
115	0.45	0.38
116	0.49	0.37
117	0.26	0.24
118	0.37	0.30
119	0.53	0.40
120	0.43	0.32
121	0.56	0.31
122	0.45	0.37
123	0.38	0.20
124	0.41	0.24
125	0.45	0.37
126	0.42	0.28
127	0.37	0.37
128	0.40	0.25

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

129	0.48	0.43
130	0.53	0.33
131	0.54	0.42
132	0.44	0.36
133	0.44	0.36
134	0.48	0.33
135	0.34	0.26
136	0.30	0.22
137	0.53	0.37
138	0.42	0.47
139	0.45	0.25
140	0.45	0.54
141	0.39	0.47
142	0.40	0.26
143	0.46	0.47
144	0.54	0.49
145	0.42	0.30
146	0.53	0.30
147	0.26	0.22

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

148	0.41	0.20
149	0.37	0.30
150	0.45	0.28
151	0.40	0.22
152	0.34	0.31
153	0.36	0.42
154	0.42	0.35
155	0.45	0.40
156	0.50	0.33
157	0.45	0.25
158	0.44	0.33
159	0.39	0.22
160	0.24	0.16
161	0.37	0.20
162	0.31	0.18
163	0.27	0.16
164	0.56	0.25
165	0.35	0.22
166	0.67	0.53

User:
Plan Name: **GA_House_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_House_ILLUSTRATIVE

167	0.46	0.25
168	0.25	0.24
169	0.47	0.39
170	0.39	0.32
171	0.46	0.51
172	0.37	0.37
173	0.50	0.35
174	0.51	0.31
175	0.49	0.16
176	0.47	0.36
177	0.32	0.26
178	0.38	0.29
179	0.45	0.42
180	0.61	0.40

Measures of Compactness Summary

Reock	The measure is always between 0 and 1, with 1 being the most compact.
Polsby-Popper	The measure is always between 0 and 1, with 1 being the most compact.

Exhibit 9

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
001	Steve Tarvin	R	2
001	Michael Cameron	R	1
002			
003	Dewayne Hill	R	3
004	Kasey Carpenter	R	4
005	Matt Barton	R	5
006	Jason Ridley	R	6
007	David Ralston	R	7
008	Norman Gunter	R	8
009	Will Wade	R	9
010	Victor Anderson	R	10
011	Rick Jasperse	R	11
012	James Lumsden	R	12
013	Katie Dempsey	R	13
014	Mitchell scoggins	R	14
015	Matthew Gambill	R	15
016			
017	Micah Gravley	R	67
017	Martin Momtahan	R	17
018	Trey Kelley	R	16
018	Tyler Smith	R	18
019	Joseph Gullett	R	19
020			
021	Brad Thomas	R	21
021	Wes Cantrell	R	22
022	Charlice Byrd	R	20
023	Mandi Ballinger	R	23

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
024	Sheri Gilligan	R	24
025	Todd Jones	R	25
026	Lauren McDonald	R	26
027	Emory Dunahoo Jr	R	30
027	Lee Hawkins	R	27
028			
029	Matt Dubnik	R	29
030			
031	Thomas Benton	R	31
032	Chris Erwin	R	28
033	Alan Powell	R	32
034	Ginny Ehrhart	R	36
034	Devan Seabaugh	R	34
035			
036	David Wilkerson	D	38
037			
038			
039	Erica Thomas	D	39
040	Teri Anulewicz	D	42
041	Michael Smith	D	41
042	Erick Allen	D	40
042	Sharon Cooper	R	43
043	Mary Frances Williams	D	37
044	Ed Setzler	R	35
045	Matthew Dollar	R	45
046	Donald Parsons	R	44
046	John Carson	R	46
047	Jan Jones	R	47

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
048	Charles Martin	R	49
049			
050	Angelika Kausche	D	50
051	Mary Robichaux	D	48
052	Mike Wilensky	D	79
053	Josh McLauren	D	51
054	Shea Roberts	D	52
055	Mesha Mainor	D	56
056	Betsy Holland	D	54
057	Stacy Evans	D	57
058	Park Cannon	D	58
059			
060	Marie Metze	D	55
060	Sheila Jones	D	53
061	Roger Bruce	D	61
062	William Boddie	D	62
063	Kim Schofield	D	60
063	David Dreyer	D	59
064			
065	Lynn Smith	R	70
066	Kimberly Alexander	D	66
067	Mandisha Thomas	D	65
068	Debra Bazemore	D	63
069	Derrick Jackson	D	64
070	James Collins	R	68
071			
072	Randy Nix	R	69
073	Philip Singleton	R	71

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
074	Josh Bonner	R	72
075	Mike Glanton	D	75
076	Sandra Scott	D	76
077	Yasmine Neal	D	74
078			
079	Rhonda Burnough	D	77
080	Scott Holcomb	D	81
081			
082	Becky Evans	D	83
082	Mary Margaret Oliver	D	82
083	Matthew Wilson	D	80
084	Bee Nguyen	D	89
084	Renitta Shannon	D	84
085	Zulma Lopez	D	86
086	Karla Drenner	D	85
086	Viola Davis	D	87
087	Billy Mitchell	D	88
088	Doreen Carter	D	92
088	Karen Bennett	D	94
088	Dar'shun Kendrick	D	93
089			
090			
091			
092	Angela Moore	D	90
093	Rhonda Taylor	D	91
094			
095	Tom Kirby	R	114
096			

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
097	Beth Moore	D	95
098	Marvin Lim	D	99
099	Bonnie Rich	R	97
100			
101	Sam Park	D	101
102			
103			
104	Terry England	R	116
104	Timothy Barr	R	103
105	Gregg Kennard	D	102
106	Rebecca Mitchell	D	106
106	Shelly Hutchinson	D	107
107			
108	Jasmine Clark	D	108
109	Pedro Marin	D	96
109	Dewey McClain	D	100
110			
111	Donna McLeod	D	105
111	Chuck Efstration	R	104
112	Bruce Williamson III	R	115
113			
114	Sharon Henderson	D	113
115			
116	Demetrius Douglas	D	78
116	El-Mahdi Holly	D	111
116	Regina Lewis-Ward	D	109
117			
118	Clint Crowe	R	110

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
118	Susan Holmes	R	129
118	Dave Belton	R	112
119			
120	Houston Gaines	R	117
120	Spencer Frye	D	118
121	Marcus Wiedower	R	119
122			
123	Rob Leverett	R	33
124	Trey Rhodes	R	120
125	Barry Fleming	R	121
126	Shelia Nelson	D	125
127	Jodi Lott	R	122
128	Mack Jackson	D	128
129	Brian Prince	D	127
129	Mark Newton	R	123
130	Wayne Howard	D	124
131			
132	Gloria Frazier	D	126
133	Rick Williams	R	145
134	David Knight	R	130
134	Mathiak	R	73
135	Beth Camp	R	131
135	Robert Dickey	R	140
136	David Jenkins	R	132
137	Vance Smith	R	133
137	Debbie Buckner	D	137
138	Richard Smith	R	134

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
139	Gerald Greene	R	151
140	Calvin Smyre	D	135
141	Carolyn Hugley	D	136
142			
143	Miriam Paris	D	142
143	James Beverly	D	143
143	Dale Washburn	R	141
144			
145			
146	Danny Mathis	R	144
146	Shaw Blackmon	R	146
147	Heath Clark	R	147
148	Robert Pruitt	R	149
149			
150	Patty Bentley	D	139
151	Mike Cheokas	R	138
151	Noel Williams	R	148
152			
153	Winfred Dukes	D	154
153	CaMia Hopson-Jackson	D	153
154	Joe Campbell	R	171
155	Matt Hatchett	R	150
156	Leesa Hagan	R	156
157	William (Bill) Werkheiser	R	157
158			
159	Larry (Butch) Parrish	R	158
159	Jon Burns	R	159
160	Jan Tankersley	R	160

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
161	Bill Hitchens	R	161
162			
163	Ron Stephens	R	164
163	Carl Gilliard	D	162
164			
165	Derek Mallow	D	163
166	Jesse Petrea	R	166
167	Steven Meeks	R	178
167	Buddy Deloach	R	167
168	Al Williams	D	168
169	Clay Pirkle	R	155
170	Penny Houston	R	170
171			
172	Sam Waston	R	172
172	Bill Yearta	R	152
173	Darlene Taylor	R	173
173	John LaHood	R	175
174	John Corbett	R	174
174	James Burchett	R	176
175			
176	Dominic LaRiccia	R	169
177	Dexter Sharper	D	177
178			
179	Don Hogan	R	179
180	Steven Sainz	R	180

User:
Plan Name: **GA_House_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_House_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District

Number of Incumbents in District with more than one Incumbent:	74	
Number of Districts with No Incumbent:	41	
Number of Districts with Incumbents of more than one party:	7	
Number of Districts with Paired Democrats:	10	
Number of Districts with Paired Republicans:	18	

Exhibit 10

User:
Plan Name: **GA_Senate2021**
Plan Type:

Population Summary

Population Summary

GA_Senate2021

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
001	191,402	118	0.06%	24.27%	25.08%
002	190,408	-876	-0.46%	48.03%	46.86%
003	191,212	-72	-0.04%	21.28%	21.18%
004	191,098	-186	-0.10%	22.86%	23.37%
005	191,921	637	0.33%	27.57%	29.94%
006	191,401	117	0.06%	21.88%	23.9%
007	189,709	-1,575	-0.82%	20.56%	21.44%
008	192,396	1,112	0.58%	30.35%	30.38%
009	192,915	1,631	0.85%	29%	29.53%
010	192,898	1,614	0.84%	69.71%	71.46%
011	189,976	-1,308	-0.68%	31.3%	31.04%
012	190,819	-465	-0.24%	59.08%	57.97%
013	189,326	-1,958	-1.02%	27.26%	26.97%
014	192,533	1,249	0.65%	17.15%	18.97%
015	189,446	-1,838	-0.96%	52.99%	54%
016	191,829	545	0.28%	22.51%	22.7%
017	192,510	1,226	0.64%	31.64%	32.01%
018	191,825	541	0.28%	30.27%	30.4%
019	192,316	1,032	0.54%	25.16%	25.72%
020	192,588	1,304	0.68%	30.89%	31.28%
021	192,572	1,288	0.67%	6.66%	7.46%
022	193,163	1,879	0.98%	57.21%	56.5%
023	190,344	-940	-0.49%	34.99%	35.48%
024	192,674	1,390	0.73%	19.18%	19.85%
025	191,161	-123	-0.06%	33.69%	33.48%
026	189,945	-1,339	-0.70%	57.75%	56.99%

User:
Plan Name: **GA_Senate2021**
Plan Type:

Population Summary

Population Summary

GA_Senate2021

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
027	190,676	-608	-0.32%	4.43%	5%
028	190,422	-862	-0.45%	19.05%	19.51%
029	189,424	-1,860	-0.97%	26.49%	26.88%
030	191,475	191	0.10%	20.15%	20.92%
031	192,560	1,276	0.67%	20.22%	20.7%
032	192,448	1,164	0.61%	13.56%	14.86%
033	192,694	1,410	0.74%	41.18%	42.96%
034	190,668	-616	-0.32%	67.47%	69.54%
035	192,839	1,555	0.81%	70.59%	71.9%
036	192,282	998	0.52%	51.92%	51.34%
037	192,671	1,387	0.73%	18.38%	19.27%
038	193,155	1,871	0.98%	63.41%	65.3%
039	191,500	216	0.11%	60.97%	60.7%
040	190,544	-740	-0.39%	16.84%	19.24%
041	191,023	-261	-0.14%	60.99%	62.61%
042	190,940	-344	-0.18%	28.54%	30.78%
043	192,729	1,445	0.76%	63.42%	64.33%
044	190,036	-1,248	-0.65%	69.94%	71.34%
045	190,692	-592	-0.31%	17.52%	18.58%
046	190,312	-972	-0.51%	16.88%	16.9%
047	190,607	-677	-0.35%	17.14%	17.42%
048	190,123	-1,161	-0.61%	8.51%	9.47%
049	189,355	-1,929	-1.01%	7.32%	7.96%
050	189,320	-1,964	-1.03%	5.13%	5.61%
051	190,167	-1,117	-0.58%	0.88%	1.21%
052	190,799	-485	-0.25%	12.56%	13.04%

User:
Plan Name: **GA_Senate2021**
Plan Type:

Population Summary

Population Summary

GA_Senate2021

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
053	190,236	-1,048	-0.55%	4.52%	5.1%
054	192,443	1,159	0.61%	3.13%	3.79%
055	190,155	-1,129	-0.59%	63.85%	65.97%
056	191,226	-58	-0.03%	6.5%	7.57%

Total Population: 10,711,908
Ideal District Population: 191,284

Summary Statistics:

Population Range:	189,320 to 193,163
Ratio Range:	0.02
Absolute Range:	-1,964 to 1,879
Absolute Overall Range:	3843
Relative Range:	-1.03% to 0.98%
Relative Overall Range:	2.01%
Absolute Mean Deviation:	1012.61
Relative Mean Deviation:	0.53%
Standard Deviation:	1154.96

Exhibit 11

User:
Plan Name: **GA_Senate2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate2021

Number of subdivisions not split:	
County	130
Voting District	2,651
Number of subdivisions split into more than one district:	
County	29
Voting District	47
Number of splits involving no population:	
County	0
Voting District	8

Split Counts

County

Cases where an area is split among 2 Districts: 18
Cases where an area is split among 3 Districts: 7
Cases where an area is split among 6 Districts: 1
Cases where an area is split among 7 Districts: 1
Cases where an area is split among 9 Districts: 1
Cases where an area is split among 10 Districts: 1

Voting District

Cases where an area is split among 2 Districts: 46
Cases where an area is split among 3 Districts: 1

County	Voting District	District	Population
Split Counties:			
Barrow GA		045	39,217
Barrow GA		046	17,116
Barrow GA		047	27,172
Bartow GA		037	11,130
Bartow GA		052	97,771
Bibb GA		018	53,182

User:
Plan Name: **GA_Senate2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate2021

Bibb GA	025	15,513
Bibb GA	026	88,651
Chatham GA	001	81,408
Chatham GA	002	190,408
Chatham GA	004	23,475
Cherokee GA	021	109,034
Cherokee GA	032	90,981
Cherokee GA	056	66,605
Clarke GA	046	52,016
Clarke GA	047	76,655
Clayton GA	034	158,608
Clayton GA	044	138,987
Cobb GA	006	92,249
Cobb GA	032	101,467
Cobb GA	033	192,694
Cobb GA	037	181,541
Cobb GA	038	108,305
Cobb GA	056	89,893
Coffee GA	013	19,881
Coffee GA	019	23,211
Columbia GA	023	59,796
Columbia GA	024	96,214
DeKalb GA	010	75,906
DeKalb GA	040	164,997
DeKalb GA	041	183,560
DeKalb GA	042	190,940
DeKalb GA	043	32,212
DeKalb GA	044	51,049
DeKalb GA	055	65,718
Douglas GA	028	25,889
Douglas GA	030	23,454

User:
Plan Name: **GA_Senate2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate2021

Douglas GA	035	94,894
Fayette GA	016	87,134
Fayette GA	034	32,060
Floyd GA	052	85,090
Floyd GA	053	13,494
Forsyth GA	027	190,676
Forsyth GA	048	60,607
Fulton GA	006	99,152
Fulton GA	014	192,533
Fulton GA	021	83,538
Fulton GA	028	6,963
Fulton GA	035	97,945
Fulton GA	036	192,282
Fulton GA	038	84,850
Fulton GA	039	191,500
Fulton GA	048	83,219
Fulton GA	056	34,728
Gordon GA	052	7,938
Gordon GA	054	49,606
Gwinnett GA	005	191,921
Gwinnett GA	007	189,709
Gwinnett GA	009	192,915
Gwinnett GA	040	25,547
Gwinnett GA	041	7,463
Gwinnett GA	045	151,475
Gwinnett GA	046	27,298
Gwinnett GA	048	46,297
Gwinnett GA	055	124,437
Hall GA	049	189,355
Hall GA	050	13,781
Henry GA	010	116,992

User:
Plan Name: **GA_Senate2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate2021

Henry GA		017	82,287
Henry GA		025	41,433
Houston GA		018	42,875
Houston GA		020	74,275
Houston GA		026	46,483
Jackson GA		047	56,660
Jackson GA		050	19,247
Muscogee GA		015	142,205
Muscogee GA		029	64,717
Newton GA		017	45,536
Newton GA		043	66,947
Paulding GA		030	18,954
Paulding GA		031	149,707
Richmond GA		022	193,163
Richmond GA		023	13,444
Walton GA		017	44,590
Walton GA		046	52,083
Ware GA		003	10,431
Ware GA		008	25,820
White GA		050	12,642
White GA		051	15,361
Split VTDs:			
Bibb GA	HOWARD 1	018	5,912
Bibb GA	HOWARD 1	025	31
Bibb GA	HOWARD 2	018	5,445
Bibb GA	HOWARD 2	025	0
Bibb GA	HOWARD 3	018	12,640
Bibb GA	HOWARD 3	025	14
Bibb GA	HOWARD 5	018	267
Bibb GA	HOWARD 5	025	2,103

User:
Plan Name: **GA_Senate2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate2021

Chatham GA	BLOOMINGDALE COMMUNITY CENTER	001	4,099
Chatham GA	BLOOMINGDALE COMMUNITY CENTER	004	755
Chatham GA	POOLER CHRURCH	001	5,330
Chatham GA	POOLER CHRURCH	004	4,407
Clarke GA	3B	046	5,752
Clarke GA	3B	047	4,194
Clarke GA	6C	046	2,971
Clarke GA	6C	047	2,036
Cobb GA	Dobbins 01	006	6,586
Cobb GA	Dobbins 01	033	6,310
Cobb GA	Dobbins 01	038	505
Cobb GA	Elizabeth 01	032	3,771
Cobb GA	Elizabeth 01	037	2,099
Cobb GA	Kennesaw 1A	032	1,471
Cobb GA	Kennesaw 1A	037	2,972
Cobb GA	Marietta 3A	032	3,439
Cobb GA	Marietta 3A	033	5,460
Cobb GA	Marietta 5A	006	0
Cobb GA	Marietta 5A	033	4,334
Cobb GA	Marietta 6A	006	3,022
Cobb GA	Marietta 6A	032	1,532
Cobb GA	Marietta 7A	006	993
Cobb GA	Marietta 7A	033	5,918
Cobb GA	Nickajack 01	006	2,398
Cobb GA	Nickajack 01	038	3,728
Cobb GA	Norton Park 01	033	7,049
Cobb GA	Norton Park 01	038	752
Cobb GA	Oregon 03	033	12,988
Cobb GA	Oregon 03	037	0

User:
Plan Name: **GA_Senate2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate2021

Cobb GA	Powers Ferry 01	006	4,963
Cobb GA	Powers Ferry 01	033	464
Cobb GA	Sewell Mill 03	006	5,051
Cobb GA	Sewell Mill 03	033	1,886
Cobb GA	Vinings 02	006	4,624
Cobb GA	Vinings 02	038	5,019
Coffee GA	DOUGLAS	013	12,595
Coffee GA	DOUGLAS	019	15,976
Floyd GA	GARDEN LAKES	052	1,024
Floyd GA	GARDEN LAKES	053	7,817
Forsyth GA	BIG CREEK	027	15,216
Forsyth GA	BIG CREEK	048	10,302
Forsyth GA	POLO	027	24,894
Forsyth GA	POLO	048	964
Fulton GA	RW09	021	2,971
Fulton GA	RW09	056	4,750
Fulton GA	RW12	021	4,274
Fulton GA	RW12	056	3,958
Fulton GA	SC08B	035	223
Fulton GA	SC08B	039	5,124
Fulton GA	SC18C	035	1,852
Fulton GA	SC18C	039	521
Gordon GA	LILY POND	052	1,641
Gordon GA	LILY POND	054	996
Gwinnett GA	DACULA	045	2,699
Gwinnett GA	DACULA	046	4,613
Gwinnett GA	LAWRENCEVILLE E	005	2,075
Gwinnett GA	LAWRENCEVILLE E	009	1,386
Gwinnett GA	PINCKNEYVILLE W	005	5,605
Gwinnett GA	PINCKNEYVILLE W	007	2,701
Hall GA	GLADE	049	5,135

User:
Plan Name: **GA_Senate2021**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate2021

Hall GA	GLADE	050	1,735
Hall GA	TADMORE	049	4,129
Hall GA	TADMORE	050	10,220
Houston GA	FMMS	018	5,178
Houston GA	FMMS	020	8,151
Houston GA	MCMS	018	3,625
Houston GA	MCMS	020	9,869
Houston GA	RECR	020	0
Houston GA	RECR	026	17,798
Jackson GA	Central Jackson	047	24,383
Jackson GA	Central Jackson	050	0
Jackson GA	North Jackson	047	0
Jackson GA	North Jackson	050	19,247
Muscogee GA	COLUMBUS TECH	015	6,919
Muscogee GA	COLUMBUS TECH	029	2,228
Paulding GA	CARL SCOGGINS MID SC	030	7,586
Paulding GA	CARL SCOGGINS MID SC	031	2,162
Paulding GA	TAYLOR FARM PARK	030	475
Paulding GA	TAYLOR FARM PARK	031	12,958
Ware GA	100	003	2,672
Ware GA	100	008	3,692
Ware GA	200A	003	0
Ware GA	200A	008	4,133
Ware GA	304	003	0
Ware GA	304	008	2,107
Ware GA	400	003	4,626
Ware GA	400	008	406

Exhibit 12

User:
Plan Name: **GA_Senate2021**
Plan Type:

Measures of Compactness Report

Wednesday, November 30, 2022

Measures of Compactness Report

GA_Senate2021

	Reock	Polsby-Popper
Sum	N/A	N/A
Min	0.17	0.13
Max	0.68	0.50
Mean	0.42	0.29
Std. Dev.	0.11	0.08

District	Reock	Polsby-Popper
001	0.49	0.31
002	0.47	0.22
003	0.39	0.21
004	0.47	0.27
005	0.17	0.21
006	0.41	0.24
007	0.35	0.34
008	0.45	0.23
009	0.24	0.21
010	0.28	0.23
011	0.36	0.33

User:
Plan Name: **GA_Senate2021**
Plan Type:

Measures of Compactness Report

Wednesday, November 30, 2022

Measures of Compactness Report

GA_Senate2021

012	0.62	0.39
013	0.45	0.26
014	0.27	0.24
015	0.57	0.32
016	0.37	0.31
017	0.35	0.17
018	0.47	0.21
019	0.53	0.37
020	0.41	0.36
021	0.42	0.33
022	0.41	0.29
023	0.37	0.16
024	0.37	0.21
025	0.39	0.24
026	0.47	0.20
027	0.50	0.46
028	0.45	0.25
029	0.58	0.42
030	0.60	0.41

User:
Plan Name: **GA_Senate2021**
Plan Type:

Measures of Compactness Report

Wednesday, November 30, 2022

Measures of Compactness Report

GA_Senate2021

031	0.37	0.38
032	0.29	0.21
033	0.40	0.22
034	0.45	0.34
035	0.47	0.26
036	0.32	0.30
037	0.49	0.37
038	0.36	0.21
039	0.17	0.13
040	0.51	0.34
041	0.51	0.30
042	0.48	0.32
043	0.64	0.35
044	0.18	0.19
045	0.35	0.30
046	0.37	0.21
047	0.36	0.19
048	0.35	0.34
049	0.46	0.34

User:
Plan Name: **GA_Senate2021**
Plan Type:

Measures of Compactness Report

Wednesday, November 30, 2022

Measures of Compactness Report

GA_Senate2021

050	0.45	0.23
051	0.68	0.50
052	0.47	0.25
053	0.49	0.40
054	0.60	0.44
055	0.34	0.27
056	0.38	0.30

Measures of Compactness Summary

Reock	The measure is always between 0 and 1, with 1 being the most compact.
Polsby-Popper	The measure is always between 0 and 1, with 1 being the most compact.

Exhibit 13

User:
Plan Name: **GA_Senate2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_Senate2021

District	Name	Party	Previous District
001	Ben Watson	R	1
002	Lester Jackson, III	D	2
003	Sheila McNeill	R	3
004	Billy Hickman	R	4
005	Sheikh Rahman	D	5
006	Jen Jordan	D	6
007			
008	Russ Goodman	R	8
009	Nikki Merritt	D	9
010	Emanuel Jones	D	10
011	Dean Burke	R	11
012	Freddie Powell Sims	D	12
013	Carden Summers	R	13
013	Tyler Harper	R	7
014			
015	Ed Harbison	D	15
016	Marty Harbin	R	16
017	Brian Strickland	R	17
018	John Kennedy	R	18
019	Blake Tillery	R	19
020	Larry Walker III	R	20
021	Brandon Beach	R	21
022	Harold Jones	D	22
023	Max Burns	R	23
024	Lee Anderson	R	24
025	Burt Jones	R	25
026	David Lucas	D	26

User:
Plan Name: **GA_Senate2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_Senate2021

District	Name	Party	Previous District
027	Greg Dolezal	R	27
028	Matt Brass	R	28
029	Randy Robertson	R	29
030	Mike Dugan	R	30
031	Jason Anavitarte	R	31
032	Kay Kirkpatrick	R	32
033	Michael Rhett	D	33
034	Valencia Seay	D	34
035	Donzella James	D	35
036	Nan Orrock	D	36
037	Lindsey Tippins	R	37
038	Horacena Tate	D	39
039	Sonya Halpern	D	39
040	Sally Harrell	D	40
041	Kim Jackson	D	41
042	Elena Parent	D	42
043	Tonya Anderson	D	43
044	Gail Davenport	D	44
045	Clint Dixon	R	45
046	Bill Cowsert	R	46
047	Frank Ginn	R	47
048	Michelle Au	D	48
049	Butch Miller	R	49
050	Bo Hatchett	R	50
051	Steve Gooch	R	51
052	Chuck Hufstetler	R	52
052	Bruce Thompson	R	14

User:
Plan Name: **GA_Senate2021**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_Senate2021

District	Name	Party	Previous District
053	Jeff Mullis	R	53
054	Chuck Payne	R	54
055	Gloria Butler	D	55
056	John Albers	R	56

Number of Incumbents in District with more than one Incumbent:	4
Number of Districts with No Incumbent:	2
Number of Districts with Incumbents of more than one party:	0
Number of Districts with Paired Democrats:	0
Number of Districts with Paired Republicans:	2

Exhibit 14

User:
Plan Name: **GA_Senate_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_Senate_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
001	190,251	-1,033	-0.54%	24.19%	24.82%
002	190,661	-623	-0.33%	45.31%	44.38%
003	190,783	-501	-0.26%	25.77%	25.96%
004	190,465	-819	-0.43%	22.96%	23.56%
005	190,713	-571	-0.30%	25.28%	26.45%
006	190,210	-1,074	-0.56%	19.88%	21.63%
007	192,767	1,483	0.78%	20.19%	22.18%
008	190,227	-1,057	-0.55%	36.1%	35.85%
009	190,626	-658	-0.34%	45.96%	46.7%
010	192,203	919	0.48%	51.62%	52.24%
011	192,025	741	0.39%	52.66%	51.94%
012	192,832	1,548	0.81%	48.45%	48.82%
013	190,981	-303	-0.16%	27.27%	27.02%
014	193,061	1,777	0.93%	15.63%	17.46%
015	191,231	-53	-0.03%	38.13%	38.84%
016	190,934	-350	-0.18%	30.79%	30.9%
017	189,559	-1,725	-0.90%	15.99%	16.36%
018	191,614	330	0.17%	33.83%	34.2%
019	189,614	-1,670	-0.87%	20.36%	20.57%
020	190,061	-1,223	-0.64%	29.66%	29.61%
021	190,882	-402	-0.21%	5.98%	6.78%
022	192,925	1,641	0.86%	56.99%	56.44%
023	190,907	-377	-0.20%	42.83%	42.46%
024	191,324	40	0.02%	21.56%	22.58%
025	192,796	1,512	0.79%	25.12%	24.16%
026	191,737	453	0.24%	49.58%	48.6%

User:
Plan Name: **GA_Senate_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_Senate_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
027	192,186	902	0.47%	3.32%	3.77%
028	192,554	1,270	0.66%	15.24%	15.78%
029	189,796	-1,488	-0.78%	26.91%	27.27%
030	191,920	636	0.33%	14.9%	15.69%
031	192,935	1,651	0.86%	26.56%	27.15%
032	193,055	1,771	0.93%	7.48%	8.21%
033	192,422	1,138	0.59%	35.5%	37.09%
034	191,323	39	0.02%	55.03%	56%
035	192,884	1,600	0.84%	59.33%	60.2%
036	192,405	1,121	0.59%	68.43%	69.78%
037	190,499	-785	-0.41%	19.2%	20.41%
038	191,844	560	0.29%	40.98%	42.48%
039	192,491	1,207	0.63%	89.67%	92%
040	189,577	-1,707	-0.89%	13.85%	16.41%
041	191,516	232	0.12%	59.32%	60.92%
042	191,555	271	0.14%	39.06%	40.75%
043	189,970	-1,314	-0.69%	55.02%	55.76%
044	190,482	-802	-0.42%	68.1%	70.47%
045	193,059	1,775	0.93%	16.41%	17.49%
046	189,897	-1,387	-0.73%	29.64%	30.31%
047	191,108	-176	-0.09%	8.98%	9.73%
048	191,791	507	0.27%	10.21%	11.49%
049	189,475	-1,809	-0.95%	7.12%	7.71%
050	189,629	-1,655	-0.87%	9.15%	9.48%
051	189,395	-1,889	-0.99%	0.88%	1.21%
052	191,887	603	0.32%	12.53%	13.02%

User:
Plan Name: **GA_Senate_ILLUSTRATIVE_REVIEW**
Plan Type:

Population Summary

Population Summary

GA_Senate_ILLUSTRATIVE_REVIEW

District	Population	Deviation	% Devn.	[% Black]	[% 18+_AP_Blk]
053	192,340	1,056	0.55%	4.59%	5.16%
054	189,406	-1,878	-0.98%	3.22%	3.88%
055	191,734	450	0.24%	90.89%	93.65%
056	191,384	100	0.05%	10.62%	12.05%

Total Population: 10,711,908
Ideal District Population: 191,284

Summary Statistics:

Population Range:	189,395 to 193,061
Ratio Range:	0.02
Absolute Range:	-1,889 to 1,777
Absolute Overall Range:	3666
Relative Range:	-0.99% to 0.93%
Relative Overall Range:	1.92%
Absolute Mean Deviation:	976.11
Relative Mean Deviation:	0.51%
Standard Deviation:	1130.8

Exhibit 15

User:
Plan Name: **GA_Senate_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate_ILLUSTRATIVE

Number of subdivisions not split:	
County	138
Voting District	2,683
Number of subdivisions split into more than one district:	
County	21
Voting District	15
Number of splits involving no population:	
County	0
Voting District	0

Split Counts

County

Cases where an area is split among 2 Districts: 16
Cases where an area is split among 3 Districts: 1
Cases where an area is split among 4 Districts: 2
Cases where an area is split among 5 Districts: 1
Cases where an area is split among 7 Districts: 1

Voting District

Cases where an area is split among 2 Districts: 15

County	Voting District	District	Population
Split Counties:			
Chatham GA		001	104,630
Chatham GA		002	190,661
Cherokee GA		021	73,565
Cherokee GA		032	193,055
Clayton GA		034	107,113
Clayton GA		044	190,482
Cobb GA		033	192,422
Cobb GA		037	190,499

User:
Plan Name: **GA_Senate_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate_ILLUSTRATIVE

Cobb GA	038	191,844
Cobb GA	056	191,384
Dawson GA	027	24,389
Dawson GA	051	2,409
DeKalb GA	040	189,577
DeKalb GA	041	191,516
DeKalb GA	042	191,555
DeKalb GA	055	191,734
Douglas GA	031	24,274
Douglas GA	035	119,963
Fayette GA	028	34,984
Fayette GA	034	84,210
Floyd GA	052	82,986
Floyd GA	053	15,598
Forsyth GA	021	83,486
Forsyth GA	027	167,797
Fulton GA	006	190,210
Fulton GA	014	193,061
Fulton GA	021	33,831
Fulton GA	035	72,921
Fulton GA	036	192,405
Fulton GA	039	192,491
Fulton GA	048	191,791
Gwinnett GA	005	190,713
Gwinnett GA	007	192,767
Gwinnett GA	009	190,626
Gwinnett GA	045	193,059
Gwinnett GA	046	189,897
Hall GA	047	13,661
Hall GA	049	189,475
Henry GA	010	192,203

User:
Plan Name: **GA_Senate_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate_ILLUSTRATIVE

Henry GA		016	48,509
Liberty GA		001	40,883
Liberty GA		003	24,373
Madison GA		025	11,571
Madison GA		050	18,549
Murray GA		051	10,975
Murray GA		054	28,998
Muscogee GA		012	192,832
Muscogee GA		015	14,090
Newton GA		016	7,140
Newton GA		017	8,943
Newton GA		043	96,400
Richmond GA		022	192,925
Richmond GA		024	13,682
Twiggs GA		020	1,978
Twiggs GA		026	6,044
Split VTDs:			
Cobb GA	Dobbins 01	033	12,936
Cobb GA	Dobbins 01	038	465
Cobb GA	Elizabeth 01	033	177
Cobb GA	Elizabeth 01	037	5,693
Cobb GA	Marietta 4B	033	3,304
Cobb GA	Marietta 4B	037	24
Cobb GA	Marietta 6A	033	4,518
Cobb GA	Marietta 6A	056	36
Cobb GA	Powder Springs 2a	033	5,005
Cobb GA	Powder Springs 2a	038	9
Cobb GA	Powers Ferry 01	033	485
Cobb GA	Powers Ferry 01	056	4,942
Cobb GA	Sewell Mill 03	033	1,886

User:
Plan Name: **GA_Senate_ILLUSTRATIVE**
Plan Type:

Political Subdivision Splits Between Districts

Political Subdivision Splits Between Districts

GA_Senate_ILLUSTRATIVE

Cobb GA	Sewell Mill 03	056	5,051
DeKalb GA	Evansdale Elem	040	1,315
DeKalb GA	Evansdale Elem	041	4,053
Floyd GA	MT ALTO NORTH	052	4,509
Floyd GA	MT ALTO NORTH	053	1,080
Forsyth GA	POLO	021	12,071
Forsyth GA	POLO	027	13,787
Gwinnett GA	CATES D	005	1,426
Gwinnett GA	CATES D	009	4,344
Hall GA	TADMORE	047	11,835
Hall GA	TADMORE	049	2,514
Murray GA	SHUCK PEN	051	2,800
Murray GA	SHUCK PEN	054	2,639
Muscogee GA	PSALMOND/MATHEWS	012	3,214
Muscogee GA	PSALMOND/MATHEWS	015	6,930
Newton GA	ALCOVY	017	1,190
Newton GA	ALCOVY	043	5,525

Exhibit 16

User:
Plan Name: **GA_Senate_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_Senate_ILLUSTRATIVE

	Reock	Polsby-Popper
Sum	N/A	N/A
Min	0.24	0.14
Max	0.66	0.60
Mean	0.46	0.36
Std. Dev.	0.09	0.09

District	Reock	Polsby-Popper
001	0.47	0.30
002	0.56	0.32
003	0.34	0.26
004	0.52	0.30
005	0.43	0.36
006	0.33	0.45
007	0.46	0.48
008	0.40	0.42
009	0.45	0.51
010	0.38	0.27
011	0.61	0.48

User:
Plan Name: **GA_Senate_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_Senate_ILLUSTRATIVE

012	0.41	0.35
013	0.61	0.31
014	0.32	0.23
015	0.55	0.27
016	0.48	0.27
017	0.46	0.31
018	0.66	0.39
019	0.56	0.27
020	0.43	0.24
021	0.36	0.22
022	0.43	0.34
023	0.48	0.31
024	0.54	0.47
025	0.41	0.29
026	0.50	0.38
027	0.53	0.50
028	0.37	0.34
029	0.50	0.37
030	0.51	0.47

User:
Plan Name: **GA_Senate_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_Senate_ILLUSTRATIVE

031	0.61	0.60
032	0.45	0.39
033	0.40	0.14
034	0.49	0.36
035	0.58	0.41
036	0.42	0.37
037	0.54	0.34
038	0.37	0.27
039	0.47	0.45
040	0.54	0.46
041	0.39	0.35
042	0.45	0.42
043	0.47	0.33
044	0.59	0.52
045	0.42	0.37
046	0.45	0.38
047	0.51	0.50
048	0.31	0.28

User:
Plan Name: **GA_Senate_ILLUSTRATIVE**
Plan Type:

Measures of Compactness Report

Measures of Compactness Report

GA_Senate_ILLUSTRATIVE

049	0.48	0.38
050	0.24	0.20
051	0.49	0.40
052	0.45	0.39
053	0.49	0.40
054	0.55	0.38
055	0.32	0.34
056	0.45	0.32

Measures of Compactness Summary

Reock	The measure is always between 0 and 1, with 1 being the most compact.
Polsby-Popper	The measure is always between 0 and 1, with 1 being the most compact.

Exhibit 17

User:
Plan Name: **GA_Senate_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_Senate_ILLUSTRATIVE_REVIEW

District	Name	Party	Previous District
001	Ben Watson	R	1
002	Lester Jackson, III	D	2
003	Sheila McNeill	R	3
004	Billy Hickman	R	4
005			
006	Sonya Halpern	D	39
007			
008			
009	Nikki Merritt	D	9
010	Brian Strickland	R	17
010	Emanuel Jones	D	10
011	Dean Burke	R	11
012	Ed Harbison	D	15
013	Carden Summers	R	13
013	Tyler Harper	R	7
014	Jen Jordan	D	6
015	Freddie Powell Sims	D	12
016	Burt Jones	R	25
016	John Kennedy	R	18
017			
018	Larry Walker III	R	20
019	Russ Goodman	R	8
020	Blake Tillery	R	19
021			
022	Harold Jones	D	22
023	Max Burns	R	23
024	Lee Anderson	R	24
025	Bill Cowsert	R	46

User:
Plan Name: **GA_Senate_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_Senate_ILLUSTRATIVE_REVIEW

026	David Lucas	D	26
027	Greg Dolezal	R	27
028	Matt Brass	R	28
029	Randy Robertson	R	29
030	Mike Dugan	R	30
031	Jason Anavitarte	R	31
032			
033	Michael Rhett	D	33
034	Marty Harbin	R	16
034	Gail Davenport	D	44
035	Donzella James	D	35
036	Nan Orrock	D	36
037	Lindsey Tippins	R	37
038			
039	Horacena Tate	D	39
040	Sally Harrell	D	40
041	Kim Jackson	D	41
041	Gloria Butler	D	55
042	Elena Parent	D	42
043			
044	Valencia Seay	D	34
045	Clint Dixon	R	45
046	Sheikh Rahman	D	5
047			
048	John Albers	R	56
048	Michelle Au	D	48
048	Brandon Beach	R	21
049	Butch Miller	R	49

User:
Plan Name: **GA_Senate_ILLUSTRATIVE_REVIEW**
Plan Type:

Districts & Their Incumbents

Districts & Their Incumbents

GA_Senate_ILLUSTRATIVE_REVIEW

050	Bo Hatchett	R	50
050	Frank Ginn	R	47
051	Steve Gooch	R	51
052	Chuck Hufstetler	R	52
052	Bruce Thompson	R	14
053	Jeff Mullis	R	53
054	Chuck Payne	R	54
055	Tonya Anderson	D	43
056	Kay Kirkpatrick	R	32

Number of Incumbents in District with more than one Incumbent:	17
Number of Districts with No Incumbent:	9
Number of Districts with Incumbents of more than one party:	3
Number of Districts with Paired Democrats:	1
Number of Districts with Paired Republicans:	4

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF GEORGIA
ATLANTA DIVISION

GEORGIA STATE CONFERENCE OF THE NAACP, et al.,	)	
Plaintiffs,	)	CASE NO. 1:21-CV-5338-ELB-SCJ-SDG
v.	)	
STATE OF GEORGIA, et al.,	)	
Defendants	)	
COMMON CAUSE, et al.,	)	
Plaintiffs,	)	CASE NO. 1:22-CV-00090-ELB-SCJ-SDG
v.	)	
BRAD RAFFENSPERGER,	)	
Defendant.	)	

EXPERT REPORT OF JOHN B. MORGAN

Pursuant to 28 U.S.C. § 1746, Fed. R. Civ. P. 26, and F.R.E. 702 and 703, I, JOHN B. MORGAN, make the following declaration:

1. My name is John B. Morgan. I am over the age of 21 years, and I am under no legal disability which would prevent me from giving this declaration. If called to testify, I would testify under oath to these facts.

EXHIBIT 2

2. I hold a B.A. in History from the University of Chicago. As detailed in my CV, attached as Exhibit 1, I have extensive experience over many years in the field of redistricting. I have worked on redistricting plans in the redistricting efforts following the 1990 Census, the 2000 Census, the 2010 Census and the 2020 Census. I have testified as an expert witness in demographics and redistricting.

3. I am being compensated at a rate of $325 per hour for my services in this case.

4. The redistricting geographic information system (GIS) software package used for this analysis is Maptitude for Redistricting 2021 from Caliper Corporation. The redistricting software was loaded with the census PL94-171 data from the Census Bureau and the census geography for Georgia. I was also provided with election data files used by the Georgia General Assembly during the redistricting process. The full suite of census geography was available, including counties, places, voting districts, water bodies, and roads, as well as census blocks, which are the lowest level of geography for which the Census Bureau reports population counts.

5. I have been asked to review the congressional, House of Representatives and State Senate plans considered and adopted by the Georgia General Assembly and compare them to the proposed congressional, House and Senate plans drawn by Dr. Moon Duchin and offer opinions regarding my analysis.

I was also provided with plans labeled "unity" plans from Dr. Duchin's data, which I also analyzed.

6. As a result of this analysis, it is my opinion that each of the plans submitted in Dr. Duchin's report and the unity plans has a significant increase in Democratic performance when compared to the enacted plans.

7. In preparing this analysis, I was given the block-equivalency files of the Duchin plans and the unity plans as well as the block-equivalency files of the 2021 adopted plans and incumbent databases used by the Georgia General Assembly during the redistricting process. The incumbent databases list the address locations and districts of the Representatives and Senators serving under the existing House (2015-enacted) and Senate (2014-enacted) plans prior to the election of 2022.

8. I loaded the 2021 House and 2021 Senate plans enacted by the Georgia General Assembly into the Maptitude for Redistricting software using the block-equivalency files provided. I loaded the Duchin Congressional, Senate and House plans and the Unity plans into the Maptitude for Redistricting software using the block-equivalency files provided. I loaded the prior congressional (2012), House (2015-enacted) and Senate (2014-enacted) plans into the Maptitude for Redistricting software using files provided with software. I loaded the associated incumbent databases provided.

9. Using the Maptitude for Redistricting software, I ran eight report and summaries for each of the Duchin plans, the Unity plans and the enacted plans:

1- Measures of compactness report,

2- Districts & incumbents report, (not run for congressional plans)

3- Population summary report,

4- Political subdivision splits report,

5- Plan component report,

6- Core constituency report compared to prior enacted plan,

7- Core constituency report compared to Enacted 2021 plan

8- District summary with election data

10. Each of these reports and summaries for each plan is included in the appendices to this report. I summarized highlights of this information in a table for each plan. An index with exhibit numbers for all of these reports and summaries is included at the end of the written report.

Chart 1. HD-Eff-Jan11 and Enacted 2021 House Plan comparisons

Plan metrics	**HD Eff Jan11**	**House Enacted**
County splits	69	69
Voting precinct splits	307	184
Mean compactness - Reock	0.41	0.39
Mean compactness - Polsby Popper	0.28	0.28
# Paired incumbents	62	20
Deviation relative range	-1.72% to 1.97%	-1.40% to 1.34%
Deviation overall range	3.70%	2.74%
# Districts won by: Biden (D-Pres20)	95	83
# Districts won by: Trump (R-Pres20)	85	97
# Districts won by: Bryant (D-PSC 20)	88	79
# Districts won by: Shaw (R-PSC 20)	92	101
# Seats 18+_AP_Blk% is: over 90%	3	0
# Seats 18+_AP_Blk% is: 80% to 90%	5	0
# Seats 18+_AP_Blk% is: 70% to 80%	4	11
# Seats 18+_AP_Blk% is: 60% to 70%	9	15
# Seats 18+_AP_Blk% is: 55% to 60%	9	5
# Seats 18+_AP_Blk% is: 52% to 55%	3	5
# Seats 18+_AP_Blk% is: 50% to 52%	5	2
# Seats majority 18+_AP_Blk%	**38**	**49**
# Seats 18+_AP_Blk% is: 45% to 50%	10	4
# Seats 18+_AP_Blk% is: 40% to 45%	8	2

Chart 2. HD-Alt1-Jan11 and Enacted 2021 House Plan comparisons

Plan metrics	**HD Alt1 Jan11**	**House Enacted**
County splits	73	69
Voting precinct splits	330	184
Mean compactness - Reock	0.39	0.39
Mean compactness - Polsby Popper	0.26	0.28
# Paired incumbents	68	20
Deviation relative range	-2.00% to 2.09%	-1.40% to 1.34%
Deviation overall range	4.08%	2.74%
# Districts won by: Biden (D-Pres20)	92	83
# Districts won by: Trump (R-Pres20)	88	97
# Districts won by: Bryant (D-PSC 20)	86	79
# Districts won by: Shaw (R-PSC 20)	94	101
# Seats 18+_AP_Blk% is: over 90%	2	0
# Seats 18+_AP_Blk% is: 80% to 90%	6	0
# Seats 18+_AP_Blk% is: 70% to 80%	2	11
# Seats 18+_AP_Blk% is: 60% to 70%	5	15
# Seats 18+_AP_Blk% is: 55% to 60%	5	5
# Seats 18+_AP_Blk% is: 52% to 55%	11	5
# Seats 18+_AP_Blk% is: 50% to 52%	19	2
# Seats majority 18+_AP_Blk%	**50**	**49**
# Seats 18+_AP_Blk% is: 45% to 50%	6	4
# Seats 18+_AP_Blk% is: 40% to 45%	5	2

Chart 3. HD-Alt2-Jan11 and Enacted 2021 House Plan comparisons

Plan metrics	**HD Alt2 Jan11**	**House Enacted**
County splits	70	69
Voting precinct splits	310	184
Mean compactness - Reock	0.4	0.39
Mean compactness - Polsby Popper	0.26	0.28
# Paired incumbents	65	20
Deviation relative range	-3.22% to 2.51%	-1.40% to 1.34%
Deviation overall range	5.73%	2.74%
# Districts won by: Biden (D-Pres20)	93	83
# Districts won by: Trump (R-Pres20)	87	97
# Districts won by: Bryant (D-PSC 20)	89	79
# Districts won by: Shaw (R-PSC 20)	91	101
# Seats 18+_AP_Blk% is: over 90%	3	0
# Seats 18+_AP_Blk% is: 80% to 90%	3	0
# Seats 18+_AP_Blk% is: 70% to 80%	4	11
# Seats 18+_AP_Blk% is: 60% to 70%	11	15
# Seats 18+_AP_Blk% is: 55% to 60%	4	5
# Seats 18+_AP_Blk% is: 52% to 55%	9	5
# Seats 18+_AP_Blk% is: 50% to 52%	9	2
# Seats majority 18+_AP_Blk%	**43**	**49**
# Seats 18+_AP_Blk% is: 45% to 50%	9	4
# Seats 18+_AP_Blk% is: 40% to 45%	10	2

Chart 4. SD-Eff-Jan11 and Enacted 2021 Senate Plan comparisons

Plan metrics	**SD Eff Jan11**	**Senate Enacted**
County splits	31	29
Voting precinct splits	129	47
Mean compactness - Reock	0.43	0.42
Mean compactness - Polsby Popper	0.29	0.29
# Paired incumbents	22	4
Deviation relative range	-1.73% to 1.67%	-1.03% to +0.98%
Deviation overall range	3.40%	2.01%
# Districts won by: Biden (D-Pres20)	33	23
# Districts won by: Trump (R-Pres20)	23	33
# Districts won by: Bryant (D-PSC 20)	30	23
# Districts won by: Shaw (R-PSC 20)	26	33
# Seats 18+_AP_Blk% is: over 90%	0	0
# Seats 18+_AP_Blk% is: 80% to 90%	1	0
# Seats 18+_AP_Blk% is: 70% to 80%	2	3
# Seats 18+_AP_Blk% is: 60% to 70%	2	6
# Seats 18+_AP_Blk% is: 55% to 60%	0	3
# Seats 18+_AP_Blk% is: 52% to 55%	0	1
# Seats 18+_AP_Blk% is: 50% to 52%	3	1
# Seats majority 18+_AP_Blk%	**8**	**14**
# Seats 18+_AP_Blk% is: 45% to 50%	7	1
# Seats 18+_AP_Blk% is: 40% to 45%	5	1

Chart 5. SD-Alt1-Jan11 and Enacted 2021 Senate Plan comparisons

Plan metrics	**SD Alt1 Jan11**	**Senate Enacted**
County splits	34	29
Voting precinct splits	120	47
Mean compactness - Reock	0.43	0.42
Mean compactness - Polsby Popper	0.29	0.29
# Paired incumbents	21	4
Deviation relative range	-1.36% to 1.28%	-1.03% to +0.98%
Deviation overall range	2.64%	2.01%
# Districts won by: Biden (D-Pres20)	28	23
# Districts won by: Trump (R-Pres20)	28	33
# Districts won by: Bryant (D-PSC 20)	26	23
# Districts won by: Shaw (R-PSC 20)	30	33
# Seats 18+_AP_Blk% is: over 90%	0	0
# Seats 18+_AP_Blk% is: 80% to 90%	0	0
# Seats 18+_AP_Blk% is: 70% to 80%	1	3
# Seats 18+_AP_Blk% is: 60% to 70%	1	6
# Seats 18+_AP_Blk% is: 55% to 60%	3	3
# Seats 18+_AP_Blk% is: 52% to 55%	2	1
# Seats 18+_AP_Blk% is: 50% to 52%	13	1
# Seats majority 18+_AP_Blk%	**20**	**14**
# Seats 18+_AP_Blk% is: 45% to 50%	1	1
# Seats 18+_AP_Blk% is: 40% to 45%	0	1

Chart 6. SD-Alt2-Jan11 and Enacted 2021 Senate Plan comparisons

Plan metrics	**SD Alt2 Jan11**	**Senate Enacted**
County splits	26	29
Voting precinct splits	98	47
Mean compactness - Reock	0.44	0.42
Mean compactness - Polsby Popper	0.3	0.29
# Paired incumbents	20	4
Deviation relative range	-1.30% to 1.33%	-1.03% to +0.98%
Deviation overall range	2.63%	2.01%
# Districts won by: Biden (D-Pres20)	28	23
# Districts won by: Trump (R-Pres20)	28	33
# Districts won by: Bryant (D-PSC 20)	26	23
# Districts won by: Shaw (R-PSC 20)	30	33
# Seats 18+_AP_Blk% is: over 90%	0	0
# Seats 18+_AP_Blk% is: 80% to 90%	1	0
# Seats 18+_AP_Blk% is: 70% to 80%	1	3
# Seats 18+_AP_Blk% is: 60% to 70%	2	6
# Seats 18+_AP_Blk% is: 55% to 60%	4	3
# Seats 18+_AP_Blk% is: 52% to 55%	3	1
# Seats 18+_AP_Blk% is: 50% to 52%	6	1
# Seats majority 18+_AP_Blk%	**17**	**14**
# Seats 18+_AP_Blk% is: 45% to 50%	4	1
# Seats 18+_AP_Blk% is: 40% to 45%	0	1

Chart 7. CD-Jan11 and Enacted 2021 congressional Plan comparisons

Plan metrics	**CD-Alt1-Jan11**	**CD Enacted**
County splits	17	15
Voting precinct splits	46	47
Mean compactness - Reock	0.47	0.44
Mean compactness - Polsby Popper	0.3	0.27
# Paired incumbents	no data	no data
Deviation relative range	-1 to 1	-1 to 1
Deviation overall range	0.00% to 0.00%	0.00% to 0.00%
# Districts won by: Biden (D-Pres20)	7	5
# Districts won by: Trump (R-Pres20)	7	9
# Districts won by: Bryant (D-PSC 20)	6	5
# Districts won by: Shaw (R-PSC 20)	8	9
# Seats 18+_AP_Blk% is: over 90%	0	0
# Seats 18+_AP_Blk% is: 80% to 90%	0	0
# Seats 18+_AP_Blk% is: 70% to 80%	0	0
# Seats 18+_AP_Blk% is: 60% to 70%	0	1
# Seats 18+_AP_Blk% is: 55% to 60%	0	0
# Seats 18+_AP_Blk% is: 52% to 55%	0	1
# Seats 18+_AP_Blk% is: 50% to 52%	4	0
# Seats majority 18+_AP_Blk%	**4**	**2**
# Seats 18+_AP_Blk% is: 45% to 50%	1	2
# Seats 18+_AP_Blk% is: 40% to 45%	0	0

Chart 8. HD-Unity and Enacted 2021 House Plan comparisons

Plan metrics	**HD Unity**	**House Enacted**
County splits	79	69
Voting precinct splits	99	184
Mean compactness - Reock	0.36	0.39
Mean compactness - Polsby Popper	0.23	0.28
# Paired incumbents	73	20
Deviation relative range	-0.62% to 0.58%	-1.40% to 1.34%
Deviation overall range	1.20%	2.74%
# Districts won by: Biden (D-Pres20)	99	83
# Districts won by: Trump (R-Pres20)	81	97
# Districts won by: Bryant (D-PSC 20)	96	79
# Districts won by: Shaw (R-PSC 20)	84	101
# Seats 18+_AP_Blk% is: over 90%	0	0
# Seats 18+_AP_Blk% is: 80% to 90%	0	0
# Seats 18+_AP_Blk% is: 70% to 80%	0	11
# Seats 18+_AP_Blk% is: 60% to 70%	12	15
# Seats 18+_AP_Blk% is: 55% to 60%	15	5
# Seats 18+_AP_Blk% is: 52% to 55%	17	5
# Seats 18+_AP_Blk% is: 50% to 52%	13	2
# Seats majority 18+_AP_Blk%	**57**	**49**
# Seats 18+_AP_Blk% is: 45% to 50%	9	4
# Seats 18+_AP_Blk% is: 40% to 45%	8	2

Chart 9. SD-Unity and Enacted 2021 Senate Plan comparisons

Plan metrics	**SD Unity**	**Senate Enacted**
County splits	46	29
Voting precinct splits	27	47
Mean compactness - Reock	0.37	0.42
Mean compactness - Polsby Popper	0.22	0.29
# Paired incumbents	22	4
Deviation relative range	-0.14% to 0.19%	-1.03% to +0.98%
Deviation overall range	0.33%	2.01%
# Districts won by: Biden (D-Pres20)	31	23
# Districts won by: Trump (R-Pres20)	25	33
# Districts won by: Bryant (D-PSC 20)	30	23
# Districts won by: Shaw (R-PSC 20)	26	33
# Seats 18+_AP_Blk% is: over 90%	0	0
# Seats 18+_AP_Blk% is: 80% to 90%	0	0
# Seats 18+_AP_Blk% is: 70% to 80%	0	3
# Seats 18+_AP_Blk% is: 60% to 70%	0	6
# Seats 18+_AP_Blk% is: 55% to 60%	0	3
# Seats 18+_AP_Blk% is: 52% to 55%	11	1
# Seats 18+_AP_Blk% is: 50% to 52%	9	1
# Seats majority 18+_AP_Blk%	**20**	**14**
# Seats 18+_AP_Blk% is: 45% to 50%	2	1
# Seats 18+_AP_Blk% is: 40% to 45%	0	1

Chart 10. CD-Unity and Enacted 2021 congressional Plan comparisons

Plan metrics	**CD-Unity**	**CD Enacted**
County splits	21	15
Voting precinct splits	31	47
Mean compactness - Reock	0.36	0.44
Mean compactness - Polsby Popper	0.23	0.27
# Paired incumbents	no data	no data
Deviation relative range	0 to 1	-1 to 1
Deviation overall range	0.00% to 0.00%	0.00% to 0.00%
# Districts won by: Biden (D-Pres20)	7	5
# Districts won by: Trump (R-Pres20)	7	9
# Districts won by: Bryant (D-PSC 20)	7	5
# Districts won by: Shaw (R-PSC 20)	7	9
# Seats 18+_AP_Blk% is: over 90%	0	0
# Seats 18+_AP_Blk% is: 80% to 90%	0	0
# Seats 18+_AP_Blk% is: 70% to 80%	0	0
# Seats 18+_AP_Blk% is: 60% to 70%	0	1
# Seats 18+_AP_Blk% is: 55% to 60%	0	0
# Seats 18+_AP_Blk% is: 52% to 55%	1	1
# Seats 18+_AP_Blk% is: 50% to 52%	3	0
# Seats majority 18+_AP_Blk%	**4**	**2**
# Seats 18+_AP_Blk% is: 45% to 50%	1	2
# Seats 18+_AP_Blk% is: 40% to 45%	1	0

11. As an experienced map drawer, I am often asked by elected officials and redistricting stakeholders to review the political performance of districts within a plan and compare that to other plans. When I conduct those analyses, I generally use statewide elections to assess the overall partisan makeup of plans. In the tables above, two elections are included - the presidential election of 2020 (Biden-D vs.

Trump-R) and the Public Service Commissioner election of 2020 (Bryant-D vs. Shaw-R). I understand that these are some of the elections that legislators used when drawing the 2021 enacted plans.

12. Having reviewed these election results, it is my opinion that each of the plans submitted in Dr. Duchin's report has a significant increase in Democratic performance when compared to the enacted plans. It is also my opinion that each of the unity plans has a significant increase in Democratic performance when compared to the enacted plans.

13. The index of exhibits attached to this report is as follows:

INDEX OF EXHIBITS

1. Morgan CV
2. CD Enacted Core Constituencies to 2012 Congressional Plan
3. CD Enacted District Election Summary
4. CD Enacted Measures of Compactness
5. CD Enacted Plan Components with Population Detail
6. CD Enacted Political Subdivision Splits – VTD
7. CD Enacted Population Summary
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9. CD-Alt1-Jan11 Core Constituencies to 2021 Congressional Plan
10. CD-Alt1-Jan11 District Election Summary
11. CD-Alt1-Jan11 Measures of Compactness
12. CD-Alt1-Jan11 Plan Components with Population Detail
13. CD-Alt1-Jan11 Political Subdivision Splits – VTD
14. CD-Alt1-Jan11 Population Summary

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99. SD-Unity Population Summary

[Signature on next page]

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

Executed this 15th day of February, 2023.

JOHN B. MORGAN

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

GEORGIA STATE CONFERENCE OF THE NAACP, et al. *Plaintiffs*, v. STATE OF GEORGIA, et al. *Defendants.*	Case No. 1:21-CV-5338-ELB-SCJ-SDG
COMMON CAUSE, et al., *Plaintiffs*, v. BRAD RAFFENSPERGER *Defendant*.	Case No. 1:22-CV-00090-ELB-SCJ-SDG

Expert Report of Dr. Moon Duchin

EXHIBIT 3

Analysis of Race and Redistricting in Georgia

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

January 13, 2022

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1 Background and qualifications

I am a Professor of Mathematics and a Senior Fellow in the Jonathan M. Tisch College of Civic Life at Tufts University. At Tisch College, I am the director and principal investigator of an interdisciplinary research group called the MGGG Redistricting Lab, focused on geometric and computational aspects of redistricting. My areas of research and teaching include the structure of census data, the history of the U.S. Census, the design and implementation of randomized algorithms for generating districting plans, and the analysis of redistricting more broadly. In 2019, I was awarded a major grant from the National Science Foundation to study *Network Science of Census Data*.

I am compensated at $400/hour for my work in this case. I have previously written reports and provided testimony by deposition, a hearing, or at trial in North Carolina, Pennsylvania, Wisconsin, Alabama, South Carolina, and Texas.[1] A full copy of my CV is attached to this report.

1.1 Assignment

I have been asked to examine the Congressional, state Senate, and state House districts enacted in Georgia this year in connection with challenges under the Voting Rights Act of 1965 (VRA) and the U.S. Constitution.

[1] *NC League of Conservation Voters, et al. v. Hall, et al.* No. 21-cvs-500085 (Wake Cnty. Sup. Ct. 2021); *Carter v. Chapman*, No. 7 MM 2022, 2022 WL 702894 (Pa. Mar. 9, 2022); *Johnson v. Wis. Elections Comm'n*, No. 2021AP1450-OA, 2022 WL 621082 (Wis. Mar. 3, 2022); *Milligan, et al. v. Merrill, et al.*, Case No. 2:21-cv-01530-AMM and *Thomas, et al. v. Merrill, et al.*, Case No. 2:21-cv-01531-AMM (N.D. Ala. 2021); *SC NAACP et al. v. Alexander, et al.*, Case No. 3-21-cv-03302-MBS-TJH-RMG (D.S.C.) (three-judge ct.); *TX NAACP et al. v. Abbott*, Case No. 1:21-CV-00943-RP-JES-JVB.

In particular, I review the maps' conformance with traditional districting principles (§6), then supply demonstration maps for the "Gingles 1" prong of a VRA challenge. Using a notion of district "effectiveness" based on electoral history (§5), I show that it is readily possible to draw additional majority-minority districts, while simultaneously increasing the number of effective districts (§7). These effective districts are shown to be highly likely to provide an opportunity for Black and Latino voters to elect candidates of their choice.

I have also assessed the maps to investigate the possibility of excessively race-conscious line-drawing (§10), especially noting when traditional districting principles have been undermined in a manner that results in "packing" and "cracking"—the related practices of over-concentrating Black and Latino voters on one hand, or splitting communities and dispersing their voters over multiple districts on the other. I have considered whether or not the design of the districts ultimately leads to discernible dilution of voting opportunity for Black voters in Georgia, or for coalitions of Black and Latino voters, and have found ample evidence to support that conclusion.

All work in this report was completed by me and by research assistants working under my direct supervision.

1.2 Materials

Materials consulted in the preparation of this report include the following.

- A major source is Census data, primarily the Decennial Census releases (i.e., the PL 94-171). Other data products from the Census Bureau, including the American Community Survey and the TIGER/Line shapefiles, were also used.
- For priorities and criteria, I consulted the "2021–22 Guidelines for the House Legislative and Congressional Reapportionment Committee." These are reprinted in full in the corresponding publication by the Senate Committee on Reapportionment and Redistricting.
- Shapefiles for the enacted plans are available on the state's redistricting website, hosted at `legis.ga.gov`.
- A collection of precinct shapefiles with historical election data joined to the shapes was provided by counsel, as well as addresses for incumbent representatives. I was also provided with written transcriptions of oral testimony in public hearings in Georgia about redistricting, and with corresponding written communication.

2 Summary of findings

- Census data shows that the state of Georgia is rapidly diversifying, and in fact now has a population very nearly evenly split between White people and people of color. At the same time, it has shifted to become what we might call "bright purple," with recent elections repeatedly demonstrating that candidates preferred by Black and Latino voters can be elected by simple majority on a statewide basis.
- At a high level, an examination of recent electoral history shows that the enacted plans at all three levels are conspicuously uncompetitive, which has been fueled by acutely race-conscious moves in the recent redistricting. In particular:
  - A Congressional district that had proved to perform for the preferences of Black and Latino voters—CD 6—has been targeted to eliminate electoral opportunity. This was achieved by excising parts of urban counties and adding conservative White counties to the north of the benchmark configuration.
  - In a ripple effect from the reconfiguration of CD 6, a dense, urban, largely Black residential segment of Cobb County has been submerged in CD 14.

  - On the western edge of Georgia, CD 3 has been drawn to retain its character as a firewall between racially and politically diverse parts of the state in metro Atlanta and the Southwest region. Meanwhile, CD 13 has been kept highly packed, which is cemented in the enacted plan through race-conscious county splitting.
  - In the enacted Senate map, numerous districts that had trended into diverse and competitive population configurations were targeted for "dismantling," i.e, were re-drawn in a way that splits the population of the benchmark district across numerous new districts. This is especially visible in the reconfiguration of SD 17 and 48, which flouts traditional districting principles and creates districts that lock out opportunity.
  - There is strikingly low core retention in the enacted House plan, with roughly three in every five Georgia residents assigned to a new district today relative to the benchmark plan. This dovetails with a pattern of "dismantling" districts in a way that usually eliminates electoral opportunity for Black and Latino voters, using racially imbalanced transfers of population.

- I have introduced a label of district "effectiveness" in §5: by definition, a district is deemed effective if candidates of choice for Black and Latino voters can frequently win both primary and general elections. To make this concrete, I have used a list of four primary and eight general statewide elections selected as being highly probative for the preferences of Black and Latino Georgians. To be effective, a district must have an electoral history such that the candidate of choice would win in at least 3/4 primary elections and 5/8 general elections from this dataset. I have confirmed that this is well aligned with actual 2022 electoral performance at the Congressional and state legislative level.

- A review of metrics associated with traditional districting principles (and other principles cited in the state's redistricting guidelines) is presented in §6. My alternative plans are shown to be highly compact, to respect the integrity of counties and cities, and to be far more cognizant of the integrity of state precincts than the enacted plans.

- I present Gingles 1 alternatives on a regional/district cluster basis in §7. These plans increase both the number of majority-BHVAP districts and the number of majority-BHCVAP districts, relative to the state, while also securing the "effective" label on the basis of electoral history. The modular design of the legislative alternatives will make it easy to mix and match plans from different clusters.

- If we foreground effectiveness instead of majority demographics, we find that districts can frequently be effective even well under the 50%+1 demographic threshold. This provides helpful examples leading in to a discussion of racial gerrymandering in the following section.

- Counties are often split in a racially sorted way, beyond what the partisan geography would suggest from a race-neutral process. In many cases this secures a high partisan differential as well; in some cases, the racial differential significantly exceeds the partisan gap.

- It is extremely frequent for precinct splits to show major racial disparity. If mapmakers were using cast vote history to track partisan lean, as is frequently done around the country, then these splits of state precincts are especially telling, since the vote history can not provide a partisan basis for the decision. These splits are shown to essentially always align with packing and cracking. Again, my alternative maps show that far less precinct splitting is possible.

- Public input, such as the record of strong pushback against the targeting of CD 6 and the encroachment of CD 14 into Cobb, also explains why the enacted plans are dissonant in terms of shared community interests.

3 Demographics of Georgia

3.1 Regions, counties, and cities

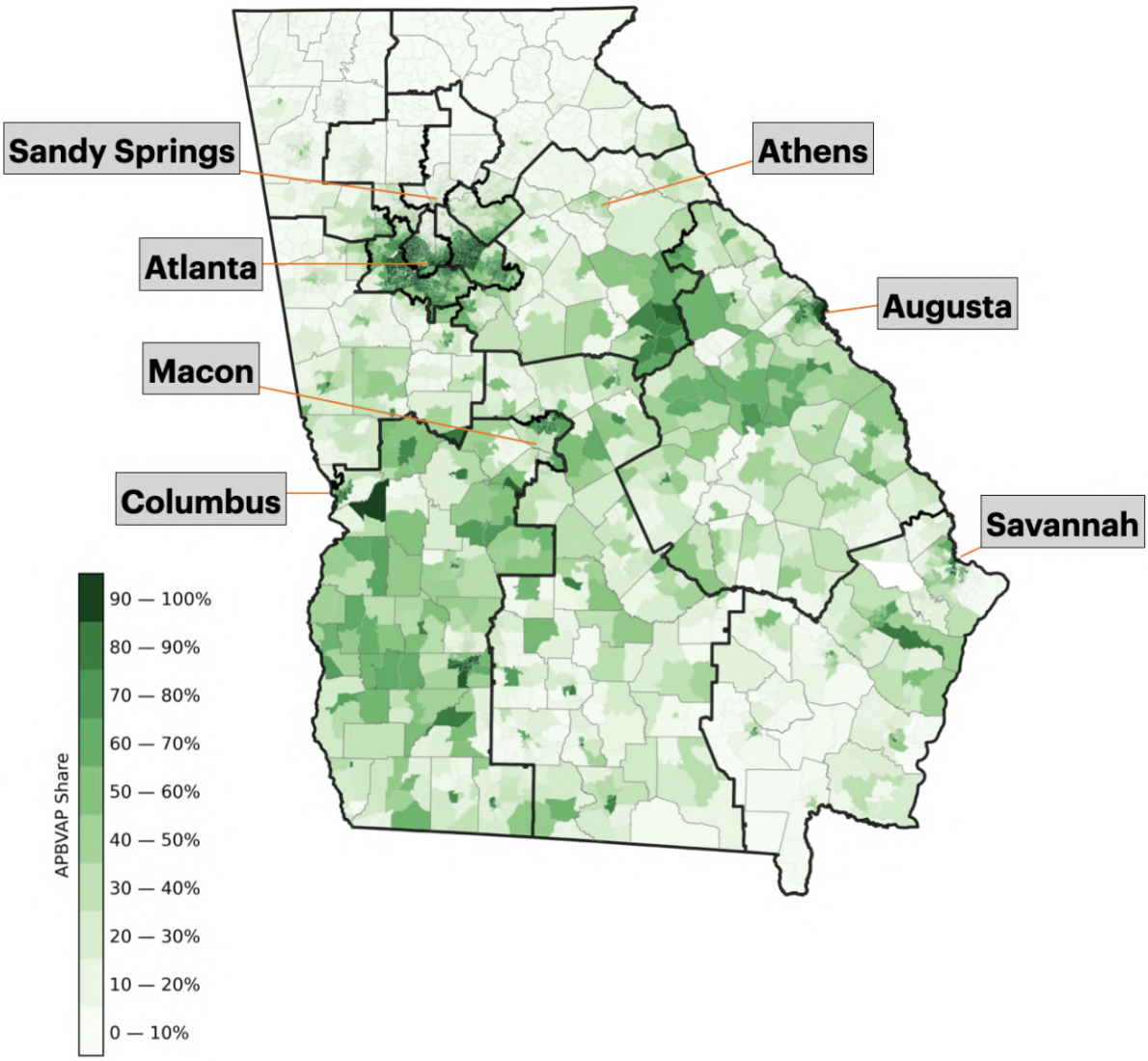


Figure 1: Choropleth of Black voting age population by state precinct, with the enacted Congressional map overlaid. County lines are shown in gray. The Atlanta metro area has dense Black population, while high proportions of Black residents in smaller cities and rural areas can be found in the swath of the state from Columbus to Augusta, broadly called Georgia's "Black Belt" region.

Georgia has 159 counties, the second highest number in the nation (after Texas with 254). Georgia's counties vary in population from Fulton County, with over a million residents, to Taliaferro County, with just 1559 residents, so that they differ by a factor of over 680×. Twenty-two of the counties are majority-Black, from DeKalb (pop. 764,382) to Taliaferro.

In Georgia, the cities proper are not very populous; even Atlanta has under 500,000 people by the 2020 Census numbers, smaller than the ideal Congressional district population of 765,136. However, the Atlanta metro area (formally the "Atlanta–Sandy Springs–Alpharetta, GA Metropolitan Statistical Area") is the eighth largest in the country, with over six million residents (6,089,815), making up nearly 57% of Georgia's total population.

3.2 Sources of population data

Apportionment and redistricting was the fundamental motivation for the establishment of the U.S. Census. The primary source of ground-truth data for redistricting is the Decennial Census tables in the PL94-171 (also called the *redistricting data release*). There are many reasons to rely on the 2020 Decennial data: it is the most recent available, it is based on a more extensive enumeration of the population (rather than a survey), it is available on the smallest geographic units (census blocks), it offers a high level of detail in its categories of race and ethnicity, and it includes both total population (TOTPOP) and voting age population (VAP).

An important secondary source of data, also produced by the Census Bureau, is the American Community Survey, or ACS. This has the advantage of being collected every year rather than at ten-year intervals, and it includes an estimate of citizen voting age population (CVAP), but this trades off with a number of well-known caveats. Since it is survey-based, it is known to have wider error bars on small geography: accordingly, the Bureau only releases single-year estimates at the tract level; 5-year estimates are released at the level of block groups, but this is still not sufficiently detailed to get exact totals on electoral districts. Furthermore, the ACS racial and ethnic categories are significantly simplified relative to the Decennial data, so that for instance it is not possible to tabulate Any-Part Black population with the same set of multiracial categories or even to tabulate Afro-Latino (Black and Hispanic) population. In addition, the use of a 5-year average will mean that the numbers are somewhat out of date, since even the most recent currently available data draws partly from 2016, which is quite a long time ago in a rapidly diversifying state. Finally, the 2020 ACS was so badly compromised by the COVID pandemic that the Bureau has cautioned people to treat the numbers that year as "experimental."[2]

For these reasons I have chosen to emphasize VAP in discussing the demographics of districts in this report, such as when counting the majority-Black districts in a plan. However, the plaintiffs' claims involve a coalition of Black and Latino voters, and the voting eligibility rate for Latino voters can be significantly lower than other groups, particularly due to a lower rate of citizenship. Therefore litigation involving Latino plaintiffs typically uses a secondary data source to validate that Gingles plans meet the 50%+1 threshold. Below, I will rely on estimated CVAP built from block-level adjusted VAP, where the citizenship rate (CVAP/VAP) for Black, Latino, White, and Other residents is pulled from the 2020 5-year ACS on larger geographies, namely census tracts. I judge this to be significantly more accurate than using the 2016-2020 5-year CVAP numbers directly. For one vivid illustration of why this is important, consider that the total voting age population of Georgia is 8,220,274 in the redistricting data, but only 8,011,265 in the 2016-2020 5-year numbers. That is, there is a shortfall of more than 200,000 adults if we pull from the ACS directly.

A full description of racial categories and of the construction of CVAP for this report can be found in Appendix A. In §8 I will confirm that my alternative plans satisfy the Gingles 1 standard for coalition districts using estimated Black and Hispanic CVAP as well as using VAP.

[2] "The Census Bureau will not release its standard 2020 ACS 1-year supplemental estimates because of the impact of the COVID-19 pandemic on data collection. Experimental estimates, developed from 2020 ACS 1-year data[,] are available on the ACS Experimental Data page. They will not be available on data.census.gov or the Application Programming Interface (API)." From www.census.gov/data/developers/data-sets/ACS-supplemental-data/2020.html, accessed January 4, 2023.

3.3 Demographic trends

A snapshot of the demographics of Georgia can be extracted from data products by the Census Bureau, as in Table 1.[3] Below, I will use the abbreviations B, H, BH, W, and POC to denote the share of population (or VAP, etc.) that is Black, Latino, Black and/or Latino, White, and people of color respectively. Detailed definitions of the racial and ethnic groupings can be found in Appendix A.

	All	Black alone	Black (APB)	Hispanic	BH Coalition	AfroLatino	White alone	POC
TOTPOP	10,711,908	3,278,119 30.60%	3,538,146 33.03%	1,123,457 10.49%	4,578,941 42.75%	82,662 0.77%	5,362,156 50.06%	5,349,752 49.94%
VAP	8,220,274	2,462,933 29.96%	2,607,986 31.73%	742,918 9.04%	3,302,581 40.18%	48,323 0.59%	4,342,333 52.82%	3,877,941 47.18%
CVAP	7,598,787	2,422,569 31.88%	2,537,328 33.39%	429,562 5.65%	2,920,522 38.43%	— —	4,285,394 56.40%	3,313,393 43.60%

Table 1: Demographics overview. The TOTPOP and VAP figures are taken from the 2020 Decennial Census. The CVAP figures use citizenship rates drawn from the most recent 5-year ACS (ending in 2020), applied to decennial VAP.

Georgia's fast growth is entirely due to the expansion in the population of people of color. In fact, the (non-Hispanic) White population of Georgia actually dropped from 2010 to 2020—from 5,413,920 to 5,362,156—while the state overall grew by over a million people. As a result, the population share of Black and Latino residents expanded from 39.75% to 42.75% in the time between the 2010 and the 2020 Census data release, while the White population share dropped markedly from 55.88% to 50.06%. Thus, to within a tenth of a percent, current redistricting data finds Georgia evenly split between White residents and people of color.

The steady diversification is visible in the citizen voting age population as well, for which we can get a snapshot each year from the American Community Survey (Table 2).[4]

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
BCVAP	1,961,750 0.3029	2,008,587 0.3049	2,055,423 0.3071	2,096,295 0.3089	2,140,693 0.3110	2,179,729 0.3123	2,228,551 0.3155	2,276,776 0.3182	2,322,275 0.3201	2,376,110 0.3230
HCVAP	188,878 0.0292	210,412 0.0319	230,724 0.0345	245,517 0.0362	263,787 0.0383	282,158 0.0404	290,840 0.0412	306,713 0.0429	324,368 0.0447	344,182 0.0468
BHCVAP	2,150,628 0.3321	2,218,999 0.3368	2,286,147 0.3415	2,341,812 0.3451	2,404,480 0.3493	2,461,887 0.3528	2,519,391 0.3567	2,583,489 0.3610	2,646,643 0.3648	2,720,292 0.3698
POC CVAP	2,239,082 0.3457	2,299,730 0.3491	2,358,789 0.3524	2,415,907 0.3560	2,477,036 0.3599	2,538,250 0.3637	2,603,198 0.3685	2,671,269 0.3733	2,738,577 0.3775	2,811,677 0.3822
WCVAP	4,237,007 0.6543	4,288,602 0.6509	4,335,200 0.6476	4,369,477 0.6440	4,405,843 0.6401	4,440,410 0.6363	4,460,606 0.6315	4,484,704 0.6267	4,516,116 0.6225	4,544,881 0.6178
total CVAP	6,476,089	6,588,332	6,693,989	6,785,384	6,882,879	6,978,660	7,063,804	7,155,973	7,254,693	7,356,558

Table 2: Georgia has seen significant growth in its citizen adult population, and nearly all of it is from communities of color. This table shows the 1-year ACS figures from 2010 through 2019.

[3] As noted in the last section, the American Community Survey (ACS) is based on an annual survey, often presented in 5-year rolling averages, where not all of the same racial and ethnic categories from the PL94-171 are available. Since the methodology, categories, and time periods are different between the ACS and the Decennial data, there is no contradiction in observing WCVAP>WVAP, for instance.

[4] As described above, the 2020 ACS was not recommended for standard use on a 1-year basis, which is why it is excluded from Table 2.

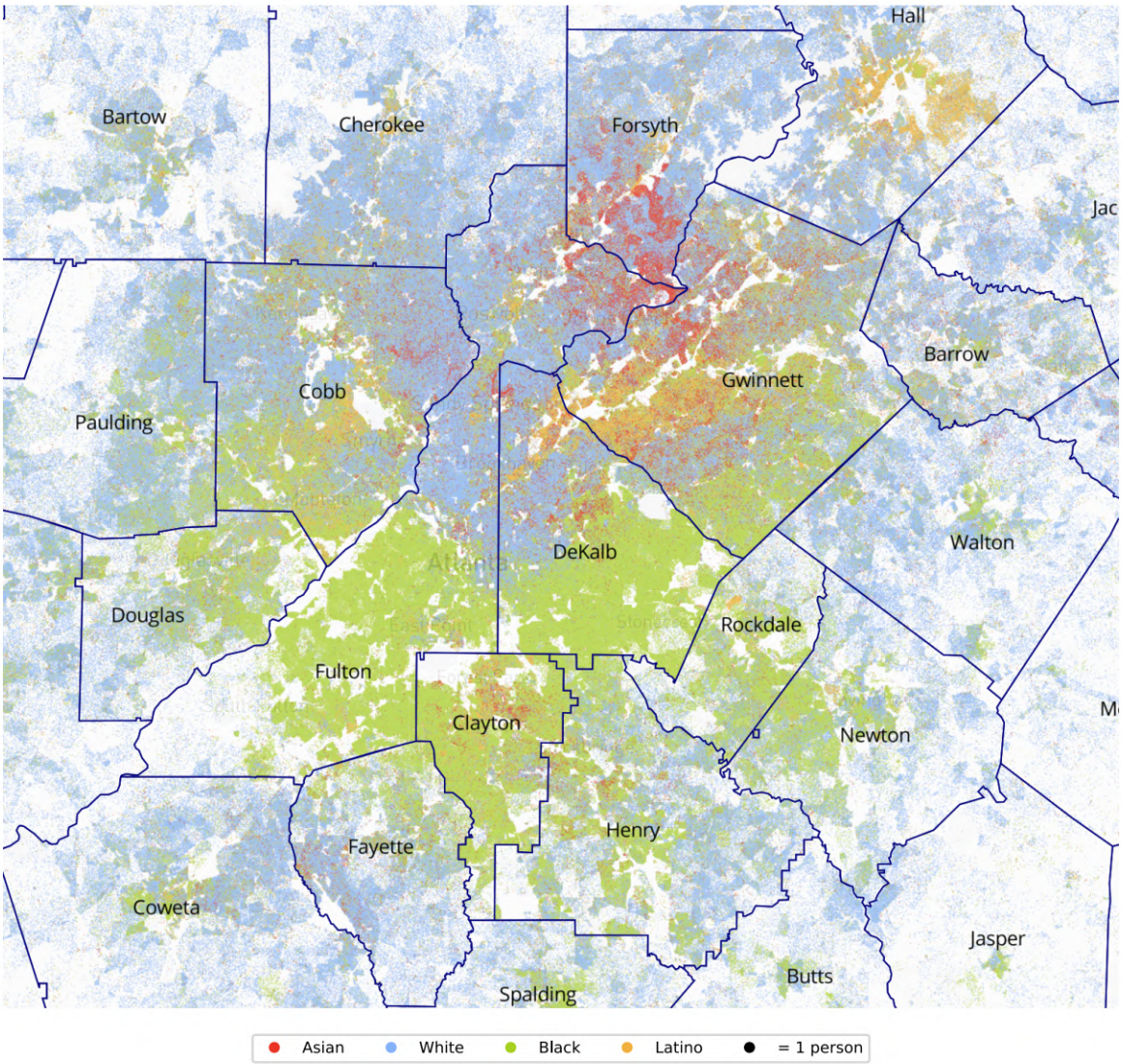


Figure 2: Racial dot density plot in the counties of the Atlanta metro area. Dense concentrations of Black population are visible in Cobb, Douglas, Fulton, Clayton, DeKalb, and southern Gwinnett Counties. Gwinnett is the heart of Georgia's Latino population, and following the I-85/I-985 corridor north connects to a substantial Latino community in Hall County.

4 Overview of enacted plans for Congress, Senate, and House

4.1 Congress

As discussed in the last section, the last decade has seen substantial growth in the Black and Latino population of Georgia and a reduction in White population. At the same time, and in a climate where the racial polarization between White Georgians and voters of color is essentially undisputed, Black and Latino candidates of choice are now routinely competitive in statewide elections, and now can frequently win outright. Despite this, the newly enacted Congressional plan makes major changes to the benchmark and does so in a way that reduces the number of performing districts for Black- and Latino-preferred candidates from 6 out of 14 (42.9%) to just 5 out of 14 (35.7%).

In 2018, Democratic candidate Lucy McBath won a surprise victory in CD 6, north of Atlanta, unseating Republican Karen Handel. She then defended her seat in 2020. My study of the Congressional plan enacted in Georgia in 2021 is completely consistent with the scenario that line-drawers targeted McBath's district, specifically by removing Black and Hispanic voters from CD 6 and replacing them with White suburban, exurban, and rural voters in Forsyth and Dawson counties. This displacement ripples across CD 11 and ends up submerging Black urban voters in rural CD 14. This is corroborated by the core retention numbers that show that CD 6 was singled out for major reconfiguration (see §10).

Correspondingly, the community of interest narratives supplied to the state in a series of public hearings and communications show that coherent and salient local identities were disregarded in the process: rural, mountainous, and industrial interests in the Northwest counties; metro Atlanta's urban counties with large Black populations and clear shared needs for infrastructure, transit, and housing; and largely suburban Forsyth and Dawson. (See §10.3.)

Strikingly, all fourteen new districts had wider than a ten-point margin between Biden and Trump in the 2020 Presidential voting—there are zero remotely competitive districts. In particular, the completely reconfigured CD 6 is now far out of reach for a Black-preferred candidate; Biden had just 42.5% of the major-party vote against Trump in the district. This lean held up in actual Congressional voting under the new lines in 2022, where the closest of the fourteen outcomes was Sanford Bishop's margin of 9.95 percentage points over opponent Chris West in CD 2; every other race was a blowout. The overall effect of the Congressional redistricting in Georgia is the instrumentalization of Black and Latino voters to achieve a profoundly uncompetitive plan in which the line-drawers have gone a long way to locking in the outcomes.

In this section I will show images, and in the following section I will present statistics, for the enacted Congressional plan compared to the benchmark plan from ten years prior. I will also consider a map I have labeled **Duncan-Kennedy**, a draft congressional map released to the public by Lt. Governor Geoff Duncan and Chairman John F. Kennedy on September 27, 2021.

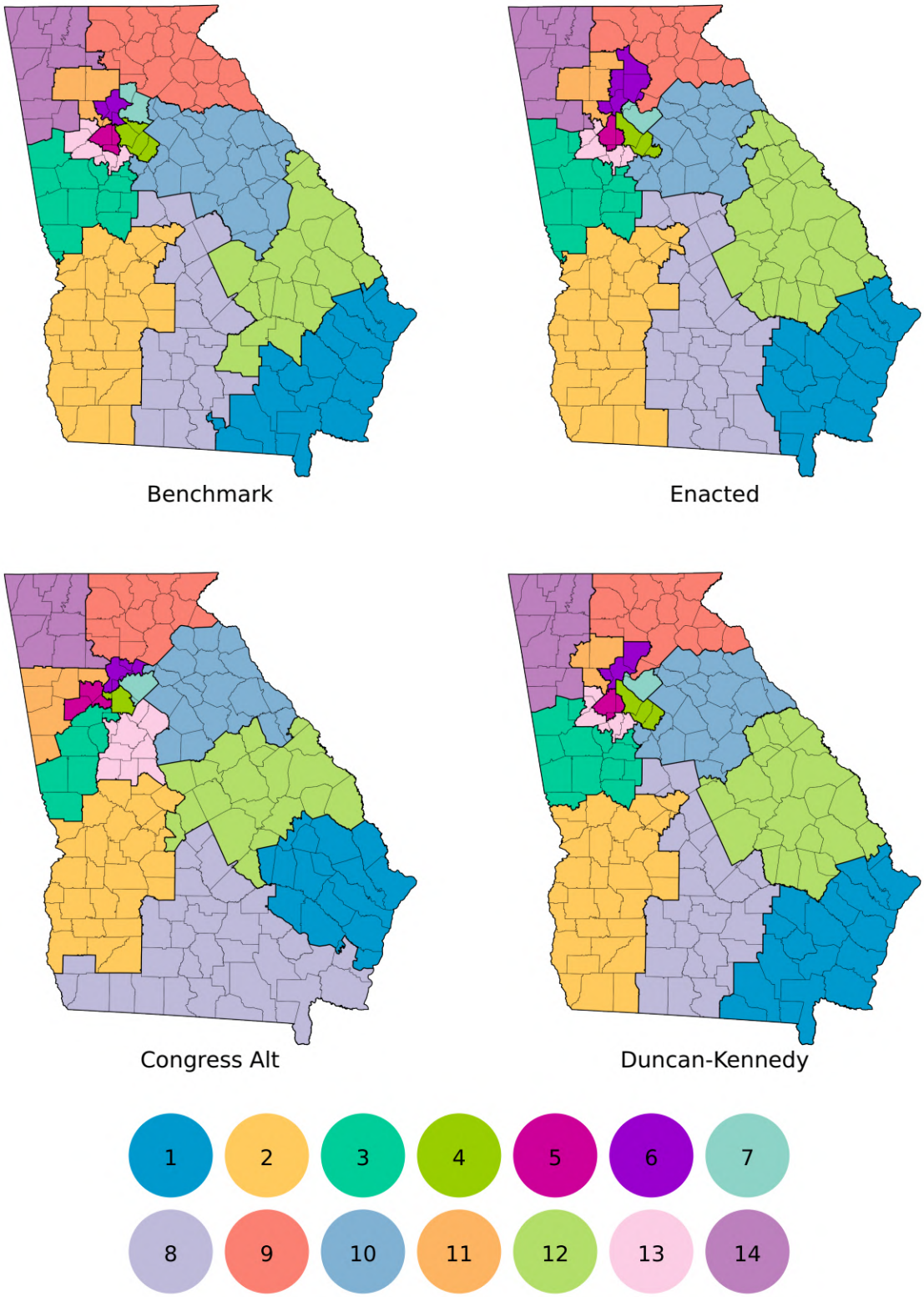


Figure 3: Congressional plans.

4.2 State Senate

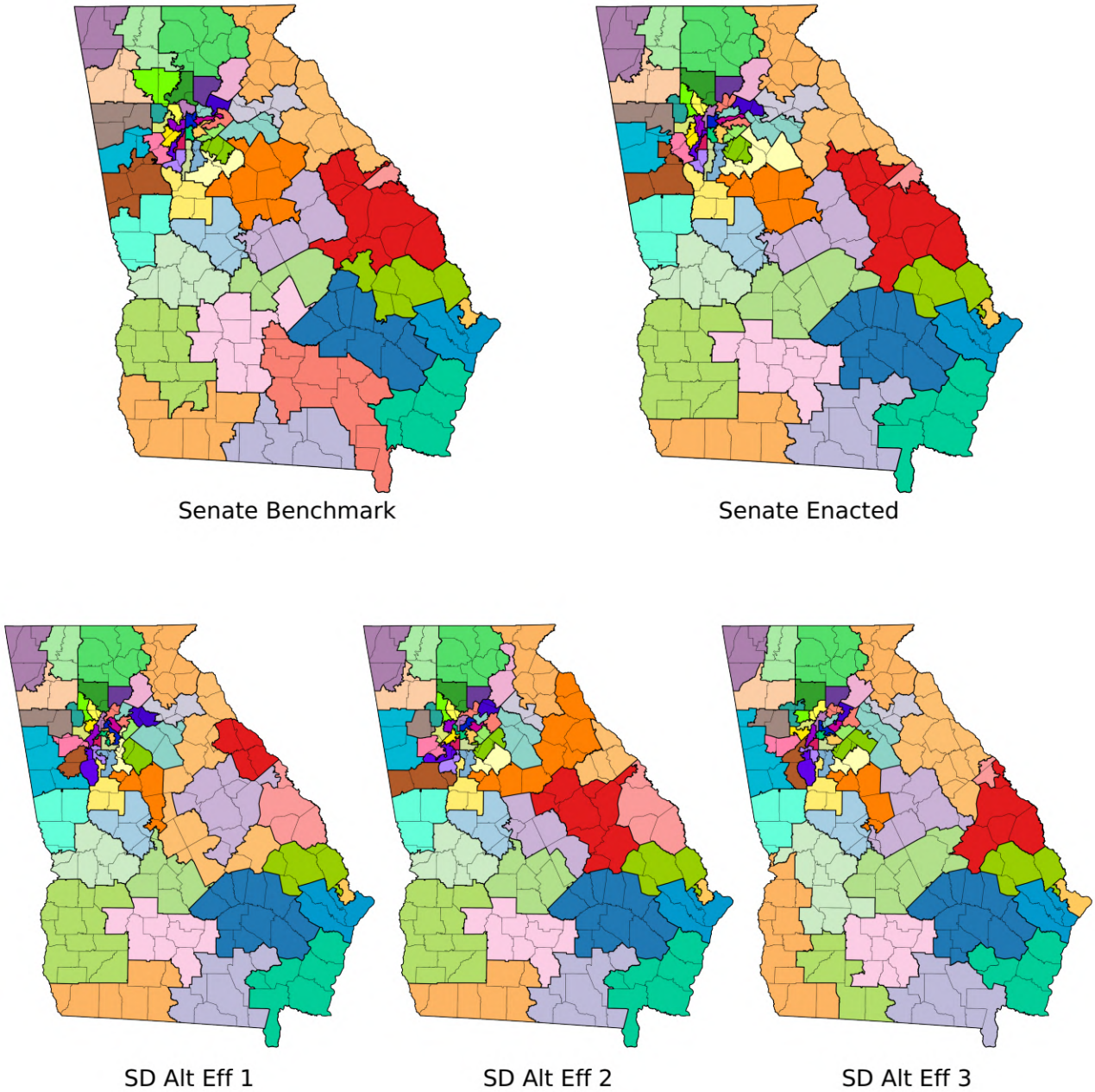


Figure 4: State Senate plans.

The state Senate plan enacted in Georgia is also remarkable in its lack of competitiveness. Despite Georgia's clear status as a new swing state, only one of the districts (SD 48) would have been within a ten-percentage-point margin (i.e., 55-45 or closer) in the Biden-Trump presidential contest of 2020. And indeed, only two of 56 districts (SD 7 and 14) were within a ten-point margin in the actual legislative voting of 2022. (Note that Georgia state Senators stand for election every two years, as for U.S. House and Georgia's state House.) More than half of the districts—30 out of 56—were uncontested.

Below, I will propose alternative districts with a *modular* approach, starting by dividing the 56 districts in the enacted plan into six district clusters, shown in Figure 5. In three of the six—Atlanta, Gwinnett, and East Black Belt—I will present alternative "Gingles 1" plans that increase the number of majority-Black and/or the number of majority-coalition districts, while ensuring that new districts are effective at securing electoral opportunity for Black and Latino voters. I will supplement the Gingles plans with regional maps showing improved effectiveness in additional clusters to create plans that span many regions of the state to form SD Alt Eff 1 and SD Alt Eff 2. Finally, I will offer an all-clusters alternative keyed to increased effectiveness alone, called SD Alt Eff 3. (See Table 10.) This is accomplished while maintaining scores for traditional districting principles that are comparable or superior to those of the enacted plan, and while giving great deference to the enacted plan by reconfiguring its own districts in clusters rather than starting from a blank map.

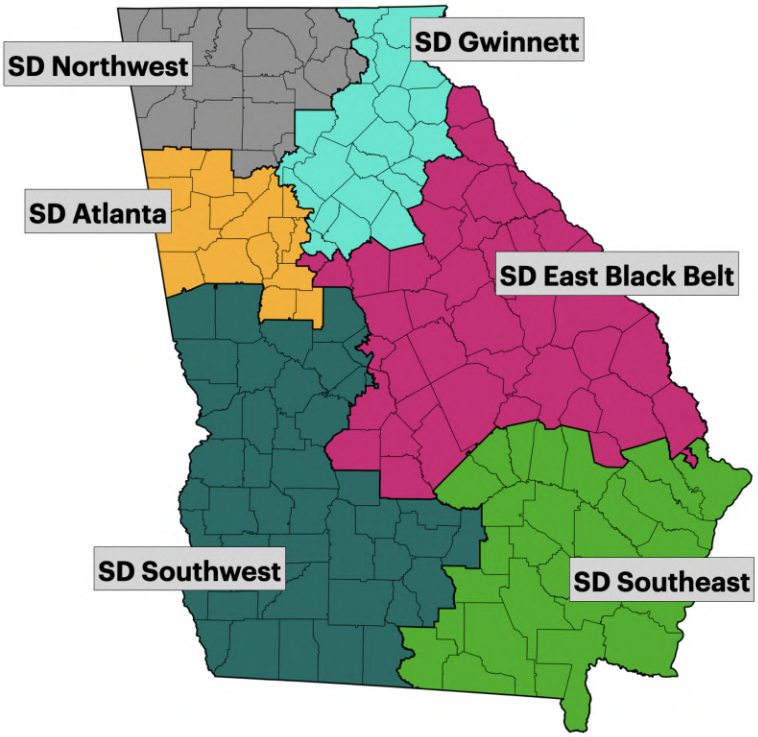


Figure 5: Six "modular" Senate clusters made up of groups of enacted districts. Below, Gingles demonstrative plans will be offered in selected clusters and effectiveness-oriented demonstrative plans will be presented in all six.

Senate Clusters

- SD Atlanta (14 districts): 6, 10, 16, 28, 30, 31, 33, 34, 35, 36, 38, 39, 42, 44
- SD Gwinnett (16 districts): 5, 7, 9, 14, 17, 27, 40, 41, 43, 45, 46, 47, 48, 49, 50, 55
- SD Southwest (6 districts): 11, 12, 13, 15, 18, 29
- SD East Black Belt (7 districts): 4, 20, 22, 23, 24, 25, 26
- SD Southeast (5 districts): 1, 2, 3, 8, 19
- SD Northwest (8 districts): 21, 32, 37, 51, 52, 53, 54, 56

4.3 State House

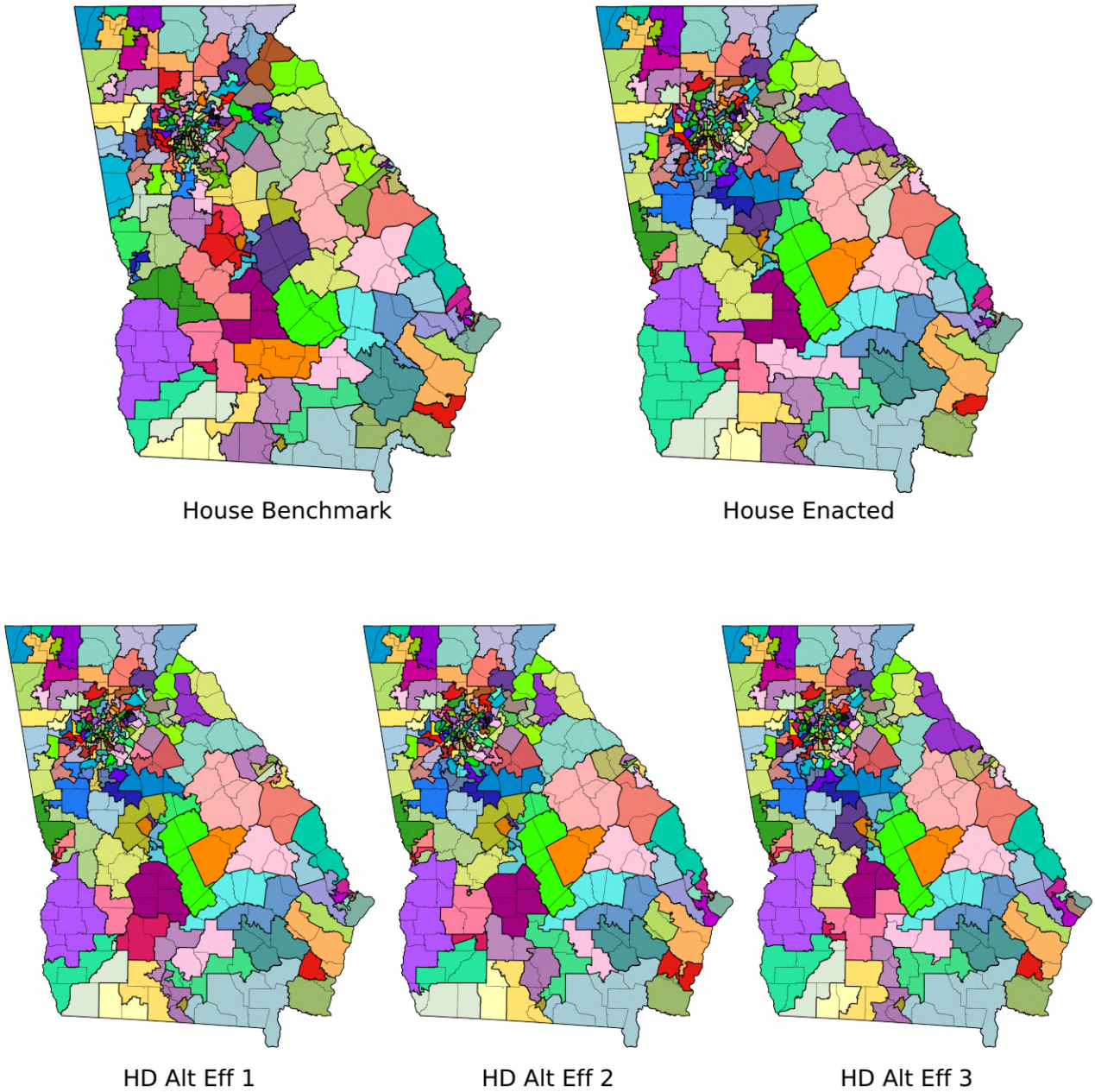


Figure 6: State House plans.

The state House plan repeats the uncompetitive design found in the other levels of redistricting; only fifteen of the 180 districts were within a ten-point margin for Biden-Trump, and only nine (HD 48, 50, 53, 99, 101, 105, 108, 117, and 151) had 2022 legislative outcomes in that range.Like in the Senate, more than half of the House districts—93 out of 180—were uncontested in 2022.

I have extended the modular approach from state Senate to the House, using seven regions formed by clusters of enacted districts, as in Figure 7. Each can be reconfigured to create

additional majority-coalition districts, and I offer up to two demonstration maps per cluster (Alt 1 and Alt 2) as Gingles 1 demonstratives in §7. As overviewed in Table 10, the alternative plans can be completed to highly effective alternatives statewide, which I call HD Alt Eff 1 and HD Alt Eff 2; a third all-clusters effective alternative is also offered, called HD Alt Eff 3.

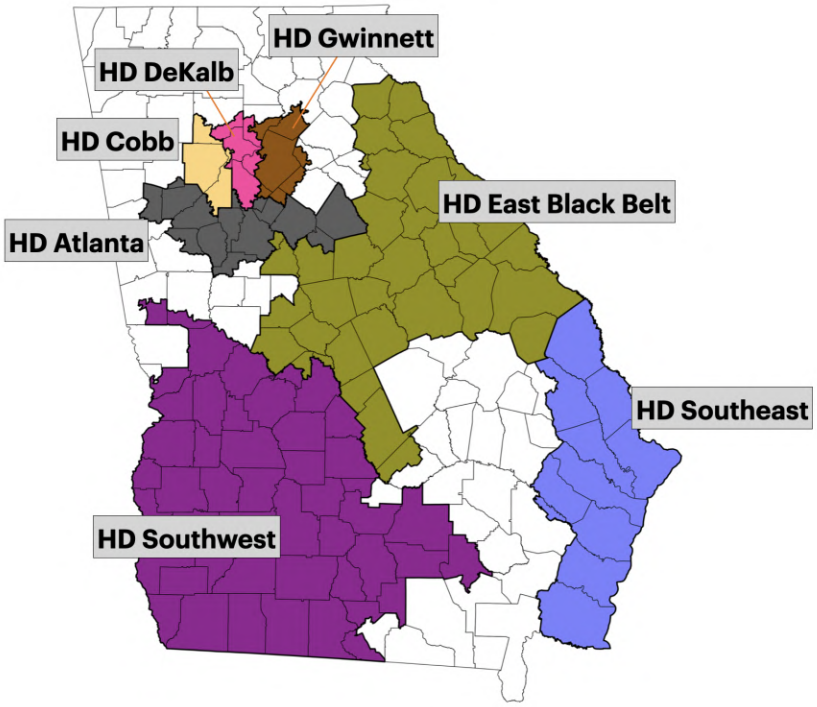


Figure 7: Seven "modular" House clusters made up of groups of enacted districts.

House Clusters

- HD Atlanta (25 districts): 61, 64, 65, 66, 67, 68, 69, 71, 73, 74, 75, 76, 77, 78, 79, 90, 91, 92, 93, 112, 113, 114, 115, 116, 117
- HD Cobb (25 districts): 20, 22, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 53, 54, 55, 56, 57, 58, 59, 60, 62, 63
- HD DeKalb (22 districts): 21, 24, 25, 47, 48, 49, 50, 51, 52, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 96, 97, 98
- HD Gwinnett (18 districts): 26, 29, 30, 94, 95, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111
- HD Southwest (18 districts): 137, 140, 141, 146, 147, 148, 150, 151, 152, 153, 154, 169, 170, 171, 172, 173, 175, 176
- HD East Black Belt (18 districts): 33, 118, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 142, 143, 144, 145, 149
- HD Southeast (12 districts): 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 179, 180

Together, these cover 138 of the 180 districts in the Georgia House. All of my demonstrative plans will leave the other 42 House districts unchanged.

5 Assessing effective opportunity-to-elect districts

The Gingles demonstration maps shown below in Section 7 are presented to satisfy the Gingles 1 condition for use with a Voting Rights Act challenge. In part, they are designed to show that it is (readily) possible to draw additional districts with a majority of Black and Latino adults in many parts of the state of Georgia, and for each of the three levels of districting plan, even while giving great deference to the Legislative enacted plan by only replacing its districts in modular clusters.[5]

In addition to demographic composition, I have offered alternative districts that showcase *effective electoral opportunity*. This shows that the harms to voters can be remedied by better design and, in the context of racial gerrymandering, demonstrates that better performance on traditional districting principles is completely compatible with greater electoral opportunity for Black and Latino voters.

There are many reasons that we should not rely on the 50%+1 line as a predictor of electoral opportunity. Some have argued that the Gingles/Bartlett 50%+1 requirement requires an element of race-consciousness that is in tension with other aspects of best practices in map-making. Additionally, a demographic share alone does not take into account voting eligibility, registration levels, and turnout. It has long been well understood that a majority-minority district is neither necessary nor sufficient to secure electoral opportunity.

Therefore it is critical to use electoral history to gauge whether a district affords a reasonable opportunity for a group to elect a candidate of its choice. I will describe an effectiveness analysis here and will provide demonstration maps emphasizing increased electoral opportunity for Black and Latino voters, without any racial threshold in play, in §9.

5.1 Identifying probative elections

In the voting rights sphere, it is well understood that certain past elections are more probative—that is, provide better and clearer evidence of polarization patterns and preferences—than others. The peer-reviewed literature is certainly clear that some factors flagging probative contests include the following: all other things being equal, elections are more suitable for an effectiveness analysis when they are more recent, when they have a viable POC candidate on the ballot, and when we can make confident statistical inferences about each group's preference. They are less suitable when they are blowouts or, of course, uncontested.

To this end, I have designated the following eight general elections and four Democratic primary elections (Tables 3) to be especially probative for analyzing effective electoral opportunity for Black and Latino voters in Georgia. All are recent statewide elections (held since 2018), most have a Black candidate on the ballot, and most are quite close on a statewide basis.[6]

[5] It is my understanding that the VRA, as clarified in *Bartlett v. Strickland*, requires a demonstration of additional districts that are have at least 50%+1 minority population. The usual standard uses VAP, or voting age population, when Black voters are the main minority group in a challenge; sometimes, CVAP, or citizen voting age population, is used when the principal group of plaintiffs has a large share of immigrants, as for Latino or Asian plaintiffs. In this case, the claims are for a coalition of Black and Latino voters, and I have used both VAP and CVAP, as explained in §3.2.

[6] Even Robinson's primary election, which was won with nearly 63% of the statewide vote, shows substantial district-level variation. By contrast, in the Democratic primary for Governor in 2018, Abrams won with 76.4% and with little regional variation, making it a less informative contest, which explains why it is not included.

Year	Contest	R Candidate	D Candidate	D share
2016	President	Trump-Pence	Clinton-Kaine	.4734
2018	Governor	Brian Kemp	Stacey Abrams (B)	.4930
2018	Super. Pub. Instruc.	Richard Woods	Otha Thornton (B)	.4697
2020	President	Trump-Pence	Biden-Harris (B)	.5013
2020	Public Serv. Commiss.	Lauren McDonald	Daniel Blackman (B)	.4848
2021	Senate Runoff	David Perdue	Jon Ossoff	.5061
2021	Senate Runoff Special	Kelly Loeffler	Raphael Warnock (B)	.5104
2022	Governor	Brian Kemp	Stacey Abrams (B)	.4620

Year	Contest	BH-Preferred Candidate	D share (outcome)
2018	Lt. Governor	Triana Arnold James (B)	.4475 (L)
2018	Super. Primary	Otha Thornton (B)	.4387 (1st of 3)
2018	Super. Runoff	Otha Thornton (B)	.5914 (W)
2018	Insurance Commiss.	Janice Laws Robinson (B)	.6286 (W)

Table 3: Eight general elections and four primaries and primary runoffs are chosen for the score of effectiveness.

5.2 Constructing and evaluating a score of electoral alignment

Using the four primary and eight general elections listed here, I will deem a district to be *effective* if it is electorally aligned with the preferences of Black and Latino voters in at least three out of four primaries and at least five out of eight general elections. This standard ascertains that minority-preferred candidates can be both nominated and elected from the district, and it distinguishes minority preferences from (related, but distinct) Democratic party preferences. This same core idea of measuring district effectiveness—keyed to electoral history, not to demographics of the district—appears frequently in the peer-reviewed literature, for instance in [1].

The enacted plans starkly limit the number of districts that earn the label of effective. Tables 4-6 show that five out of 14 Congressional districts are likely to give Black and Latino voters an effective opportunity to elect candidates of choice.

Similarly, the enacted plans have 19 expected effective districts out of 56 in the Senate, and 68/180 in the House. (For detailed supporting tables, see Appendix B.)

Since elections were conducted under these new districts in 2022, we can review some basic evidence about the success of the classification of "effective" opportunity districts. I have not conducted a racially polarized voting analysis, but we can nonetheless use information about whether each district elected candidates of color as a rough proxy for the preferences of voters of color. Since White and/or Republican candidates can certainly be preferred by voters of color, this is imperfect, but it is at least an indication that can help us assess the labeling mechanism.[7] Here is what we find for the enacted plans:

- 5/5 Congressional districts marked effective elected POC Democrats (100%);
- 0/9 Congressional districts marked ineffective elected POC Democrats (0%);
- 18/19 Senate districts marked effective elected POC Democrats (94.7%);
- 1/37 Senate districts marked ineffective elected POC Democrats (2.7%);
- 58/68 House districts marked effective elected POC Democrats (85.3%);
- 4/112 House districts marked ineffective elected POC Democrats (3.6%).

CD	Primaries out of 4	Generals out of 8	Effective?
1	3	0	N
2	4	8	Y
3	3	0	N
4	3	8	Y
5	3	8	Y
6	0	0	N
7	3	8	Y
8	3	0	N
9	2	0	N
10	3	0	N
11	3	0	N
12	3	0	N
13	4	8	Y
14	3	0	N

Table 4: By the standard of requiring that the candidate of choice should win at least three out of four primaries and at least five out of eight generals, the enacted plan has five districts that present an effective opportunity: CD 2, 4, 5, 7, and 13.

CD overall	James18P 0.4475	Thornton18P 0.4387	Thornton18R 0.5914	Robinson18P 0.6286
1	0.4992	0.4997	0.7150	0.6967
2	0.5515	0.4720	0.6379	0.7430
3	0.4177	0.4185	0.5388	0.6178
4	0.4566	0.4444	0.5622	0.6034
5	0.3747	0.4082	0.5611	0.5184
6	0.2815	0.3458	0.4720	0.4789
7	0.4489	0.4515	0.5968	0.6082
8	0.4861	0.4403	0.6273	0.6940
9	0.3411	0.3811	0.5444	0.5560
10	0.4112	0.4294	0.6444	0.5898
11	0.3603	0.4200	0.5276	0.5549
12	0.4928	0.4196	0.6462	0.7626
13	0.5594	0.5089	0.6524	0.7190
14	0.4190	0.3863	0.5049	0.6123

Table 5: Vote shares for the candidate of choice in probative primary and runoff elections. (Note that the Superintendent primary from 2018 (Thornton18P) is a race with three candidates, so a win is recorded if Thornton has the most votes, even if that does not exceed 50% of cast votes.)

[7] Indeed, Nan Orrock of SD 36, the only White Democrat in the Senate to be elected from a district marked effective, is an Associate Member of the Georgia Black Legislative Caucus, suggesting with high likelihood that she is the Black candidate of choice.

CD	**Clinton16**	**Abrams18**	**Thornton18**	**Biden20**	**Blackman20**	**Ossoff21**	**Warnock21**	**Abrams22**
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
1	0.4149	0.4245	0.4105	0.4322	0.4193	0.4379	0.4386	0.3950
2	0.5463	0.5508	0.5354	0.5524	0.5445	0.5611	0.5624	0.5188
3	0.3168	0.3287	0.3119	0.3476	0.3312	0.3524	0.3564	0.3130
4	0.7692	0.7886	0.7567	0.7917	0.7789	0.7927	0.7982	0.7707
5	0.8352	0.8418	0.7910	0.8366	0.8080	0.8203	0.8287	0.8072
6	0.3603	0.3878	0.3498	0.4250	0.3851	0.4068	0.4151	0.3602
7	0.5727	0.6113	0.5788	0.6307	0.6136	0.6366	0.6421	0.5874
8	0.3430	0.3427	0.3280	0.3604	0.3473	0.3648	0.3664	0.3185
9	0.2650	0.2822	0.2668	0.3081	0.2897	0.3084	0.3129	0.2554
10	0.3510	0.3654	0.3518	0.3814	0.3650	0.3864	0.3903	0.3480
11	0.3708	0.4014	0.3741	0.4223	0.3972	0.4163	0.4233	0.3696
12	0.4324	0.4319	0.4174	0.4487	0.4331	0.4511	0.4526	0.4023
13	0.7790	0.8112	0.7916	0.8048	0.8068	0.8230	0.8261	0.8056
14	0.2767	0.2961	0.2873	0.3105	0.3015	0.3217	0.3234	0.2778

Table 6: Vote shares for the candidate of choice in probative general/runoff elections.

In addition, this method works quite well to distinguish race from party: if we flag districts with 0/4 primary wins and at least 5/8 general wins, these might reasonably be considered likely to elect White-preferred Democrats. There are no such districts in the enacted Congressional map, but the Senate map has three (which elected three White Democrats and one Asian Democrat in November 2022) and the House map has eight (which elected seven White Democrats and one Asian Democrat).

6 Metrics for enacted plans

Georgia has 14 Congressional districts, 56 state Senate districts, and 180 state House districts, making the task of redistricting into an extremely complicated balancing act. The list of substantive criteria for assessing districting plans that was published by each chamber of the Legislature reads as follows, in full:

```
A. GENERAL PRINCIPLES FOR DRAFTING PLANS
1. Each congressional district should be drawn with a total population of plus
   or minus one person from the ideal district size.
2. Each legislative district of the General Assembly should be drawn to
   achieve a total population that is substantially equal as practicable,
   considering the principles listed below.
3. All plans adopted by the Committee will comply with Section 2 of the
   Voting Rights Act of 1965, as amended.
4. All plans adopted by the Committee will comply with the United States
   and Georgia Constitutions.
5. Districts shall be composed of contiguous geography. Districts that
   connect on a single point are not contiguous.
6. No multi-member districts shall be drawn on any legislative redistricting plan.
7. The Committee should consider:
   a.  The boundaries of counties and precincts;
   b.  Compactness; and
   c.  Communities of interest.
8. Efforts should be made to avoid the unnecessary pairing of incumbents.
9. The identifying of these criteria is not intended to limit the consideration
   of any other principles or factors that the Committee deems appropriate.
```

This is unusually terse for a redistricting framework at the state level, declining to specify more detail, for example, about the operative principles of racial fairness, the definition of communities of interest, or even whether to encourage the use of quantitative metrics of compactness.

All of the plans under consideration are contiguous, and I will systematically discuss the other principles below.

6.1 Population balance

All plans are tightly balanced in population terms, using the Census redistricting data.

	Maximum positive deviation	Maximum negative deviation	Top-to-bottom deviation
EnactedCD	+1	−1	2
DuncanKennedy	+2	−1	3
CD Alt	+1	−1	2
EnactedSD	+1879	−1964	3843 (2.01%)
SD Alt Eff 1	+2457	−2598	5055 (2.64%)
SD Alt Eff 2	+2547	−2490	5037 (2.63%)
SD Alt Eff 3	+3200	−3305	6505 (3.40%)
EnactedHD	+797	−833	1630 (2.74%)
HD Alt Eff 1	+1194	−1176	2370 (3.98%)
HD Alt Eff 2	+1222	−1097	2319 (3.90%)
HD Alt Eff 3	+1173	−1026	2199 (3.70%)

Table 7: Population deviation in each plan.

6.2 Compactness

In redistricting, the notion of *compactness* is connected to the shapes of the districts, where simple boundaries and regular shapes are traditionally thought to indicate a "natural" division of population, while eccentric boundaries and contorted shapes can signal that some other agenda has predominated.

The two most common compactness metrics are the Polsby-Popper score and the Reock score. These are both *contour-based* scores that rely on the outline of the district on a map. *Polsby-Popper* is a ratio formed by comparing the district's area to its perimeter via the formula $4\pi A/P^2$. *Reock* considers how much of the smallest bounding circle is filled out by the district's area. Recently, mathematicians (such as myself) have argued for the use of discrete compactness metrics that de-emphasize the outline and instead consider how the districts are formed from units of census geography. The simplest discrete metric is called *(block) cut edges*, found by counting the number of pairs of census blocks that are adjacent to each other in the state, but are assigned to different districts. This assesses the "scissors complexity" of a plan, giving a measure of how many blocks would have to be separated from one another to divide up all the districts.

An advantage of the contour scores is that they are familiar and in wide use. An advantage of discrete scores is that they do not excessively penalize districts for having winding boundaries when those boundaries come from physical geography, like coastlines or rivers.

	avg Polsby-Popper (higher is better)	**avg Reock** (higher is better)	**Block cut edges** (lower is better)
BenchmarkCD	0.238	0.452	5775
EnactedCD	0.267	0.441	5075
DuncanKennedy	0.295	0.471	4665
CD Alt	0.287	0.452	4729
BenchmarkSD	0.250	0.421	12,549
EnactedSD	0.287	0.418	11,005
SD Alt Eff 1	0.287	0.427	10,897
SD Alt Eff 2	0.296	0.440	10,349
SD Alt Eff 3	0.295	0.431	10,479
BenchmarkHD	0.244	0.382	24,001
EnactedHD	0.278	0.391	22,014
HD Alt Eff 1	0.275	0.399	21,360
HD Alt Eff 2	0.281	0.406	21,301
HD Alt Eff 3	0.279	0.403	20,917

Table 8: Compactness scores for each plan.

Note that compactness scores should only be used to make relative assessments, comparing plans to others in the same state and at the same level of redistricting.

6.3 Respect for political boundaries

The most populous Georgia counties by 2020 population are Fulton County (pop. 1,066,710), Gwinnett County (pop. 957,062), Cobb County (pop. 766,149), and DeKalb County (pop. 764,382). Both Cobb and DeKalb are within 0.1% of ideal Congressional district size of 765,136, with Cobb slightly larger and DeKalb slightly smaller.[8]

Since there are four times as many Senate as Congressional districts, this also means that Cobb (4.005) and DeKalb (3.996) are ideally suited in population terms to make up four Senate districts; in addition, Gwinnett (5.003) is very nearly five times ideal Senate population. Instead, Cobb touches six Senate districts, DeKalb touches seven, and Gwinnett is split among nine in the enacted Senate plan. This observation spotlights the fact that it is important to consider not only how many counties are split, but into how many pieces, as in Table 9. If a unit is split in two, that adds two to the "pieces" count; likewise, if it is split into three parts, this counts as three "pieces," and so on. Unsplit units do not count toward "pieces." (A forensic look at the nature of the county and precinct splits can be found below in §10.2.) In this table, the "muni" units are Census places with functional status A ("Active government providing primary general-purpose functions").[9] These primarily include cities and towns.

	County Splits (out of 159)	**County Pieces**	**Muni Splits** (out of 538)	**Muni Pieces**	**Precinct Splits** (out of 2685)	**Precinct Pieces**
BenchmarkCD	16	38	67	141	67	134
EnactedCD	15	36	64	136	86	172
DuncanKennedy	15	36	53	114	66	132
CD Alt	13	30	58	127	47	95
BenchmarkSD	37	100	114	269	154	309
EnactedSD	29	89	109	266	144	289
SD Alt Eff 1	33	95	112	275	110	221
SD Alt Eff 2	26	78	108	264	97	196
SD Alt Eff 3	29	84	108	264	106	213
BenchmarkHD	72	284	169	506	303	630
EnactedHD	69	278	166	494	352	724
HD Alt Eff 1	73	276	164	492	279	570
HD Alt Eff 2	69	266	168	494	276	567
HD Alt Eff 3	69	265	165	478	277	567

Table 9: Number of county, muni, and precinct splits and pieces in each plan.

[8] This means that only three Georgia counties are larger than the ideal population of a Congressional district. Twelve Georgia counties are larger than ideal Senate size, and thirty-nine Georgia counties, from Fulton down to Effingham (pop. 64,769) are larger than ideal House size.

[9] https://www.census.gov/library/reference/code-lists/functional-status-codes.html

6.4 Racial demographics

Though majority-minority districts are not demanded for compliance with the Voting Rights Act, they nonetheless play a significant role in VRA litigation, especially in the Gingles 1 threshold test. For that purpose, plaintiffs must show maps with additional districts that are at least 50%+1 person composed of members of the specified minority group. Typically, when Black residents are the largest minority group, the basis for measurement is BVAP, or voting age population, as tabulated in the Decennial Census data. For a coalition of Black and Latino voters, we additionally use a secondary basis of population, in this case BHCVAP.

Here, I review the plans discussed in this report and enumerate the number of districts that have a majority of voting age population that is Black by VAP, Black and Latino by VAP, or Black and Latino by CVAP. The final column enumerates the number of districts that, according to their recent electoral history in statewide contests, are likely to provide an effective opportunity for Black and Latino voters to nominate and elect candidates of their choosing. Racial and ethnic categories are described in Appendix A, and the concept of measuring district effectiveness is delineated in §5.

	majority BVAP	**majority BHVAP**	**majority BHCVAP**	**effective**
BenchmarkCD	4	4	4	5
EnactedCD	2	5	4	5
Duncan-Kennedy	3	5	4	5
CD Alt	4	6	6	6
BenchmarkSD	14	17	17	19
EnactedSD	14	17	17	19
SD Alt Eff 1	17	23	22	23
SD Alt Eff 2	15	21	21	23
SD Alt Eff 3	8	17	16	28
BenchmarkHD	46	57	57	62
EnactedHD	49	62	60	68
HD Alt Eff 1	50	77	74	77
HD Alt Eff 2	44	75	71	79
HD Alt Eff 3	37	62	54	83

Table 10: The first three columns report the number of majority-BVAP, majority-BHVAP, and majority-BHCVAP districts, in the plans under discussion in this report. Overall, the state is 31.7% Black by VAP, 40.18% Black and Latino by VAP, and 38.43% Black and Latino by CVAP. The final column reports the number of districts labeled as effective in terms of electoral opportunity for Black and Latino voters.

6.5 Incumbency and core retention

Next, we review the handling of incumbency and the more general issue of reassigning voters to new districts in the plans under consideration. Note that members of Congress do not have to establish residency in the district that they represent, while Georgia law does have a district residency requirement for members of the state legislature.[10] In this section, I am relying on address data for incumbents that was supplied by counsel and there is certainly a strong possibility that it is not fully up-to-date or accurate.

The enacted Congressional plan double-bunked two pairs of incumbents: Nikema Williams (D) and David Scott (D) in CD 5; Jody Hice (R) and Andrew Clyde (R) in CD 10. However, Hice did not run for Congress in 2022, shifting to an unsuccessful run for Secretary of State, and David Scott already lived in CD 5 in the benchmark plan.

The enacted Senate plan also double-bunked two pairs of incumbents: Tyler Harper (R) and Carden Summers (R) in SD 13; Chuck Hufstetler (R) and Bruce Thompson (R) in SD 52. But Harper ran a successful campaign for Agriculture Commissioner, leaving Summers to win SD 13, while Thompson ran a successful campaign for Labor Commissioner, leaving SD 52 for Hufstetler. This leaves no meaningful pairings in the Senate map.

The shifting of incumbents is also apparent in the state House map. The enacted House plan seemingly double-bunks seventeen pairs of incumbents: nine R/R pairs, six D/D pairs, and two R/D pairs.

However, the apparent HD 10 collision is suspect (likely due to an inaccurate address for Lauren "Bubba" McDonald) because McDonald was reelected in HD 26, which contains no incumbent address from our list. Several seeming collisions are not meaningful because one of the Representatives had already retired or resigned: this includes Micah Gravley (now located in HD 19), Wes Cantrell (HD 21), Tommy Benton (HD 31), Matt Dollar (HD 45), Susan Holmes (HD 118), and Dominic LaRiccia (HD 176). The HD 100 collision is real, and Bonnie Rich lost to David Clark in the Republican primary; the HD 149 collision also ended in a primary showdown.

Among Democratic collisions, we note that Matthew Wilson (placed in HD 52) made an unsuccessful primary run for Insurance Commissioner; William Boddie made an unsuccessful run for Labor Commissioner; and David Dreyer (HD 62) did not run. Mitchell and Hutchinson did face off in a primary in HD 106.

Among the R/D collisions, Mickey Stephens (HD 74) died in office; Timothy Barr (HD 101) ran an unsuccessful primary for CD 10; and Winifred Dukes (HD 154) ran an unsuccessful primary for Agriculture Commissioner.

In all, this means that of 17 apparent collisions of incumbents, only three ended in a contest between incumbents. By far most of the others seem to be explained by retirement, resignation, or a run for another office.[11]

While incumbent pairings were therefore avoided, this is not to say that the new House plan was very favorable to incumbents in other ways. As I will discuss throughout this report, the state's line-drawers clearly placed a low priority on *core retention*, i.e., on maintaining voters in the same districts as they belonged to in the benchmark plan. The enacted plans for Congress and for state Senate each reassign more then two million residents to new districts relative to the prior assignment of their census block. But the House plan is on another level, with 6,135,234 people—roughly three out of every five Georgia residents—voting in a different district than before. This unusually high displacement is certainly permissible under the law, but it reveals that the legislature was willing to accept major changes to the map in pursuit of other goals. Below, in §10.1, I will present a closer look at which districts were particularly targeted for wholesale reconfiguration.

[10] See law.georgia.gov/opinions/2001-3-0.

[11] With the caveat that these numbers may not be highly meaningful without considering who planned to run again, and that they may not be wholly accurate, here are the numbers of districts with more than one incumbent address for the alternative plans. Benchmark CD - 1, SD - 0, HD - 5; Duncan-Kennedy - 3; CD Alt - 3; SD Alt Eff 1 - 11; SD Alt Eff 2 - 8; SD Alt Eff 3- 9; HD Alt Eff 1 - 35; HD Alt Eff 2 - 31; HD Alt Eff 3 - 31.

7 Gingles demonstration plans

7.1 Congressional alternatives

The state's enacted Congressional plan has two majority-BVAP districts (CD 4 and CD 13). Moving to the Black and Latino coalition, three more districts (CD 2, CD 5, and CD 7, by a hair) join these in being majority-BHVAP. However, if we switch the basis of population to CVAP rather than VAP, the number of coalition districts in the state's enacted plan drops to 4, losing CD 7.

Here, I have provided an alternative plan with 4/6/6 majority districts (by BVAP, BHVAP, and BHCVAP, respectively). That is, the six coalition-majority districts (CD 2, 3, 4, 5, 7, and 13) are still BH-majority on the basis of CVAP, making this a gain of two districts over the state. The newcomer to the list is CD 3, which runs along Georgia's western border, connecting the metro Atlanta area to Sanford Bishop's district in the southwest. By the notion of electoral effectiveness outlined in §5 below, all six of these districts offer an effective opportunity for Black and Latino voters to elect candidates of choice (Table 50).

	CD Enacted (Statewide)						**CD Alt 1**					
CD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
1	28.2%	6.8%	35.0%	60.4%	0.285	0.456	30.3%	6.9%	37.2%	58.5%	0.312	0.633
2	49.3%	5.1%	54.4%	42.7%	0.267	0.458	47.7%	4.7%	52.4%	44.5%	0.315	0.494
3	23.3%	5.3%	28.6%	66.8%	0.275	0.461	51.2%	7.2%	58.4%	37.4%	0.278	0.411
4	54.5%	10.1%	64.6%	28.3%	0.246	0.307	50.6%	8.2%	58.8%	33.8%	0.295	0.481
5	49.6%	6.7%	56.3%	37.9%	0.322	0.512	50.1%	11.4%	61.5%	33.4%	0.216	0.424
6	9.9%	9.1%	19.0%	66.6%	0.198	0.424	13.7%	10.9%	24.6%	57.1%	0.232	0.346
7	29.8%	21.3%	51.1%	32.8%	0.386	0.496	34.3%	22.4%	56.7%	29.4%	0.351	0.518
8	30.0%	6.1%	36.1%	60.5%	0.210	0.338	27.3%	6.9%	34.2%	63.0%	0.227	0.377
9	10.4%	12.9%	23.3%	68.3%	0.253	0.380	4.6%	11.5%	16.1%	77.9%	0.403	0.512
10	22.6%	6.5%	29.1%	66.2%	0.284	0.558	17.6%	6.9%	24.5%	69.8%	0.335	0.576
11	17.9%	11.2%	29.1%	64.0%	0.207	0.480	17.6%	7.6%	25.2%	68.1%	0.283	0.364
12	36.7%	4.9%	41.6%	54.6%	0.278	0.502	39.2%	4.6%	43.8%	51.9%	0.181	0.489
13	66.7%	10.5%	77.2%	18.8%	0.157	0.380	52.0%	6.8%	58.8%	37.8%	0.276	0.510
14	14.3%	10.6%	24.9%	71.3%	0.373	0.426	7.6%	11.0%	18.6%	77.0%	0.514	0.484
Avg					0.267	0.441					0.301	0.473

Table 11: VAP statistics and compactness comparison by district for the enacted Congressional plan and an alternative plan. The alternative plan has more majority-minority districts; it is also more compact by all three scores of compactness, including both contour-based scores in the table as well as 4665 rather than 5075 cut edges. The alternative also splits only 13 counties while the enacted plan splits 15. CVAP comparison is shown below in Table 24.

7.2 State Senate alternatives

Overall, the enacted state Senate plan creates majority BVAP/BHVAP/BHCVAP majority districts in the numbers 14/17/17 out of 56. By mixing and matching the options I have provided, my modular alternatives can replace that with a new Senate plan with and additional 1-6 majority districts.

The increase is accomplished while maintaining other traditional principles—like compactness and splitting scores—that are generally comparable to or better than those of the state's enacted plan.

Below, I will review the Gingles demonstration alternatives one cluster at a time, showing the enacted plan and alternatives (which sometimes include both an Alt 1 and an Alt 2) for each cluster. The purpose of showing multiple alternatives is to illustrate the kinds of tradeoffs present in all redistricting problems, and to give a sense of the enormous range of possible directions for satisfying the Gingles 1 threshold test.

7.2.1 SD Atlanta

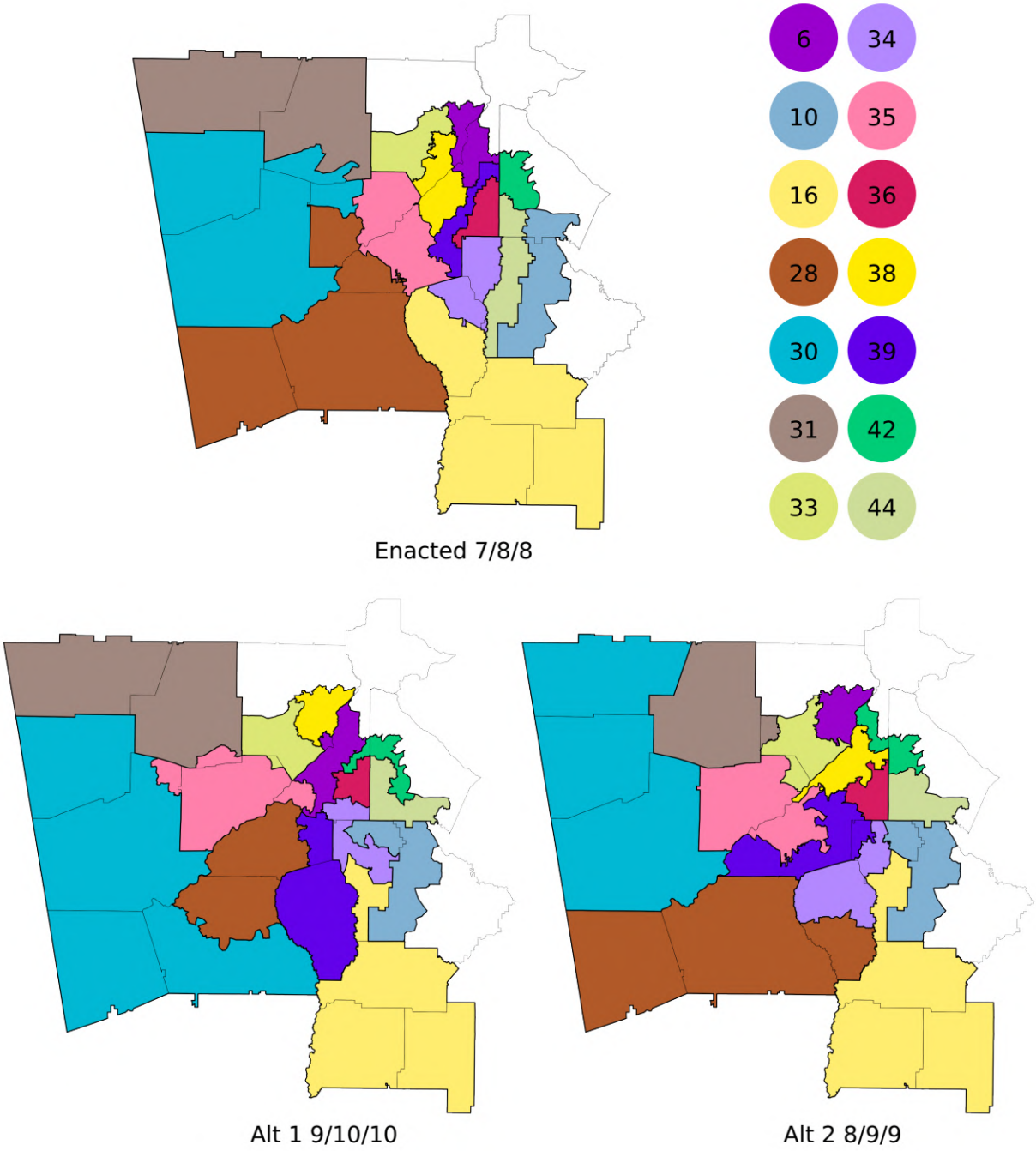


Figure 8: SD Atlanta (14 districts).

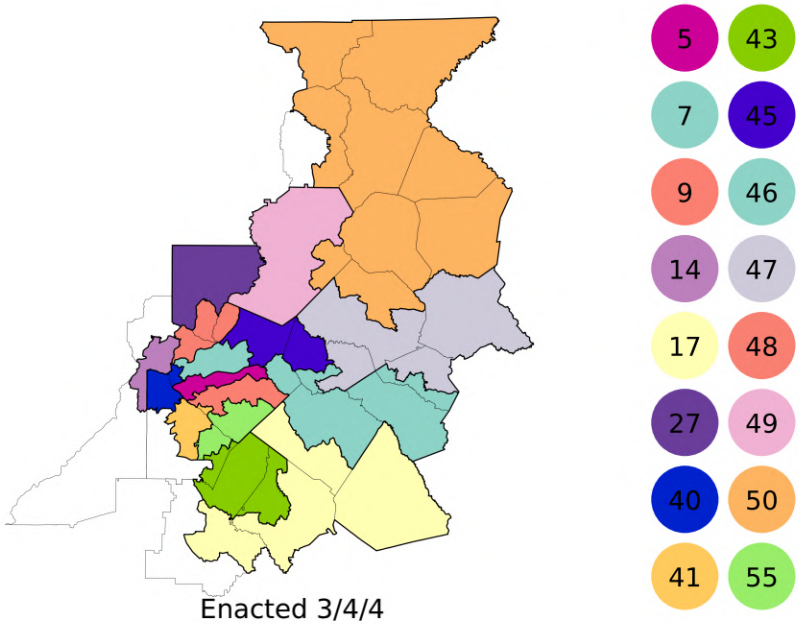
	SD Atlanta Enacted						**SD Alt 1**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
6	23.9%	8.2%	32.1%	57.8%	0.236	0.405	50.1%	6.1%	56.2%	39.8%	0.169	0.246
10	71.5%	5.2%	76.7%	19.6%	0.231	0.281	59.5%	11.0%	70.5%	23.4%	0.238	0.420
16	22.7%	5.0%	27.7%	66.9%	0.314	0.368	50.2%	6.2%	56.4%	40.9%	0.254	0.354
28	19.5%	6.4%	25.9%	69.4%	0.246	0.445	50.6%	6.8%	57.4%	39.3%	0.335	0.489
30	20.9%	6.1%	27.0%	69.4%	0.407	0.597	14.3%	5.1%	19.4%	76.9%	0.286	0.361
31	20.7%	7.4%	28.1%	68.3%	0.379	0.366	19.7%	7.2%	26.9%	69.4%	0.470	0.395
33	43.0%	22.9%	65.9%	30.2%	0.215	0.401	50.4%	18.1%	68.5%	27.9%	0.381	0.528
34	69.5%	12.7%	82.2%	13.4%	0.335	0.451	72.2%	11.6%	83.8%	11.5%	0.163	0.326
35	71.9%	7.5%	79.4%	18.8%	0.263	0.472	50.9%	8.0%	58.9%	38.2%	0.347	0.400
36	51.3%	7.1%	58.4%	36.2%	0.305	0.321	50.0%	5.7%	55.7%	38.8%	0.339	0.452
38	65.3%	8.4%	73.7%	21.9%	0.208	0.361	27.9%	15.4%	43.3%	46.1%	0.271	0.487
39	60.7%	5.6%	66.3%	27.9%	0.128	0.166	51.2%	5.4%	56.6%	38.6%	0.277	0.357
42	30.8%	8.6%	39.4%	51.4%	0.321	0.479	35.8%	9.6%	45.4%	43.5%	0.112	0.289
44	71.3%	8.6%	79.9%	15.3%	0.185	0.180	61.6%	3.6%	65.2%	31.0%	0.237	0.356
Avg					0.270	0.378					0.277	0.390

Table 12: SD Atlanta Alt 1 splits 8 counties within the cluster compared to 7 in the enacted plan and has a better discrete compactness score, with 2017 cut edges rather than 2197, to go with comparable Polsby-Popper and superior Reock compactness.

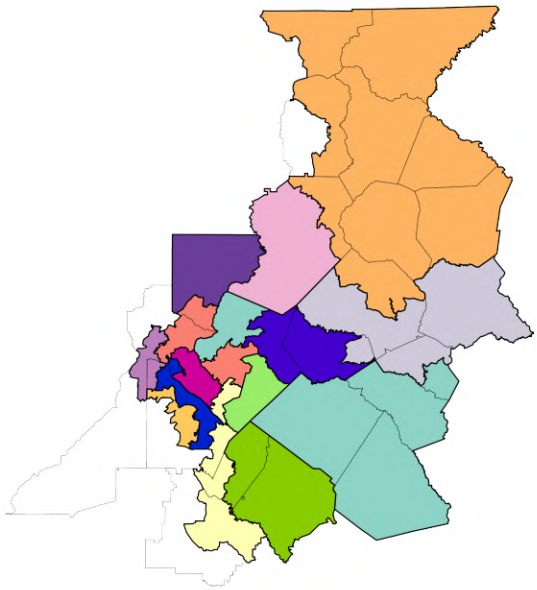
	SD Atlanta Enacted						**SD Alt 2**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
6	23.9%	8.2%	32.1%	57.8%	0.236	0.405	28.0%	14.9%	42.9%	46.7%	0.256	0.477
10	71.5%	5.2%	76.7%	19.6%	0.231	0.281	59.7%	9.8%	69.5%	23.3%	0.307	0.416
16	22.7%	5.0%	27.7%	66.9%	0.314	0.368	48.4%	6.1%	54.5%	42.4%	0.258	0.366
28	19.5%	6.4%	25.9%	69.4%	0.246	0.445	15.8%	6.1%	21.9%	72.8%	0.347	0.371
30	20.9%	6.1%	27.0%	69.4%	0.407	0.597	15.7%	6.6%	22.3%	74.2%	0.473	0.508
31	20.7%	7.4%	28.1%	68.3%	0.379	0.366	25.9%	6.7%	32.6%	63.6%	0.591	0.636
33	43.0%	22.9%	65.9%	30.2%	0.215	0.401	50.6%	18.2%	68.8%	27.4%	0.224	0.463
34	69.5%	12.7%	82.2%	13.4%	0.335	0.451	54.4%	11.9%	66.3%	27.9%	0.246	0.381
35	71.9%	7.5%	79.4%	18.8%	0.263	0.472	60.9%	7.5%	68.4%	29.3%	0.206	0.490
36	51.3%	7.1%	58.4%	36.2%	0.305	0.321	54.0%	6.8%	60.8%	33.6%	0.263	0.466
38	65.3%	8.4%	73.7%	21.9%	0.208	0.361	51.0%	5.6%	56.6%	37.6%	0.154	0.260
39	60.7%	5.6%	66.3%	27.9%	0.128	0.166	86.5%	5.5%	92.0%	7.0%	0.118	0.271
42	30.8%	8.6%	39.4%	51.4%	0.321	0.479	17.0%	10.7%	27.7%	61.4%	0.144	0.282
44	71.3%	8.6%	79.9%	15.3%	0.185	0.180	76.3%	3.2%	79.5%	18.7%	0.374	0.456
Avg					0.270	0.378					0.283	0.417

Table 13: SD Atlanta Alt 2 splits 6 counties within the cluster and has just 1985 cut edges, better than the enacted plan's 7 and 2197, while also improving on both contour-based compactness scores.

7.2.2 SD Gwinnett



Enacted 3/4/4



Alt 1 4/7/6

Figure 9: SD Gwinnett (16 districts).

	SD Gwinnett Enacted						**SD Alt 1**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
5	29.9%	41.7%	71.6%	15.7%	0.207	0.166	20.3%	34.6%	54.9%	28.0%	0.285	0.384
7	21.4%	16.6%	38.0%	37.8%	0.339	0.344	17.1%	14.3%	31.4%	45.5%	0.278	0.401
9	29.5%	18.8%	48.3%	35.8%	0.213	0.233	29.3%	27.0%	56.3%	26.2%	0.234	0.498
14	19.0%	12.1%	31.1%	57.1%	0.242	0.273	18.1%	11.4%	29.5%	57.6%	0.208	0.296
17	32.0%	5.1%	37.1%	59.4%	0.168	0.342	51.1%	6.6%	57.7%	35.9%	0.113	0.188
27	5.0%	10.2%	15.2%	71.5%	0.456	0.499	4.7%	10.2%	14.9%	70.8%	0.500	0.497
40	19.2%	21.6%	40.8%	46.3%	0.345	0.508	50.1%	17.7%	67.8%	25.1%	0.130	0.208
41	62.6%	6.7%	69.3%	21.4%	0.302	0.509	57.3%	10.0%	67.3%	23.3%	0.149	0.279
43	64.3%	6.9%	71.2%	26.5%	0.346	0.635	52.0%	7.0%	59.0%	38.3%	0.420	0.537
45	18.6%	13.1%	31.7%	55.5%	0.305	0.350	19.8%	12.1%	31.9%	58.8%	0.226	0.380
46	16.9%	7.0%	23.9%	69.9%	0.207	0.365	16.5%	5.0%	21.5%	73.4%	0.416	0.514
47	17.4%	9.6%	27.0%	67.5%	0.187	0.353	16.7%	8.7%	25.4%	68.5%	0.176	0.326
48	9.5%	7.0%	16.5%	52.2%	0.342	0.348	10.1%	6.4%	16.5%	54.8%	0.266	0.387
49	8.0%	21.9%	29.9%	65.6%	0.341	0.461	8.1%	24.6%	32.7%	62.8%	0.382	0.573
50	5.6%	8.8%	14.4%	81.5%	0.228	0.450	5.4%	6.1%	11.5%	84.3%	0.232	0.462
55	66.0%	8.7%	74.7%	20.6%	0.271	0.333	50.0%	13.9%	63.9%	30.0%	0.419	0.451
Avg					0.281	0.386					0.277	0.399

Table 14: SD Gwinnett Alt 1 has 9 splits and 2024 cut edges, both better than the enacted plan (10 and 2232). The Polsby-Popper scores are comparable while the alternative plan has a better Reock score.

7.2.3 SD East Black Belt

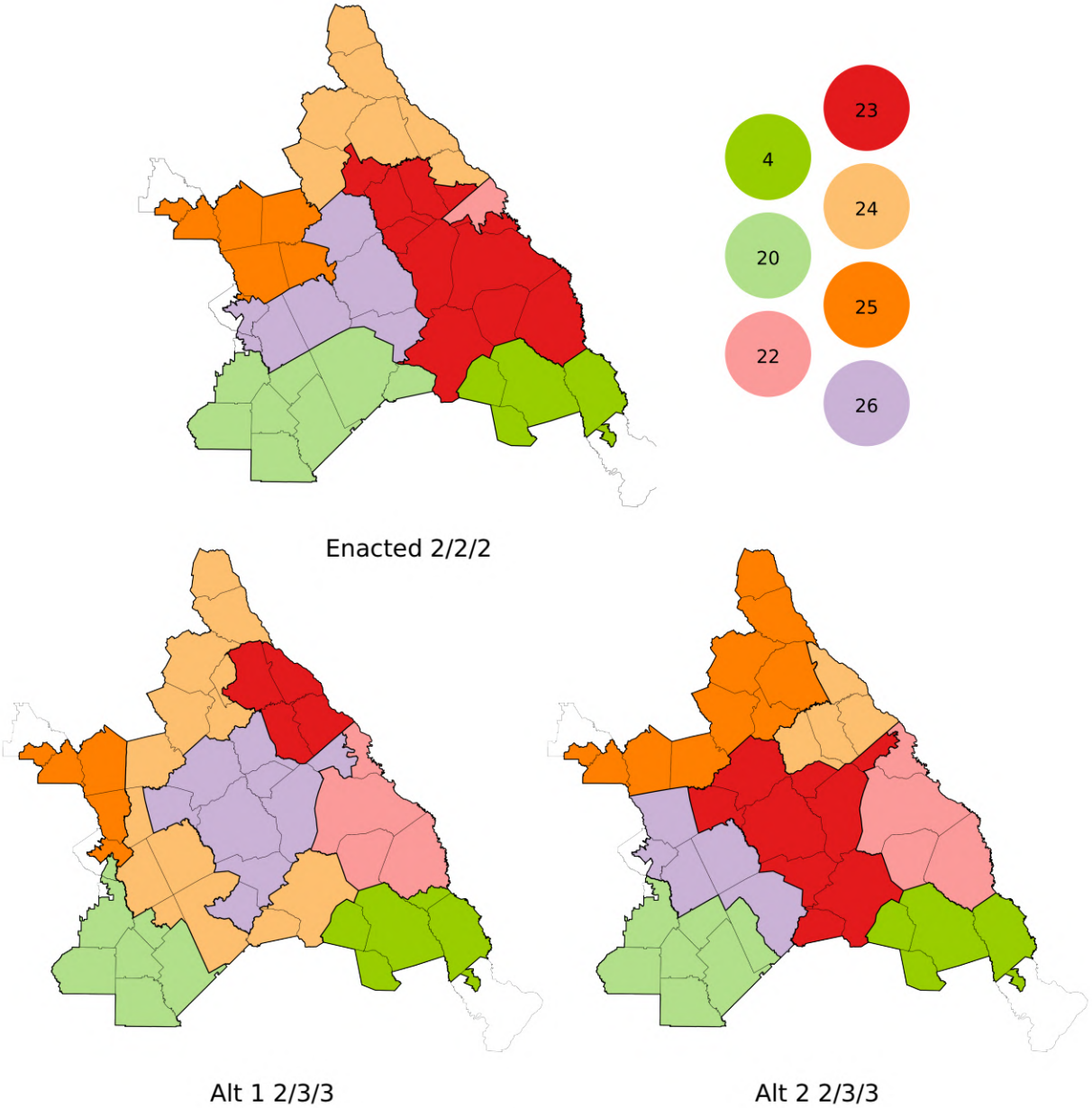


Figure 10: SD East Black Belt (7 districts).

	SD East Black Belt Enacted						**SD Alt 1**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
4	23.4%	5.5%	28.9%	66.8%	0.265	0.471	23.5%	5.5%	29.0%	66.7%	0.284	0.495
20	31.3%	3.5%	34.8%	61.7%	0.358	0.404	34.4%	5.1%	39.5%	56.5%	0.231	0.498
22	56.5%	5.3%	61.8%	34.4%	0.288	0.404	50.5%	3.8%	54.3%	42.6%	0.241	0.455
23	35.5%	4.5%	40.0%	56.9%	0.164	0.365	23.0%	5.6%	28.6%	64.6%	0.466	0.497
24	19.9%	4.4%	24.3%	69.8%	0.213	0.366	25.0%	3.5%	28.5%	69.1%	0.083	0.229
25	33.5%	3.7%	37.2%	59.9%	0.241	0.386	50.0%	4.0%	54.0%	43.4%	0.174	0.344
26	57.0%	4.2%	61.2%	36.6%	0.203	0.469	50.1%	3.7%	53.8%	43.4%	0.209	0.472
Avg					0.247	0.409					0.241	0.427

Table 15: SD East Black Belt Alt 1 has more cut edges than the state (1301 vs. 1021 from the enacted plan), paired with a comparable Polsby-Popper and a superior Reock score. This alternative plan splits seven counties while the state splits four within the cluster.

	SD East Black Belt Enacted						**SD Alt 2**					
SD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
4	23.4%	5.5%	28.9%	66.8%	0.265	0.471	23.4%	5.5%	28.9%	66.8%	0.265	0.471
20	31.3%	3.5%	34.8%	61.7%	0.358	0.404	32.5%	4.9%	37.4%	58.7%	0.304	0.586
22	56.5%	5.3%	61.8%	34.4%	0.288	0.404	50.4%	3.5%	53.9%	42.9%	0.264	0.432
23	35.5%	4.5%	40.0%	56.9%	0.164	0.365	47.4%	4.1%	51.5%	45.8%	0.231	0.441
24	19.9%	4.4%	24.3%	69.8%	0.213	0.366	23.1%	5.6%	28.7%	64.5%	0.327	0.458
25	33.5%	3.7%	37.2%	59.9%	0.241	0.386	28.2%	4.5%	32.7%	64.3%	0.176	0.311
26	57.0%	4.2%	61.2%	36.6%	0.203	0.469	51.2%	3.1%	54.3%	43.5%	0.205	0.331
Avg					0.247	0.409					0.253	0.433

Table 16: SD East Black Belt Alt 2 has just two county splits, compared to four in the state's plan. With just 1008 cut edges, it also executes a clean sweep of compactness scores relative to the enacted plan.

7.3 State House alternatives

In the state House, the enacted plan creates majority districts for BVAP/BHVAP/BHCVAP in the numbers 49/62/60 out of 180. Taken together, my modular alternatives can combine to replace that with a new House plan with up to 77 majority-BHVAP districts and up to 74 majority-BHCVAP districts.

7.3.1 HD Atlanta

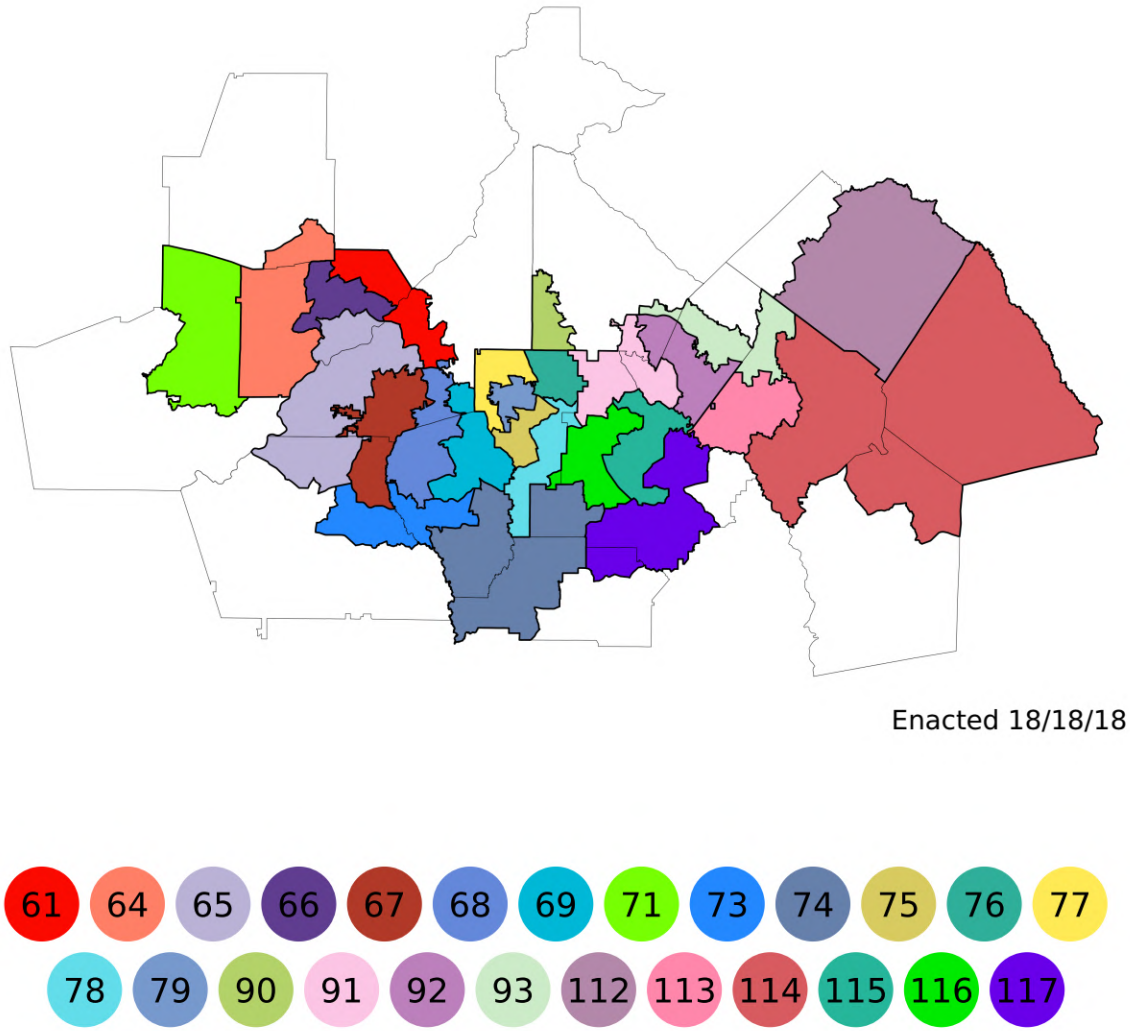
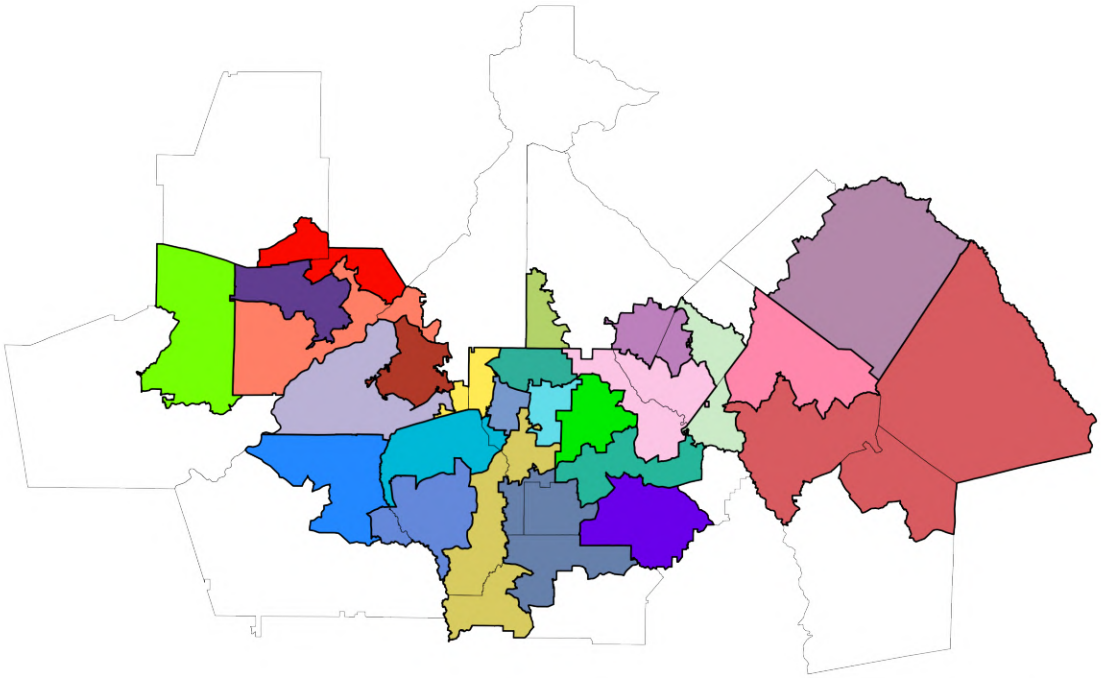
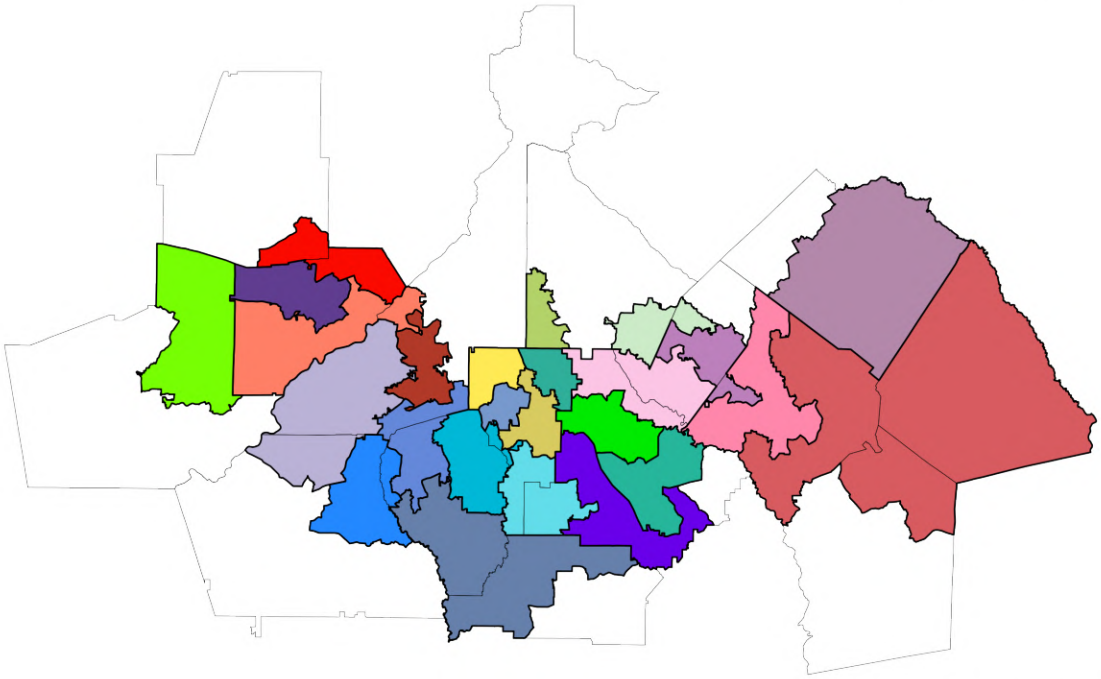


Figure 11: HD Atlanta (25 districts).



Alt 1 20/20/20



Alt 2 19/20/20

Figure 12: HD Atlanta (25 districts).

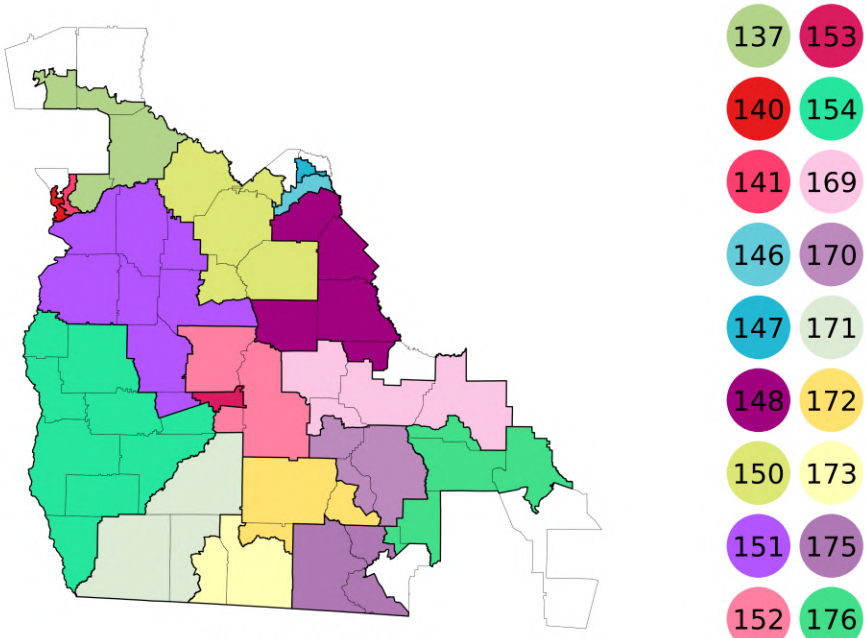
	HD Atlanta Enacted						**HD Alt 1**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
61	74.3%	7.6%	81.9%	16.8%	0.198	0.247	50.1%	10.0%	60.1%	37.1%	0.229	0.265
64	30.7%	7.4%	38.1%	57.8%	0.361	0.365	50.9%	6.5%	57.4%	40.0%	0.132	0.263
65	62.0%	4.5%	66.5%	31.5%	0.172	0.454	81.7%	4.7%	86.4%	12.5%	0.222	0.350
66	53.4%	9.5%	62.9%	33.9%	0.246	0.356	51.0%	9.0%	60.0%	36.2%	0.256	0.386
67	58.9%	7.8%	66.7%	30.9%	0.122	0.357	89.9%	5.4%	95.3%	4.4%	0.195	0.515
68	55.7%	6.3%	62.0%	33.9%	0.172	0.318	13.7%	6.6%	20.3%	71.5%	0.310	0.518
69	63.6%	5.4%	69.0%	26.9%	0.247	0.403	51.9%	8.8%	60.7%	34.0%	0.339	0.409
71	19.9%	6.2%	26.1%	69.8%	0.352	0.441	19.9%	6.2%	26.1%	69.8%	0.350	0.441
73	12.1%	7.0%	19.1%	72.6%	0.198	0.278	11.8%	6.4%	18.2%	75.9%	0.335	0.417
74	25.5%	5.6%	31.1%	64.4%	0.247	0.496	50.8%	6.9%	57.7%	39.7%	0.205	0.461
75	74.4%	11.3%	85.7%	11.3%	0.285	0.420	54.2%	7.7%	61.9%	34.1%	0.133	0.230
76	67.2%	13.2%	80.4%	10.5%	0.509	0.524	61.6%	20.0%	81.6%	11.2%	0.460	0.409
77	76.1%	12.2%	88.3%	7.6%	0.211	0.396	89.6%	5.0%	94.6%	3.5%	0.211	0.292
78	71.6%	8.9%	80.5%	15.0%	0.194	0.210	64.2%	11.3%	75.5%	15.4%	0.256	0.414
79	71.6%	16.0%	87.6%	7.1%	0.209	0.498	73.3%	14.6%	87.9%	8.0%	0.370	0.444
90	58.5%	4.3%	62.8%	34.0%	0.286	0.359	58.5%	4.3%	62.8%	34.0%	0.286	0.359
91	70.0%	5.9%	75.9%	22.0%	0.202	0.447	50.3%	5.2%	55.5%	40.7%	0.245	0.384
92	68.8%	4.7%	73.5%	24.1%	0.198	0.361	87.6%	3.5%	91.1%	8.3%	0.260	0.543
93	65.4%	9.6%	75.0%	22.9%	0.112	0.260	62.1%	10.4%	72.5%	25.4%	0.160	0.232
112	19.2%	3.3%	22.5%	73.7%	0.522	0.619	19.2%	3.3%	22.5%	73.7%	0.522	0.619
113	59.5%	6.7%	66.2%	31.8%	0.318	0.501	51.0%	5.1%	56.1%	41.2%	0.338	0.425
114	24.7%	3.7%	28.4%	68.8%	0.283	0.502	32.8%	4.4%	37.2%	60.3%	0.267	0.438
115	52.1%	7.0%	59.1%	36.9%	0.226	0.436	50.2%	6.0%	56.2%	38.6%	0.193	0.282
116	58.1%	7.3%	65.4%	27.2%	0.280	0.407	54.8%	8.0%	62.8%	29.6%	0.333	0.478
117	36.6%	5.4%	42.0%	54.5%	0.275	0.408	51.0%	7.2%	58.2%	39.0%	0.409	0.511
Avg					0.257	0.402					0.281	0.403

Table 17: In HD Atlanta, the enacted plan has 10 county splits and 2221 cut edges. Alt 1 maintains 10 county splits and improves to 1988 cut edges.

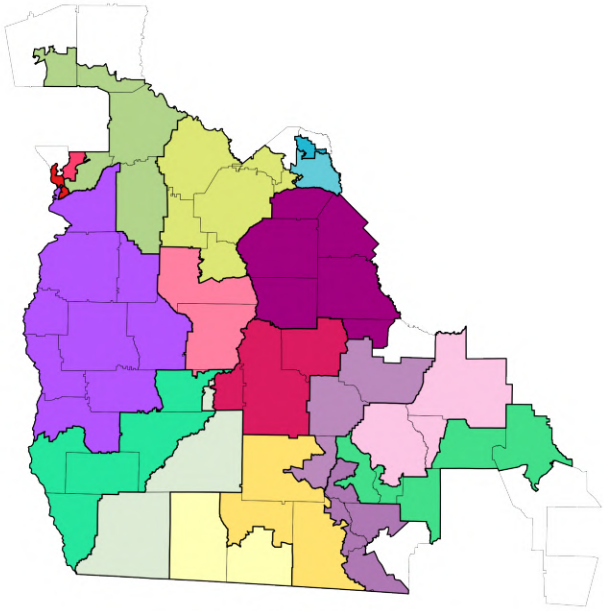
	HD Atlanta Enacted						**HD Alt 2**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
61	74.3%	7.6%	81.9%	16.8%	0.198	0.247	47.4%	10.1%	57.5%	39.6%	0.290	0.276
64	30.7%	7.4%	38.1%	57.8%	0.361	0.365	50.5%	6.8%	57.3%	40.0%	0.201	0.271
65	62.0%	4.5%	66.5%	31.5%	0.172	0.454	67.6%	4.1%	71.7%	26.6%	0.302	0.458
66	53.4%	9.5%	62.9%	33.9%	0.246	0.356	51.2%	9.1%	60.3%	36.0%	0.336	0.407
67	58.9%	7.8%	66.7%	30.9%	0.122	0.357	90.4%	5.3%	95.7%	4.0%	0.131	0.428
68	55.7%	6.3%	62.0%	33.9%	0.172	0.318	58.2%	6.8%	65.0%	31.0%	0.168	0.329
69	63.6%	5.4%	69.0%	26.9%	0.247	0.403	54.6%	6.3%	60.9%	34.4%	0.310	0.538
71	19.9%	6.2%	26.1%	69.8%	0.352	0.441	19.9%	6.2%	26.1%	69.8%	0.352	0.441
73	12.1%	7.0%	19.1%	72.6%	0.198	0.278	11.9%	7.0%	18.9%	73.6%	0.373	0.498
74	25.5%	5.6%	31.1%	64.4%	0.247	0.496	12.8%	5.7%	18.5%	75.5%	0.192	0.320
75	74.4%	11.3%	85.7%	11.3%	0.285	0.420	61.4%	12.0%	73.4%	17.6%	0.225	0.404
76	67.2%	13.2%	80.4%	10.5%	0.509	0.524	70.4%	13.2%	83.6%	9.6%	0.352	0.416
77	76.1%	12.2%	88.3%	7.6%	0.211	0.396	77.0%	12.6%	89.6%	7.0%	0.491	0.510
78	71.6%	8.9%	80.5%	15.0%	0.194	0.210	68.6%	8.4%	77.0%	21.0%	0.325	0.540
79	71.6%	16.0%	87.6%	7.1%	0.209	0.498	73.1%	15.5%	88.6%	7.5%	0.357	0.549
90	58.5%	4.3%	62.8%	34.0%	0.286	0.359	58.5%	4.3%	62.8%	34.0%	0.286	0.359
91	70.0%	5.9%	75.9%	22.0%	0.202	0.447	53.0%	5.2%	58.2%	38.4%	0.231	0.369
92	68.8%	4.7%	73.5%	24.1%	0.198	0.361	69.6%	6.9%	76.5%	21.3%	0.174	0.330
93	65.4%	9.6%	75.0%	22.9%	0.112	0.260	85.5%	7.2%	92.7%	7.0%	0.201	0.329
112	19.2%	3.3%	22.5%	73.7%	0.522	0.619	19.2%	3.3%	22.5%	73.7%	0.522	0.619
113	59.5%	6.7%	66.2%	31.8%	0.318	0.501	53.9%	5.6%	59.5%	37.9%	0.153	0.355
114	24.7%	3.7%	28.4%	68.8%	0.283	0.502	24.9%	3.8%	28.7%	68.6%	0.235	0.487
115	52.1%	7.0%	59.1%	36.9%	0.226	0.436	50.3%	6.9%	57.2%	39.8%	0.304	0.475
116	58.1%	7.3%	65.4%	27.2%	0.280	0.407	53.2%	7.9%	61.1%	31.0%	0.382	0.452
117	36.6%	5.4%	42.0%	54.5%	0.275	0.408	50.1%	6.5%	56.6%	38.4%	0.155	0.323
Avg					0.257	0.402					0.282	0.419

Table 18: With 9 county splits and 1995 cut edges, Alt 2 dominates the enacted plan.

7.3.2 HD Southwest



Enacted 6/6/6



Alt 1 8/8/8

Figure 13: HD Southwest (18 districts).

	HD Southwest Enacted						**HD Alt 1**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
137	52.1%	4.5%	56.6%	40.8%	0.165	0.328	51.7%	3.7%	55.4%	42.0%	0.143	0.259
140	57.6%	8.0%	65.6%	31.7%	0.192	0.289	57.1%	7.9%	65.0%	32.4%	0.197	0.257
141	57.5%	6.6%	64.1%	31.8%	0.200	0.261	53.6%	6.7%	60.3%	35.5%	0.299	0.423
146	27.6%	4.7%	32.3%	61.8%	0.195	0.257	23.3%	4.9%	28.2%	64.4%	0.208	0.468
147	30.1%	7.2%	37.3%	55.3%	0.261	0.331	31.8%	7.2%	39.0%	55.1%	0.220	0.341
148	34.0%	3.1%	37.1%	60.4%	0.235	0.438	38.6%	3.4%	42.0%	56.1%	0.388	0.590
150	53.6%	6.1%	59.7%	38.3%	0.275	0.439	51.2%	5.3%	56.5%	41.5%	0.250	0.544
151	42.4%	7.3%	49.7%	47.2%	0.222	0.528	51.0%	7.5%	58.5%	38.6%	0.275	0.424
152	26.1%	2.3%	28.4%	67.9%	0.297	0.394	34.2%	3.2%	37.4%	58.7%	0.314	0.473
153	67.9%	2.5%	70.4%	27.7%	0.297	0.298	52.9%	2.7%	55.6%	43.0%	0.400	0.536
154	54.8%	1.7%	56.5%	42.2%	0.332	0.410	50.1%	2.1%	52.2%	45.7%	0.175	0.261
169	29.0%	7.7%	36.7%	61.0%	0.226	0.283	24.0%	9.0%	33.0%	64.6%	0.296	0.456
170	24.2%	8.7%	32.9%	64.2%	0.342	0.531	26.8%	12.5%	39.3%	57.9%	0.223	0.285
171	39.6%	4.6%	44.2%	53.9%	0.368	0.347	51.0%	4.0%	55.0%	43.4%	0.249	0.275
172	23.3%	13.4%	36.7%	61.0%	0.316	0.437	25.1%	9.4%	34.5%	63.1%	0.217	0.375
173	36.3%	5.4%	41.7%	55.7%	0.378	0.564	35.4%	5.6%	41.0%	56.4%	0.412	0.424
175	24.2%	5.0%	29.2%	66.5%	0.374	0.472	21.0%	5.7%	26.7%	68.7%	0.143	0.273
176	22.7%	8.2%	30.9%	66.2%	0.160	0.335	23.8%	6.2%	30.0%	67.1%	0.116	0.227
Avg					0.269	0.386					0.252	0.383

Table 19: HD Southwest Alt 1 splits 12 counties within the cluster, to the state's 10 split counties. Its 2290 cut edges are more than the state's 2094, though the Reock scores are nearly identical.

7.3.3 HD East Black Belt

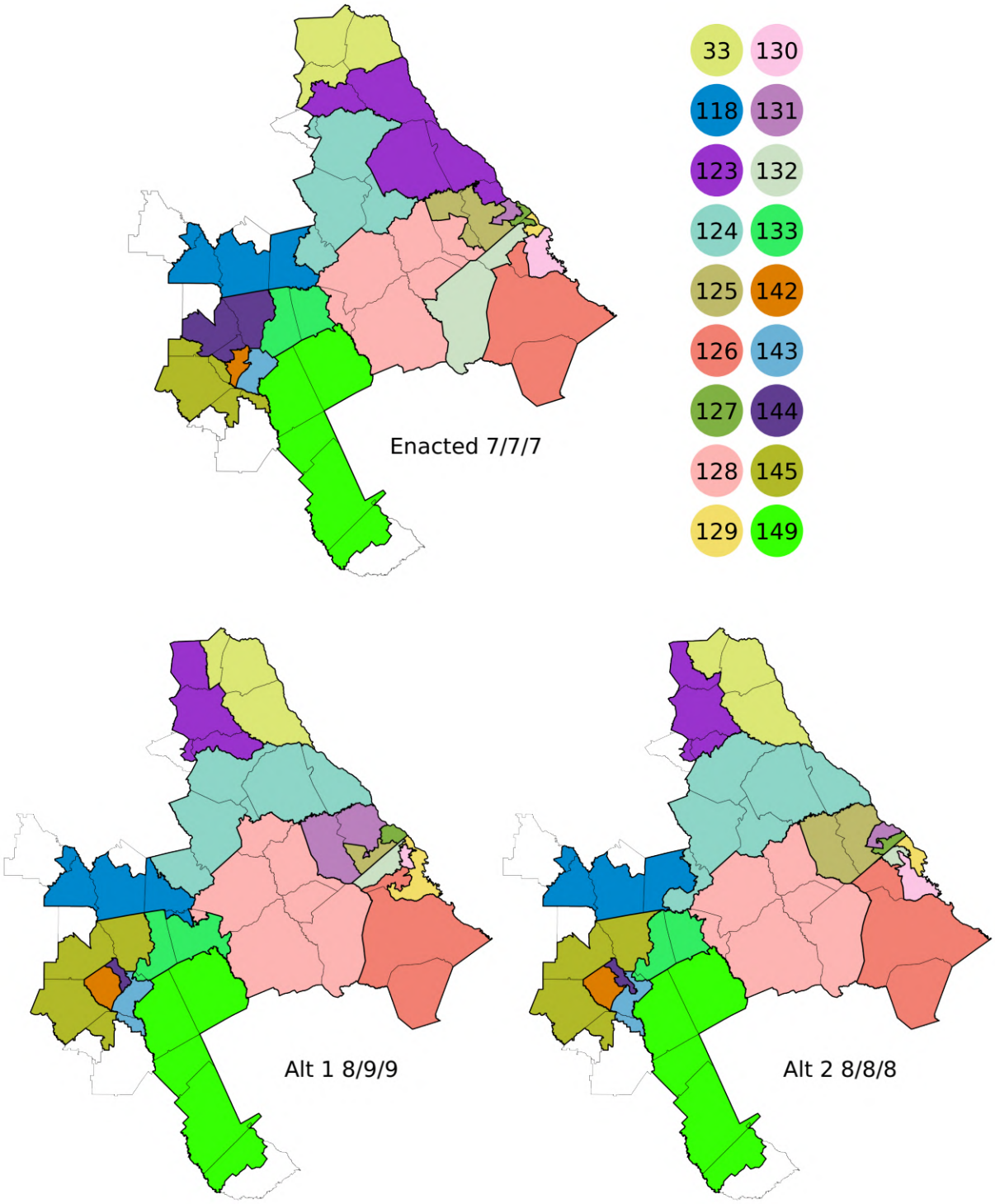


Figure 14: HD East Black Belt (18 districts).

	HD East Black Belt Enacted						**HD Alt 1**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
33	11.2%	3.1%	14.3%	82.3%	0.371	0.487	18.7%	3.8%	22.5%	74.6%	0.405	0.343
118	23.6%	3.7%	27.3%	69.7%	0.223	0.350	23.2%	3.1%	26.3%	70.6%	0.218	0.329
123	24.3%	4.3%	28.6%	68.1%	0.178	0.295	13.3%	5.8%	19.1%	76.3%	0.281	0.357
124	25.6%	6.2%	31.8%	65.0%	0.233	0.442	28.4%	4.7%	33.1%	64.4%	0.224	0.362
125	23.7%	7.7%	31.4%	63.0%	0.173	0.409	24.1%	8.0%	32.1%	61.5%	0.255	0.328
126	54.5%	3.2%	57.7%	40.0%	0.414	0.516	52.5%	3.5%	56.0%	41.6%	0.322	0.534
127	18.5%	4.8%	23.3%	68.1%	0.201	0.351	14.6%	4.9%	19.5%	70.1%	0.585	0.546
128	50.4%	1.7%	52.1%	46.5%	0.319	0.601	50.1%	1.6%	51.7%	46.7%	0.357	0.628
129	54.9%	4.3%	59.2%	37.2%	0.254	0.482	51.9%	3.5%	55.4%	40.7%	0.108	0.314
130	59.9%	3.9%	63.8%	33.7%	0.255	0.508	54.4%	4.3%	58.7%	38.7%	0.253	0.451
131	17.6%	5.9%	23.5%	68.2%	0.283	0.377	27.1%	5.1%	32.2%	63.3%	0.285	0.604
132	52.3%	7.8%	60.1%	35.6%	0.296	0.270	53.6%	8.2%	61.8%	33.1%	0.293	0.243
133	36.8%	2.1%	38.9%	58.4%	0.415	0.543	48.7%	2.0%	50.7%	47.2%	0.178	0.385
142	59.5%	3.7%	63.2%	34.8%	0.229	0.353	50.8%	3.7%	54.5%	42.3%	0.539	0.605
143	60.8%	4.7%	65.5%	32.3%	0.299	0.502	52.4%	6.3%	58.7%	38.4%	0.176	0.332
144	29.3%	2.6%	31.9%	63.0%	0.325	0.510	50.4%	4.3%	54.7%	41.3%	0.299	0.298
145	35.7%	5.9%	41.6%	55.1%	0.194	0.376	23.1%	2.8%	25.9%	71.1%	0.204	0.422
149	32.1%	5.7%	37.8%	61.0%	0.223	0.325	32.1%	5.7%	37.8%	61.0%	0.223	0.325
Avg					0.271	0.428					0.289	0.411

Table 20: The Alt 1 map has 10 split counties within the HD East Black Belt cluster, while the enacted plan has 9. Its 1775 cut edges improves on the state's 1887, while also being more compact by Polsby-Popper.

	HD East Black Belt Enacted						**HD Alt 2**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
33	11.2%	3.1%	14.3%	82.3%	0.371	0.487	18.3%	3.5%	21.8%	75.2%	0.370	0.323
118	23.6%	3.7%	27.3%	69.7%	0.223	0.350	27.0%	4.1%	31.1%	65.9%	0.229	0.342
123	24.3%	4.3%	28.6%	68.1%	0.178	0.295	13.7%	6.0%	19.7%	75.8%	0.293	0.395
124	25.6%	6.2%	31.8%	65.0%	0.233	0.442	25.5%	3.8%	29.3%	68.1%	0.234	0.381
125	23.7%	7.7%	31.4%	63.0%	0.173	0.409	30.2%	6.1%	36.3%	60.1%	0.396	0.670
126	54.5%	3.2%	57.7%	40.0%	0.414	0.516	50.7%	4.2%	54.9%	42.3%	0.394	0.494
127	18.5%	4.8%	23.3%	68.1%	0.201	0.351	17.6%	6.2%	23.8%	67.2%	0.267	0.264
128	50.4%	1.7%	52.1%	46.5%	0.319	0.601	50.2%	1.5%	51.7%	46.8%	0.409	0.672
129	54.9%	4.3%	59.2%	37.2%	0.254	0.482	50.4%	3.6%	54.0%	41.8%	0.248	0.323
130	59.9%	3.9%	63.8%	33.7%	0.255	0.508	57.1%	4.7%	61.8%	35.4%	0.231	0.325
131	17.6%	5.9%	23.5%	68.2%	0.283	0.377	17.6%	5.7%	23.3%	67.8%	0.318	0.373
132	52.3%	7.8%	60.1%	35.6%	0.296	0.270	54.4%	7.1%	61.5%	34.1%	0.219	0.278
133	36.8%	2.1%	38.9%	58.4%	0.415	0.543	46.6%	2.1%	48.7%	49.0%	0.296	0.438
142	59.5%	3.7%	63.2%	34.8%	0.229	0.353	50.1%	3.8%	53.9%	42.9%	0.436	0.605
143	60.8%	4.7%	65.5%	32.3%	0.299	0.502	52.9%	6.3%	59.2%	38.0%	0.143	0.316
144	29.3%	2.6%	31.9%	63.0%	0.325	0.510	51.0%	4.2%	55.2%	40.8%	0.226	0.243
145	35.7%	5.9%	41.6%	55.1%	0.194	0.376	23.1%	2.8%	25.9%	71.1%	0.190	0.359
149	32.1%	5.7%	37.8%	61.0%	0.223	0.325	32.1%	5.7%	37.8%	61.0%	0.223	0.325
Avg					0.271	0.428					0.285	0.396

Table 21: Alt 2 eliminates one county split relative to the enacted plan and has a sharply improved 1604 cut edges.

7.3.4 HD Southeast

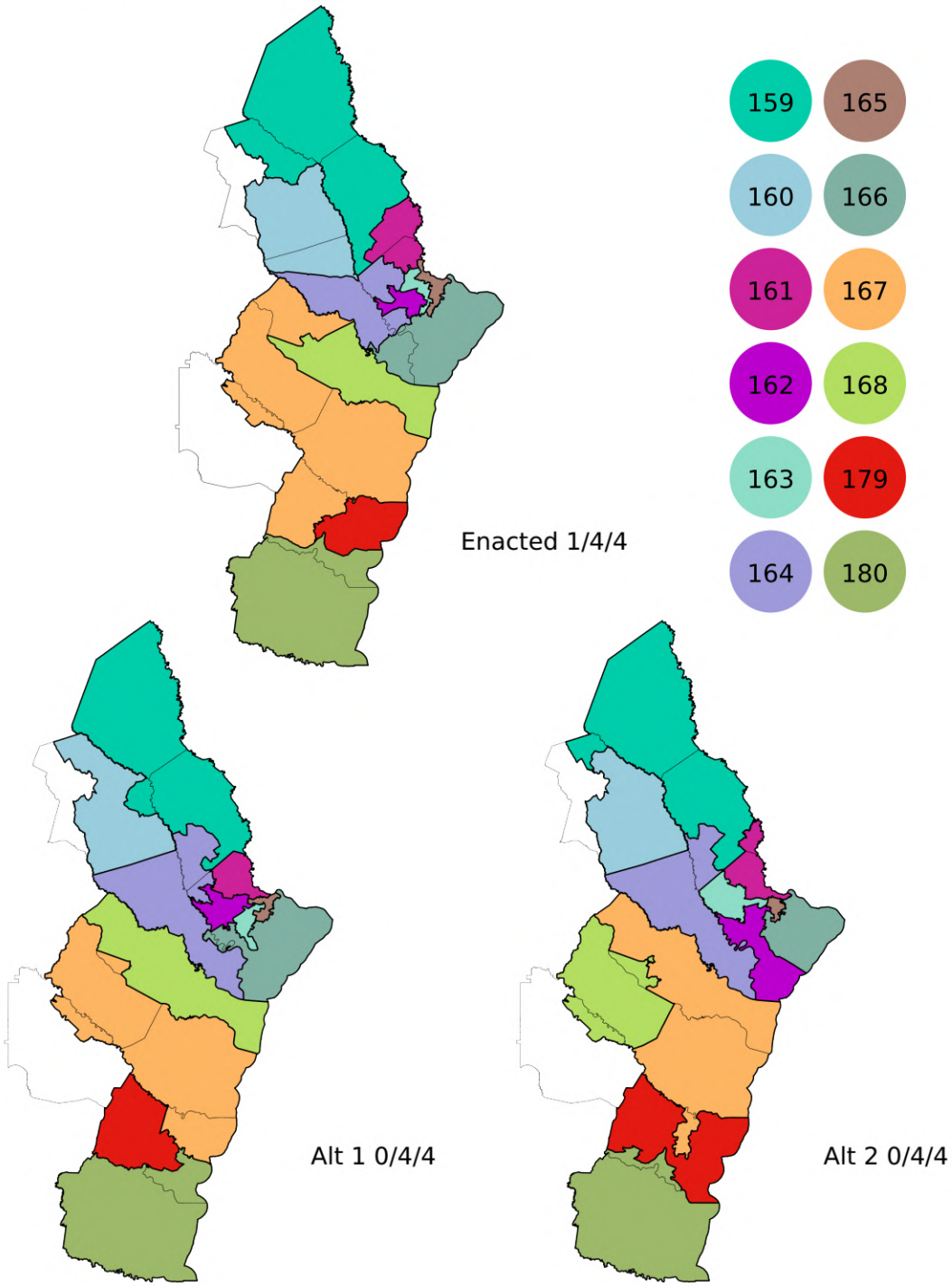


Figure 15: HD Southeast (12 districts).

	HD Southeast Enacted						**HD Alt 1**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
159	24.5%	2.9%	27.4%	69.4%	0.219	0.345	22.2%	3.7%	25.9%	70.5%	0.204	0.358
160	22.6%	5.0%	27.6%	68.5%	0.369	0.483	26.6%	5.1%	31.7%	64.7%	0.242	0.373
161	27.1%	6.8%	33.9%	60.2%	0.306	0.511	42.1%	8.8%	50.9%	42.7%	0.359	0.475
162	43.7%	9.6%	53.3%	40.6%	0.211	0.366	39.9%	10.5%	50.4%	42.6%	0.147	0.372
163	45.5%	7.4%	52.9%	41.9%	0.175	0.271	44.0%	6.9%	50.9%	43.7%	0.244	0.335
164	23.5%	8.5%	32.0%	60.6%	0.167	0.299	12.9%	5.1%	18.0%	76.5%	0.143	0.309
165	50.3%	5.3%	55.6%	39.2%	0.162	0.230	47.3%	4.7%	52.0%	42.9%	0.189	0.380
166	5.7%	4.1%	9.8%	84.7%	0.364	0.429	7.2%	4.7%	11.9%	82.4%	0.245	0.459
167	22.3%	7.4%	29.7%	66.0%	0.192	0.417	20.0%	6.2%	26.2%	70.1%	0.266	0.327
168	46.3%	10.3%	56.6%	39.3%	0.258	0.243	45.9%	10.7%	56.6%	39.2%	0.236	0.246
179	27.0%	6.4%	33.4%	63.7%	0.417	0.451	32.0%	7.5%	39.5%	56.9%	0.433	0.539
180	18.2%	5.6%	23.8%	71.2%	0.396	0.606	17.0%	5.4%	22.4%	72.8%	0.348	0.594
Avg					0.270	0.388					0.255	0.397

Table 22: HD Southeast Alt 1 has fewer county splits (5 vs. 6) and a better cut edges score (1122 vs. 1245) than the enacted plan.

	HD Southeast Enacted						**HD Alt 2**					
HD	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock	Black VAP	Hisp VAP	BH VAP	White VAP	Polsby Popper	Reock
159	24.5%	2.9%	27.4%	69.4%	0.219	0.345	22.0%	3.6%	25.6%	70.7%	0.192	0.356
160	22.6%	5.0%	27.6%	68.5%	0.369	0.483	26.3%	5.1%	31.4%	64.9%	0.333	0.515
161	27.1%	6.8%	33.9%	60.2%	0.306	0.511	41.6%	10.0%	51.6%	42.2%	0.180	0.332
162	43.7%	9.6%	53.3%	40.6%	0.211	0.366	43.0%	8.5%	51.5%	42.5%	0.191	0.341
163	45.5%	7.4%	52.9%	41.9%	0.175	0.271	42.7%	7.7%	50.4%	43.1%	0.282	0.411
164	23.5%	8.5%	32.0%	60.6%	0.167	0.299	13.4%	5.5%	18.9%	75.6%	0.168	0.290
165	50.3%	5.3%	55.6%	39.2%	0.162	0.230	45.5%	5.0%	50.5%	44.4%	0.229	0.501
166	5.7%	4.1%	9.8%	84.7%	0.364	0.429	7.2%	4.1%	11.3%	83.0%	0.391	0.653
167	22.3%	7.4%	29.7%	66.0%	0.192	0.417	36.5%	7.4%	43.9%	52.5%	0.204	0.331
168	46.3%	10.3%	56.6%	39.3%	0.258	0.243	40.9%	10.8%	51.7%	44.3%	0.327	0.555
179	27.0%	6.4%	33.4%	63.7%	0.417	0.451	18.7%	6.0%	24.7%	71.6%	0.196	0.454
180	18.2%	5.6%	23.8%	71.2%	0.396	0.606	18.6%	5.7%	24.3%	70.7%	0.346	0.577
Avg					0.270	0.388					0.253	0.443

Table 23: Alt 2 also has just 5 county splits, to go with 1263 cut edges.

8 Secondary population estimates for coalition districts

Above, in §3.2, I described my construction of an estimated citizen voting age population for the state of Georgia. In this section, I confirm that nearly all of the majority-BHVAP districts in my alternative plans are still majority districts by BHCVAP.

	CD enacted	
CD	BH VAP	BH CVAP
1	34.5%	33.4%
2	54.0%	53.5%
3	28.3%	27.2%
4	63.9%	63.3%
5	55.6%	55.8%
6	18.7%	16.6%
7	50.2%	46.6%
8	35.8%	34.5%
9	23.0%	18.2%
10	28.8%	27.2%
11	28.7%	25.1%
12	41.2%	40.7%
13	76.3%	76.0%
14	24.6%	20.5%

	CD Alt	
CD	BH VAP	BH CVAP
1	36.6%	35.6%
2	51.8%	51.6%
3	57.7%	57.1%
4	58.0%	57.7%
5	60.6%	59.8%
6	24.0%	21.6%
7	55.5%	52.4%
8	33.8%	32.0%
9	15.9%	11.0%
10	24.2%	22.5%
11	24.7%	22.6%
12	43.2%	43.1%
13	57.9%	57.0%
14	18.3%	13.9%

Table 24: The enacted Congressional plan has 5 majority-BHVAP districts, but only four majority districts by BHCVAP. My alternative Congressional plan has 6 majority-BH districts by both either basis of population.

Next, I will present the statistics for the Alt Eff 1 and Alt Eff 2 plans in Senate and House, which use the Alt 1 and Alt 2 Gingles demonstrative plans above and add more modular effectiveness-boosting changes.

	SD enacted	
SD	BH VAP	BH CVAP
1	31.9%	31.2%
2	53.8%	54.0%
3	27.1%	24.8%
4	28.6%	27.1%
5	70.4%	65.7%
6	31.5%	30.3%
7	37.2%	34.7%
8	36.3%	35.4%
9	47.4%	44.4%
10	75.7%	75.8%
11	38.4%	36.2%
12	61.2%	60.7%
13	32.8%	31.2%
14	30.5%	26.8%
15	59.8%	59.8%
16	27.5%	26.7%
17	36.6%	35.4%
18	34.6%	33.8%
19	33.7%	31.2%
20	34.5%	34.2%
21	16.0%	13.5%
22	61.2%	61.3%
23	39.6%	39.0%
24	24.0%	23.4%
25	36.8%	36.3%
26	60.8%	60.6%
27	15.0%	11.6%
28	25.6%	24.3%
29	31.0%	30.8%
30	26.6%	24.8%
31	27.7%	25.4%
32	24.9%	21.8%
33	65.1%	61.5%
34	81.2%	80.9%
35	78.5%	78.3%
36	57.7%	57.6%
37	27.5%	24.7%
38	72.9%	73.3%
39	65.6%	67.1%
40	40.2%	33.0%
41	68.5%	69.1%
42	38.9%	37.4%
43	70.5%	69.8%
44	79.0%	79.3%
45	31.1%	28.7%
46	23.6%	22.0%
47	26.8%	24.0%
48	16.1%	16.1%
49	29.6%	20.2%
50	14.3%	10.5%
51	5.5%	3.9%
52	21.1%	18.1%
53	8.2%	6.7%
54	26.2%	16.7%
55	73.6%	73.2%
56	15.0%	13.2%

	SD Alt Eff 1	
SD	BH VAP	BH CVAP
1	31.8%	31.2%
2	53.7%	54.0%
3	26.9%	24.8%
4	28.6%	27.2%
5	53.9%	45.2%
6	55.5%	55.4%
7	30.6%	28.6%
8	36.2%	35.4%
9	55.1%	51.6%
10	69.4%	68.9%
11	38.4%	36.2%
12	61.1%	60.7%
13	32.8%	31.2%
14	28.8%	26.0%
15	59.7%	59.8%
16	55.6%	54.6%
17	56.8%	56.4%
18	34.5%	33.8%
19	33.6%	31.2%
20	39.1%	38.4%
21	15.9%	13.5%
22	53.6%	53.8%
23	28.0%	27.7%
24	28.3%	27.5%
25	53.5%	53.5%
26	53.4%	53.5%
27	14.7%	11.4%
28	56.7%	56.1%
29	31.0%	30.8%
30	19.2%	17.3%
31	26.4%	24.3%
32	24.8%	21.8%
33	67.5%	65.0%
34	82.6%	83.2%
35	58.0%	56.8%
36	54.9%	55.3%
37	27.4%	24.7%
38	42.4%	40.2%
39	55.9%	56.1%
40	66.6%	64.4%
41	66.4%	66.3%
42	44.6%	44.3%
43	58.2%	57.2%
44	64.5%	65.2%
45	31.3%	28.8%
46	21.2%	19.8%
47	25.2%	23.0%
48	16.1%	15.4%
49	32.4%	22.2%
50	11.4%	8.9%
51	5.5%	3.9%
52	21.1%	18.1%
53	8.2%	6.7%
54	26.2%	16.7%
55	62.6%	60.9%
56	14.9%	13.2%

	SD Alt Eff 2	
SD	BH VAP	BH CVAP
1	31.8%	31.2%
2	53.7%	54.0%
3	26.9%	24.8%
4	28.5%	27.1%
5	58.6%	52.2%
6	42.0%	39.8%
7	46.2%	43.2%
8	36.2%	35.4%
9	53.1%	50.5%
10	68.5%	68.5%
11	38.4%	36.2%
12	61.1%	60.7%
13	32.8%	31.2%
14	26.5%	24.6%
15	59.7%	59.8%
16	53.7%	52.7%
17	51.2%	50.3%
18	34.5%	33.8%
19	33.6%	31.2%
20	37.0%	36.4%
21	15.9%	13.5%
22	53.3%	53.5%
23	51.1%	51.2%
24	28.1%	27.8%
25	32.4%	31.4%
26	53.9%	53.9%
27	15.0%	11.6%
28	21.6%	20.3%
29	31.0%	30.8%
30	22.0%	19.4%
31	32.0%	30.3%
32	24.8%	21.8%
33	67.7%	65.4%
34	65.4%	64.4%
35	67.4%	66.8%
36	59.9%	60.5%
37	27.4%	24.7%
38	55.8%	56.4%
39	90.9%	91.5%
40	44.9%	35.6%
41	69.8%	70.6%
42	27.0%	23.7%
43	61.0%	60.3%
44	78.6%	79.0%
45	27.2%	24.9%
46	21.2%	19.5%
47	27.2%	24.7%
48	19.3%	17.7%
49	30.7%	20.6%
50	12.6%	10.3%
51	5.5%	3.9%
52	21.1%	18.1%
53	8.2%	6.7%
54	26.2%	16.7%
55	64.9%	64.7%
56	14.9%	13.2%

Table 25: The enacted Senate plan has 17 coalition districts, whether by VAP or CVAP. Both alternative plans add numerous districts, finding additional majority districts in several areas of the state.

	HD enacted	
HD	BH VAP	BH CVAP
1	6.2%	5.7%
2	10.6%	7.4%
3	6.2%	4.7%
4	49.2%	34.8%
5	17.0%	11.1%
6	13.4%	7.8%
7	6.1%	3.7%
8	4.1%	2.9%
9	6.2%	4.9%
10	13.6%	9.2%
11	6.0%	4.8%
12	15.7%	12.6%
13	29.8%	25.8%
14	12.6%	10.4%
15	23.6%	21.3%
16	20.1%	16.7%
17	29.4%	27.4%
18	10.3%	9.4%
19	30.4%	28.8%
20	18.1%	14.5%
21	12.3%	10.0%
22	26.2%	22.6%
23	20.5%	14.1%
24	17.1%	14.1%
25	10.8%	11.0%
26	14.6%	11.0%
27	13.2%	9.5%
28	15.2%	10.6%
29	52.9%	37.6%
30	24.0%	18.9%
31	26.3%	19.6%
32	12.7%	10.7%
33	14.3%	13.4%
34	23.2%	20.2%
35	38.7%	34.8%
36	23.1%	21.6%
37	46.1%	41.2%
38	65.9%	64.0%
39	73.2%	70.6%
40	38.1%	38.6%
41	67.2%	63.0%
42	50.2%	47.9%
43	39.9%	38.6%
44	22.1%	20.2%
45	9.9%	9.1%
46	15.1%	14.0%
47	17.8%	18.2%
48	23.8%	20.0%
49	14.8%	13.5%
50	18.3%	18.4%
51	36.4%	30.0%
52	23.0%	24.5%
53	21.5%	19.6%
54	27.7%	23.8%
55	59.7%	60.2%
56	50.7%	53.6%
57	25.6%	23.8%
58	67.5%	67.9%
59	73.8%	73.9%
60	68.3%	68.1%

	HD Alt Eff 1	
HD	BH VAP	BH CVAP
1	6.2%	5.7%
2	10.6%	7.4%
3	6.2%	4.7%
4	49.2%	34.8%
5	17.0%	11.1%
6	13.4%	7.8%
7	6.1%	3.7%
8	4.1%	2.9%
9	6.2%	4.9%
10	13.6%	9.2%
11	6.0%	4.8%
12	15.7%	12.6%
13	29.8%	25.8%
14	12.6%	10.4%
15	23.5%	21.3%
16	20.0%	16.7%
17	29.3%	27.4%
18	10.2%	9.4%
19	30.2%	28.8%
20	14.4%	11.7%
21	12.3%	10.1%
22	34.4%	31.3%
23	20.4%	14.1%
24	12.9%	10.8%
25	11.5%	11.8%
26	14.2%	11.6%
27	13.2%	9.5%
28	15.2%	10.6%
29	54.8%	39.4%
30	21.8%	16.7%
31	26.2%	19.6%
32	12.7%	10.7%
33	22.4%	21.7%
34	19.5%	17.2%
35	31.9%	29.3%
36	26.5%	24.8%
37	52.9%	47.2%
38	51.9%	50.3%
39	61.7%	58.8%
40	50.7%	50.5%
41	52.5%	50.3%
42	54.9%	50.5%
43	51.0%	51.1%
44	27.5%	22.5%
45	12.7%	11.5%
46	14.0%	13.0%
47	23.0%	23.9%
48	17.9%	16.2%
49	11.3%	10.1%
50	19.2%	19.3%
51	43.3%	36.2%
52	19.5%	19.2%
53	26.3%	22.5%
54	23.0%	20.8%
55	56.0%	58.6%
56	50.7%	52.4%
57	25.2%	23.8%
58	57.2%	57.6%
59	93.5%	93.5%
60	64.5%	64.6%

	HD Alt Eff 2	
HD	BH VAP	BH CVAP
1	6.2%	5.7%
2	10.6%	7.4%
3	6.2%	4.7%
4	49.2%	34.8%
5	17.0%	11.1%
6	13.4%	7.8%
7	6.1%	3.7%
8	4.1%	2.9%
9	6.2%	4.9%
10	13.6%	9.2%
11	6.0%	4.8%
12	15.7%	12.6%
13	29.8%	25.8%
14	12.6%	10.4%
15	23.5%	21.3%
16	20.0%	16.7%
17	29.3%	27.4%
18	10.2%	9.4%
19	30.2%	28.8%
20	15.3%	11.6%
21	12.3%	10.1%
22	36.0%	32.4%
23	20.4%	14.1%
24	14.8%	12.6%
25	10.6%	10.6%
26	14.1%	11.6%
27	13.2%	9.5%
28	15.2%	10.6%
29	52.8%	37.6%
30	22.4%	17.0%
31	26.2%	19.6%
32	12.7%	10.7%
33	21.7%	21.1%
34	16.7%	14.9%
35	34.1%	30.8%
36	23.3%	19.5%
37	56.2%	50.6%
38	53.4%	51.3%
39	60.7%	58.3%
40	51.0%	50.8%
41	52.6%	50.6%
42	54.6%	50.3%
43	51.7%	50.7%
44	25.1%	24.5%
45	10.5%	10.0%
46	13.8%	13.2%
47	22.9%	23.6%
48	18.9%	16.8%
49	11.3%	10.1%
50	18.4%	18.2%
51	40.6%	34.0%
52	20.7%	21.0%
53	27.8%	23.5%
54	20.6%	18.5%
55	95.7%	95.9%
56	50.5%	52.6%
57	26.1%	25.0%
58	52.6%	54.3%
59	64.4%	64.8%
60	55.7%	55.7%

	HD enacted	
HD	BH VAP	BH CVAP
61	81.0%	80.4%
62	78.2%	78.3%
63	77.8%	77.3%
64	37.6%	36.2%
65	65.7%	65.8%
66	62.0%	60.6%
67	66.1%	65.3%
68	61.4%	61.5%
69	68.2%	68.2%
70	35.4%	33.4%
71	25.8%	23.6%
72	27.4%	24.9%
73	18.8%	17.9%
74	30.6%	29.2%
75	84.5%	84.9%
76	79.6%	80.9%
77	87.3%	87.4%
78	79.4%	79.2%
79	86.5%	86.7%
80	36.6%	28.0%
81	42.1%	34.5%
82	23.2%	22.2%
83	43.0%	28.0%
84	75.7%	76.6%
85	67.9%	71.9%
86	78.5%	80.9%
87	78.8%	79.0%
88	72.5%	73.5%
89	65.3%	65.6%
90	62.2%	62.2%
91	75.0%	74.7%
92	72.7%	72.4%
93	74.1%	73.2%
94	75.3%	75.8%
95	74.0%	73.5%
96	58.1%	52.9%
97	45.0%	42.0%
98	74.8%	68.4%
99	22.9%	23.0%
100	19.6%	18.1%
101	41.6%	39.4%
102	57.8%	53.8%
103	33.0%	29.2%
104	27.8%	25.3%
105	44.9%	42.5%
106	46.7%	45.3%
107	59.6%	55.6%
108	35.9%	30.2%
109	67.4%	64.6%
110	56.7%	55.0%
111	30.6%	28.2%
112	22.3%	21.9%
113	65.5%	64.6%
114	28.1%	26.8%
115	58.2%	57.0%
116	64.4%	64.2%
117	41.5%	40.7%
118	27.1%	26.0%
119	23.6%	21.0%
120	21.2%	19.3%

	HD Alt Eff 1	
HD	BH VAP	BH CVAP
61	59.3%	57.1%
62	88.0%	88.6%
63	65.4%	64.8%
64	56.6%	55.9%
65	85.5%	86.8%
66	58.9%	58.1%
67	94.2%	94.5%
68	19.9%	19.2%
69	59.7%	58.8%
70	35.3%	33.4%
71	25.7%	23.6%
72	27.4%	24.9%
73	17.9%	17.0%
74	56.7%	55.1%
75	60.9%	60.2%
76	80.5%	80.4%
77	93.4%	94.0%
78	74.3%	75.6%
79	86.6%	87.1%
80	60.6%	50.4%
81	51.6%	40.1%
82	16.9%	15.9%
83	22.6%	21.7%
84	80.0%	80.5%
85	58.2%	60.3%
86	94.3%	94.4%
87	63.3%	64.8%
88	68.1%	67.6%
89	68.8%	69.6%
90	62.0%	62.2%
91	54.9%	54.1%
92	90.1%	90.5%
93	71.4%	70.4%
94	85.0%	85.2%
95	56.4%	55.6%
96	52.2%	50.1%
97	58.5%	50.7%
98	68.8%	63.7%
99	24.5%	24.6%
100	20.5%	18.6%
101	37.4%	35.3%
102	54.7%	52.1%
103	30.0%	26.3%
104	26.7%	24.2%
105	52.8%	50.2%
106	57.5%	53.1%
107	54.4%	50.2%
108	53.5%	51.3%
109	56.0%	51.2%
110	52.6%	50.9%
111	31.2%	29.5%
112	22.3%	21.9%
113	55.3%	54.3%
114	36.7%	35.4%
115	55.2%	54.9%
116	61.8%	61.6%
117	57.2%	56.6%
118	26.1%	25.2%
119	23.5%	21.0%
120	21.1%	19.3%

	HD Alt Eff 2	
HD	BH VAP	BH CVAP
61	56.7%	54.2%
62	87.5%	88.1%
63	70.8%	70.5%
64	56.5%	55.8%
65	70.9%	71.4%
66	59.2%	58.2%
67	94.6%	95.0%
68	64.3%	64.4%
69	59.9%	59.6%
70	35.3%	33.4%
71	25.7%	23.6%
72	27.4%	24.9%
73	18.6%	17.6%
74	18.1%	17.0%
75	72.3%	73.0%
76	82.6%	83.5%
77	88.2%	88.6%
78	75.6%	75.0%
79	87.2%	87.6%
80	58.5%	50.1%
81	51.1%	36.6%
82	18.4%	17.6%
83	25.4%	23.5%
84	78.2%	79.2%
85	71.3%	75.0%
86	64.5%	65.9%
87	92.8%	93.2%
88	59.8%	57.8%
89	67.7%	68.8%
90	62.0%	62.2%
91	57.4%	56.7%
92	75.4%	74.9%
93	91.6%	92.0%
94	84.8%	85.0%
95	58.0%	57.3%
96	54.0%	50.0%
97	53.5%	47.3%
98	68.8%	63.7%
99	26.3%	26.2%
100	27.9%	26.4%
101	54.7%	50.4%
102	53.0%	50.6%
103	24.4%	19.5%
104	30.3%	28.2%
105	42.3%	41.4%
106	51.8%	50.7%
107	54.3%	50.4%
108	56.2%	50.4%
109	55.1%	50.4%
110	51.8%	50.4%
111	22.9%	20.4%
112	22.3%	21.9%
113	58.7%	58.1%
114	28.3%	27.0%
115	56.1%	55.6%
116	60.0%	59.8%
117	55.6%	55.2%
118	30.9%	29.9%
119	23.5%	21.0%
120	21.1%	19.3%

	HD enacted	
HD	BH VAP	BH CVAP
121	15.0%	13.8%
122	39.9%	36.6%
123	28.4%	27.9%
124	31.6%	29.3%
125	30.6%	29.6%
126	57.2%	57.2%
127	22.9%	22.1%
128	51.9%	51.9%
129	58.5%	58.9%
130	63.2%	63.1%
131	23.0%	23.1%
132	59.5%	59.5%
133	38.7%	38.7%
134	37.1%	36.5%
135	25.4%	24.9%
136	32.2%	32.0%
137	55.9%	56.1%
138	22.4%	21.9%
139	26.2%	25.8%
140	64.8%	64.9%
141	63.1%	63.6%
142	62.6%	62.4%
143	65.1%	65.0%
144	31.7%	31.6%
145	41.2%	40.3%
146	32.0%	32.0%
147	36.9%	36.1%
148	36.9%	36.3%
149	37.1%	34.2%
150	59.5%	58.7%
151	49.4%	47.5%
152	28.3%	27.9%
153	70.2%	70.2%
154	56.2%	56.1%
155	37.9%	37.8%
156	37.0%	35.1%
157	33.4%	30.9%
158	35.5%	34.3%
159	27.2%	26.8%
160	27.3%	25.4%
161	33.4%	32.2%
162	52.6%	52.6%
163	52.5%	52.5%
164	31.4%	30.4%
165	55.2%	55.7%
166	9.6%	8.4%
167	29.2%	28.2%
168	55.2%	55.3%
169	36.5%	34.9%
170	32.7%	30.2%
171	44.0%	42.8%
172	36.6%	32.3%
173	41.4%	39.6%
174	25.2%	21.3%
175	29.0%	28.5%
176	30.7%	28.2%
177	59.4%	59.4%
178	19.7%	18.2%
179	33.1%	30.8%
180	23.5%	22.1%

	HD Alt Eff 1	
HD	BH VAP	BH CVAP
121	14.9%	13.8%
122	39.8%	36.6%
123	19.0%	17.0%
124	32.9%	31.6%
125	31.2%	29.9%
126	55.5%	55.6%
127	19.1%	19.2%
128	51.5%	51.6%
129	54.7%	55.2%
130	58.0%	58.0%
131	31.5%	31.5%
132	60.8%	61.1%
133	50.4%	50.5%
134	37.0%	36.5%
135	25.4%	24.9%
136	32.1%	32.0%
137	54.9%	55.1%
138	22.4%	21.9%
139	26.1%	25.8%
140	64.0%	64.5%
141	59.1%	59.4%
142	53.9%	53.9%
143	58.2%	57.6%
144	54.2%	54.4%
145	25.6%	25.2%
146	27.8%	27.5%
147	38.4%	37.8%
148	41.7%	41.1%
149	37.0%	34.2%
150	56.2%	55.6%
151	58.0%	56.9%
152	37.1%	36.6%
153	55.3%	54.9%
154	51.9%	51.7%
155	37.8%	37.8%
156	36.9%	35.1%
157	33.4%	30.9%
158	35.4%	34.3%
159	25.6%	24.9%
160	31.2%	29.6%
161	50.1%	50.0%
162	49.7%	49.6%
163	50.3%	50.1%
164	17.6%	16.8%
165	51.5%	52.5%
166	11.6%	10.5%
167	25.6%	25.1%
168	55.0%	55.2%
169	32.9%	30.3%
170	39.1%	35.7%
171	54.8%	54.1%
172	34.3%	31.4%
173	40.7%	38.8%
174	24.7%	21.3%
175	26.3%	25.8%
176	29.8%	28.3%
177	59.4%	59.4%
178	19.7%	18.2%
179	39.0%	36.8%
180	22.0%	20.6%

	HD Alt Eff 2	
HD	BH VAP	BH CVAP
121	14.9%	13.8%
122	39.8%	36.6%
123	19.5%	17.6%
124	29.1%	27.9%
125	35.6%	35.0%
126	54.4%	54.4%
127	23.2%	22.5%
128	51.5%	51.6%
129	53.2%	53.7%
130	61.1%	61.0%
131	22.7%	22.7%
132	60.6%	61.1%
133	48.4%	48.4%
134	37.0%	36.5%
135	25.4%	24.9%
136	32.1%	32.0%
137	51.4%	51.5%
138	22.4%	21.9%
139	26.1%	25.8%
140	70.8%	71.4%
141	55.0%	55.3%
142	53.3%	53.4%
143	58.6%	58.0%
144	54.7%	54.9%
145	25.7%	25.2%
146	29.4%	29.2%
147	37.2%	36.5%
148	43.9%	43.2%
149	37.0%	34.2%
150	56.9%	56.3%
151	52.6%	51.2%
152	36.2%	35.7%
153	63.9%	63.9%
154	64.1%	63.7%
155	37.8%	37.8%
156	36.9%	35.1%
157	33.4%	30.9%
158	35.4%	34.3%
159	25.3%	24.6%
160	30.9%	29.3%
161	50.9%	50.0%
162	50.8%	50.6%
163	49.8%	50.5%
164	18.4%	17.7%
165	49.9%	50.7%
166	11.2%	10.0%
167	43.1%	42.5%
168	50.2%	50.1%
169	35.6%	34.2%
170	35.2%	33.4%
171	40.1%	37.7%
172	39.0%	35.8%
173	34.4%	33.1%
174	24.7%	21.3%
175	22.5%	21.7%
176	32.2%	29.6%
177	59.4%	59.4%
178	19.7%	18.2%
179	24.4%	22.3%
180	23.9%	22.5%

Table 26: Overall, the enacted House plan has 62 majority-BHVAP districts, dropping to 60 majority districts by BHCVAP. Both Gingles 1 demonstrative alternatives add to the count significantly.

9 Effectiveness-oriented demonstration plans

In §7 above, I presented a number of alternative plans as Gingles 1 demonstrative maps. Each of these plans increases the number of majority districts for the coalition of Black and Latino Georgians, while simultaneously ensuring that traditional districting principles are highly respected and that the new majority districts are likely to provide effective opportunity-to-elect.

In this section, I will offer an additional set of alternative plans—one new example per legislative cluster—that illustrate that my notion of effectiveness is capable of identifying opportunity districts short of the Gingles 1 demographic threshold of 50%+1. Indeed, the existence of crossover support for Black and Latino candidates of choice by Asian-American, White, and other voters is a certainty. The ease of finding alternative plans that draw on broader voting coalitions will bolster the racial gerrymandering discussion below in §10. That is, in the enacted plans, the state has not just avoided majority districts but has even conspicuously limited the number of districts providing effective opportunity-to-elect well below the level that is easily attainable from a race-neutral mapping process.

9.1 Congressional effectiveness

As a matter of mapmaking, it is extremely easy to improve on the very limited number of effective districts—just five—in the state's enacted plan (see Table 4). To do this involves relieving the packing and cracking from the enacted plan.

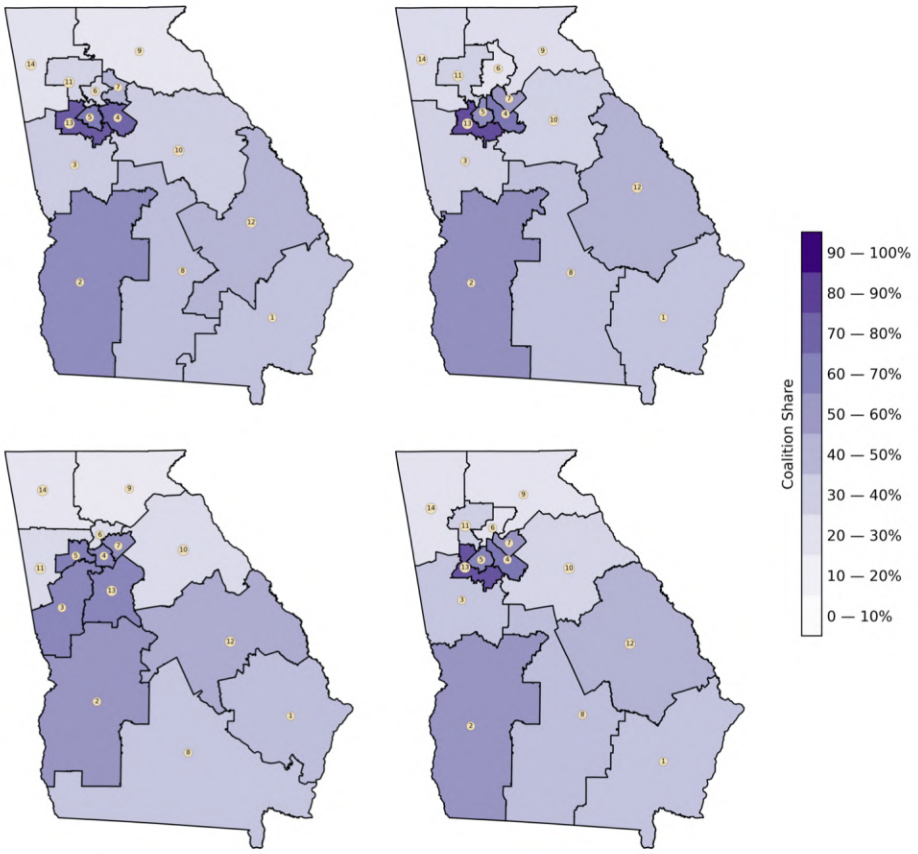


Figure 16: The benchmark plan (top left), the enacted plan (top right), and the Duncan-Kennedy plan (bottom right) all exhibit a pronounced pattern of packing and cracking relative to the alternative Congressional plan presented here (CD Alt, bottom left).

9.2 State Senate alternatives

The "Alt Eff 3" plans shown here are another set of effective alternatives; these cover the entire state, working modularly in the clusters from Atlanta, Gwinnett, Southwest, East Black Belt, Southeast, and Northwest Georgia.

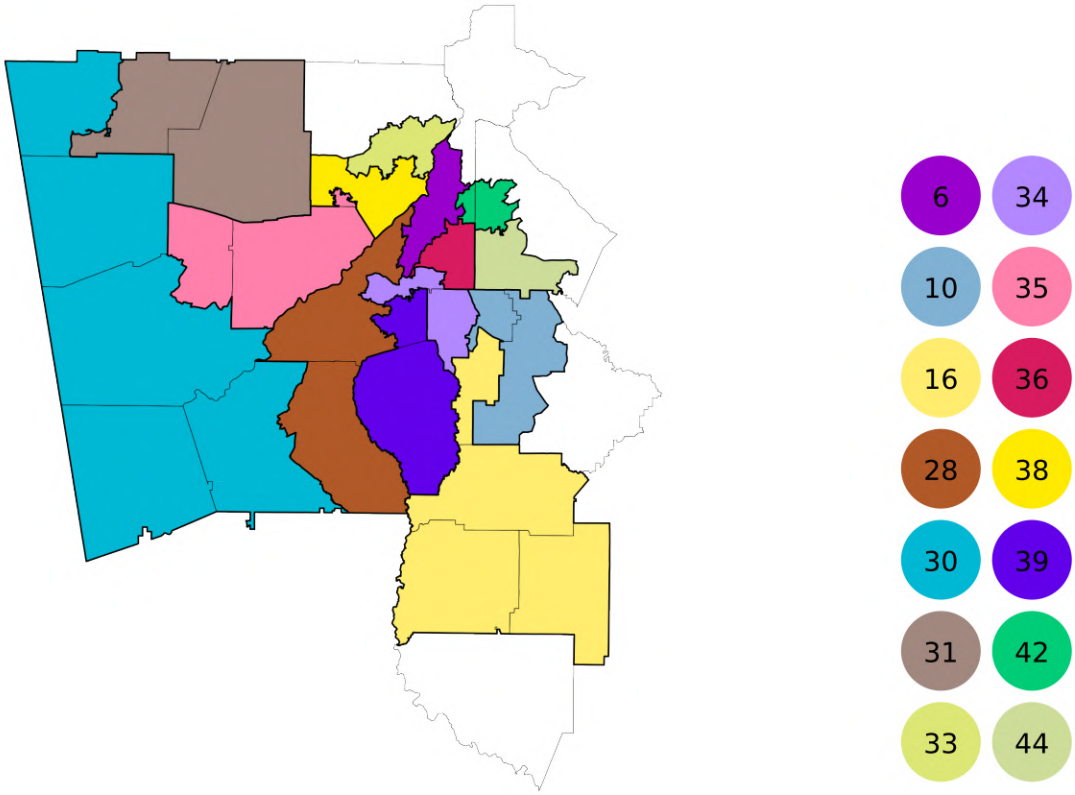


Figure 17: SD Atlanta alternative effective plan.

	SD Atlanta Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
6	23.9%	32.1%	0	8
10	71.5%	76.7%	4	8
16	22.7%	27.7%	3	0
28	19.5%	25.9%	2	0
30	20.9%	27.0%	2	0
31	20.7%	28.1%	3	0
33	43.0%	65.9%	4	8
34	69.5%	82.2%	4	8
35	71.9%	79.4%	4	8
36	51.3%	58.4%	3	8
38	65.3%	73.7%	4	8
39	60.7%	66.3%	3	8
42	30.8%	39.4%	0	8
44	71.3%	79.9%	4	8

	SD Atlanta Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
6	43.8%	50.3%	3	8
10	60.7%	70.3%	4	8
16	47.5%	53.4%	4	8
28	51.9%	57.5%	4	8
30	17.3%	24.2%	1	0
31	21.6%	27.6%	3	0
33	30.3%	50.2%	3	8
34	76.8%	88.7%	4	8
35	42.8%	51.4%	4	8
36	60.1%	66.4%	3	8
38	46.3%	59.2%	3	8
39	49.7%	55.6%	3	8
42	17.2%	27.3%	0	8
44	76.9%	80.1%	3	8

Table 27: SD Atlanta (14 districts).

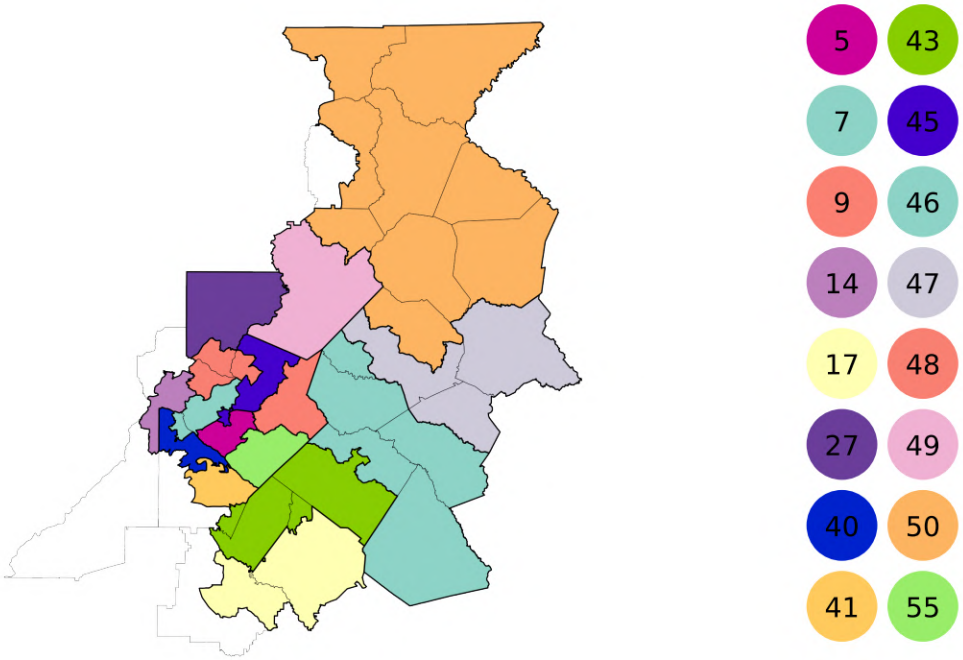


Figure 18: SD Gwinnett alternative effective plan.

	SD Gwinnett Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
5	29.9%	71.6%	3	8
7	21.4%	38.0%	3	8
9	29.5%	48.3%	3	8
14	19.0%	31.1%	0	8
17	32.0%	37.1%	3	0
27	5.0%	15.2%	0	0
40	19.2%	40.8%	0	8
41	62.6%	69.3%	3	8
43	64.3%	71.2%	4	8
45	18.6%	31.7%	3	0
46	16.9%	23.9%	1	0
47	17.4%	27.0%	3	0
48	9.5%	16.5%	1	0
49	8.0%	29.9%	1	0
50	5.6%	14.4%	1	0
55	66.0%	74.7%	4	8

	SD Gwinnett Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
5	25.2%	61.5%	3	8
7	20.2%	46.4%	3	8
9	32.1%	49.2%	3	6
14	19.0%	31.1%	0	8
17	46.9%	52.7%	4	7
27	4.7%	14.9%	0	0
40	25.6%	39.1%	0	8
41	84.8%	89.6%	4	8
43	45.4%	51.8%	4	7
45	22.4%	42.0%	3	5
46	12.0%	19.4%	1	0
47	18.8%	27.5%	2	7
48	9.9%	16.3%	2	0
49	8.2%	32.8%	1	0
50	5.3%	11.3%	1	0
55	44.0%	54.8%	4	8

Table 28: SD Gwinnett (16 districts).

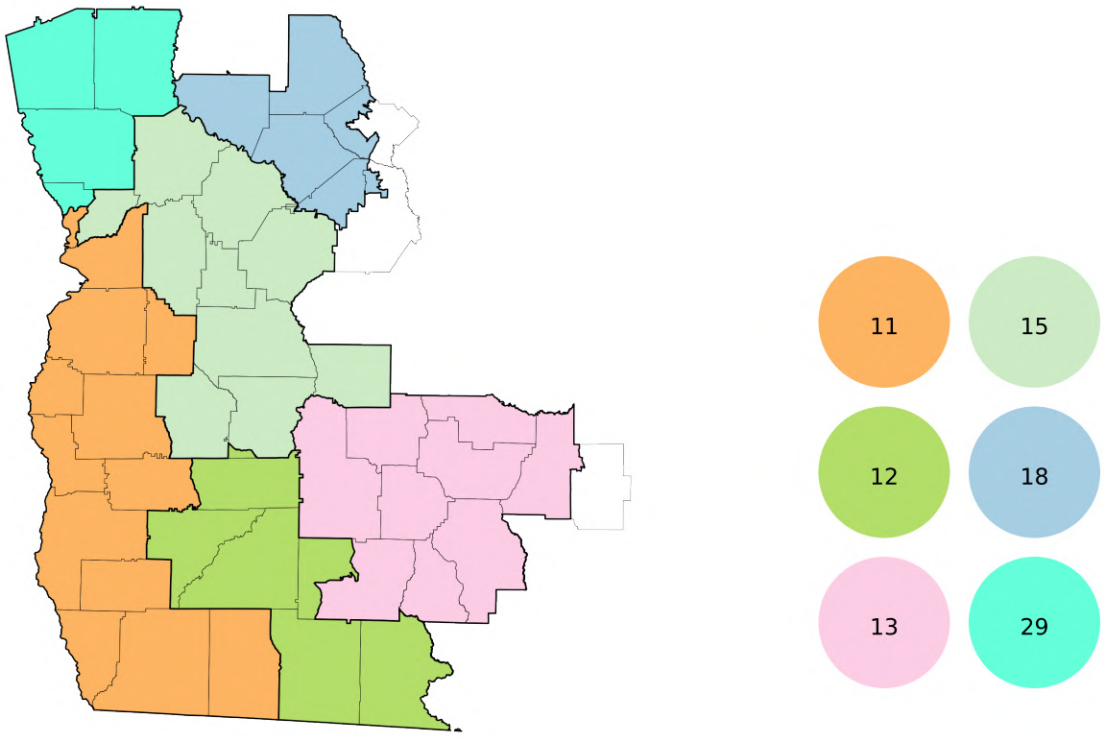


Figure 19: SD Southwest alternative effective plan.

	SD Southwest Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
11	31.0%	38.6%	4	0
12	58.0%	61.5%	4	8
13	27.0%	33.0%	4	0
15	54.0%	60.6%	4	8
18	30.4%	34.9%	3	0
29	26.9%	31.4%	3	0

	SD Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
11	44.0%	50.9%	4	6
12	50.1%	53.4%	4	7
13	25.6%	34.7%	4	0
15	50.4%	54.7%	4	8
18	30.4%	34.9%	3	0
29	27.3%	31.9%	3	0

Table 29: SD Southwest (6 districts).

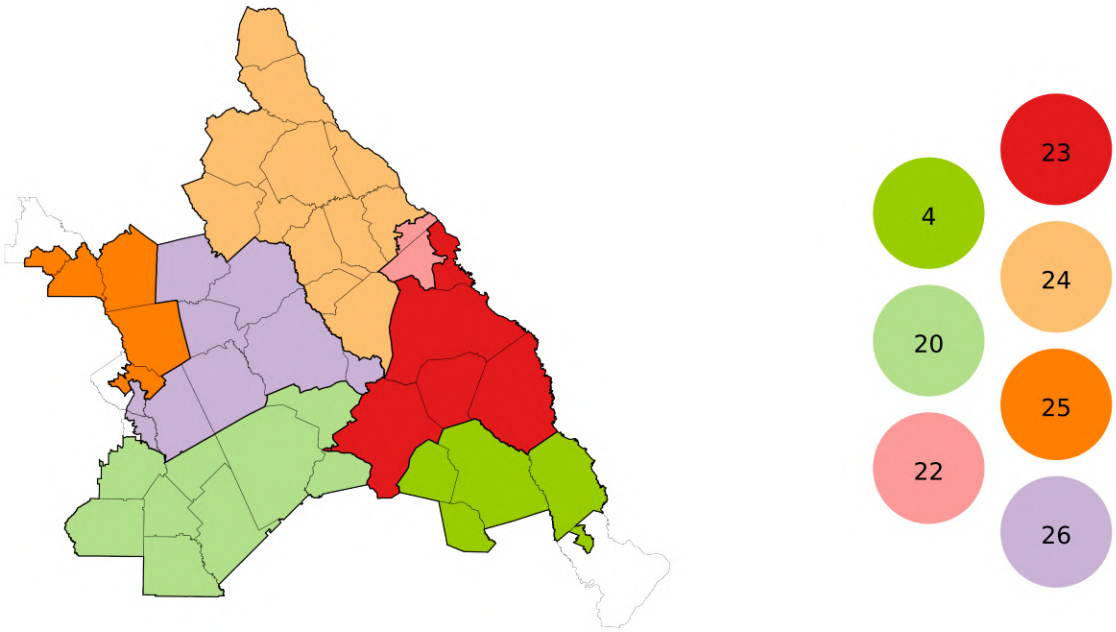


Figure 20: SD East Black Belt alternative effective plan.

	SD East Black Belt Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
4	23.4%	28.9%	3	0
20	31.3%	34.8%	3	0
22	56.5%	61.8%	4	8
23	35.5%	40.0%	3	0
24	19.9%	24.3%	3	0
25	33.5%	37.2%	3	0
26	57.0%	61.2%	3	8

	SD East Black Belt Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
4	23.4%	28.9%	3	0
20	32.0%	35.3%	3	0
22	39.1%	46.1%	4	8
23	46.1%	49.6%	3	7
24	26.5%	30.3%	3	0
25	45.7%	49.6%	3	8
26	44.0%	48.2%	3	5

Table 30: SD East Black Belt (7 districts).

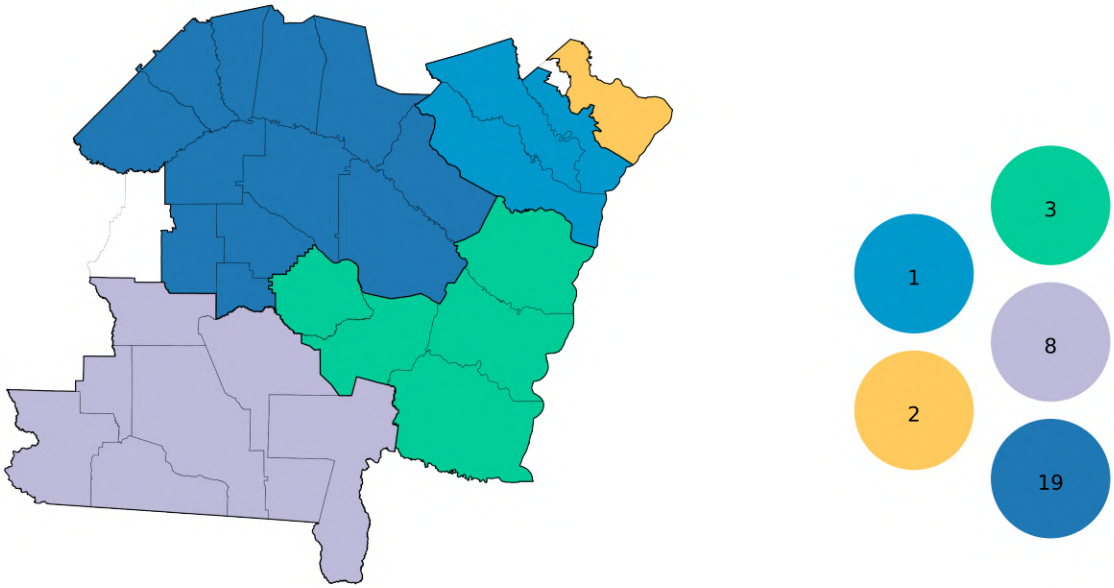


Figure 21: SD Southeast alternative effective plan.

	SD Southeast Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	25.1%	32.6%	3	0
2	46.9%	54.4%	4	8
3	21.2%	27.4%	3	0
8	30.4%	36.6%	4	0
19	25.7%	34.1%	4	0

	SD Southeast Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	34.8%	43.7%	4	6
2	37.4%	43.6%	3	8
3	19.1%	24.3%	3	0
8	32.5%	39.7%	4	0
19	25.5%	33.8%	4	0

Table 31: SD Southeast (5 districts).

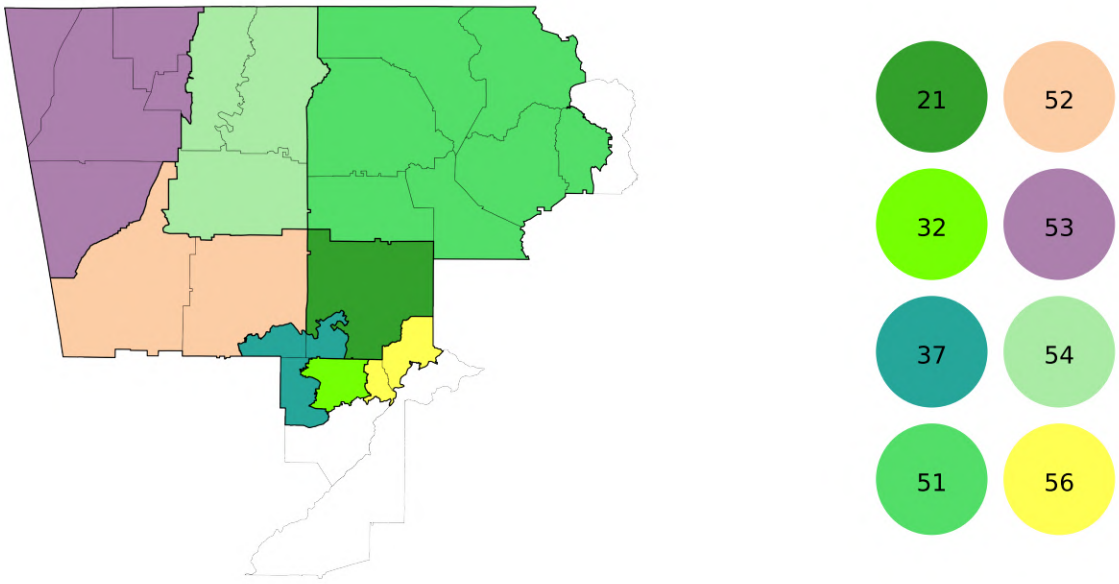


Figure 22: SD Northwest alternative plan that increases effectiveness by creating a competitive SD 32 that is well aligned with Black and Latino preferences in primary elections.

	SD Northwest Enacted			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
21	7.5%	16.3%	2	0
32	14.9%	25.4%	3	0
37	19.3%	28.0%	3	0
51	1.2%	5.5%	0	0
52	13.0%	21.2%	1	0
53	5.1%	8.3%	1	0
54	3.8%	26.4%	1	0
56	7.6%	15.3%	0	0

	SD Northwest Alt Eff 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
21	6.5%	16.5%	1	0
32	21.0%	31.2%	3	3
37	13.1%	22.1%	3	0
51	1.2%	5.5%	0	0
52	13.3%	22.0%	1	0
53	4.6%	7.5%	1	0
54	3.8%	26.6%	1	0
56	8.3%	14.6%	0	0

Table 32: SD Northwest (8 districts).

9.3 State House alternatives

The "Alt Eff" (alternative effective) districts in the House cover all of the regional clusters listed above: Atlanta, Cobb, DeKalb, Gwinnett, Southwest, East Black Belt, and Southeast Georgia.

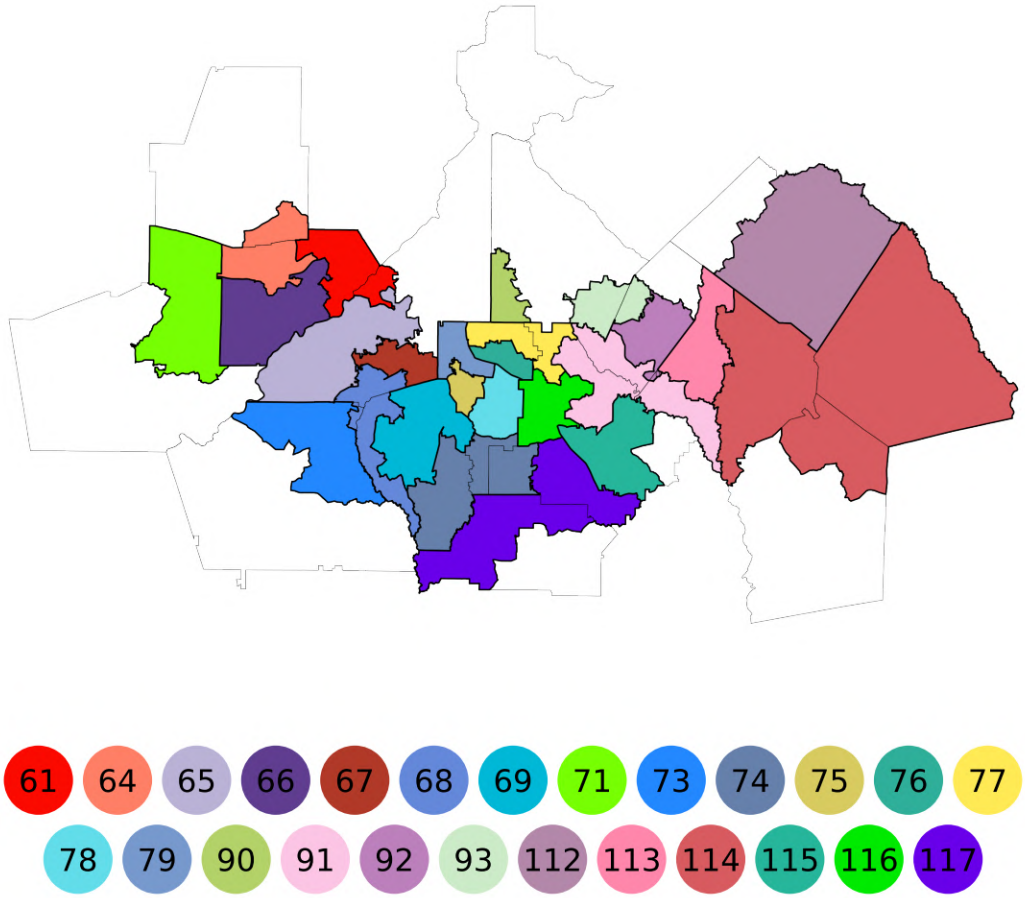


Figure 23: HD Atlanta Alt Eff 3 plan.

	HD Atlanta Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
61	74.3%	81.9%	4	8
64	30.7%	38.1%	3	0
65	62.0%	66.5%	4	8
66	53.4%	62.9%	4	8
67	58.9%	66.7%	4	8
68	55.7%	62.0%	4	8
69	63.6%	69.0%	4	8
71	19.9%	26.1%	3	0
73	12.1%	19.1%	2	0
74	25.5%	31.1%	3	0
75	74.4%	85.7%	4	8
76	67.2%	80.4%	4	8
77	76.1%	88.3%	4	8
78	71.6%	80.5%	4	8
79	71.6%	87.6%	4	8
90	58.5%	62.8%	2	8
91	70.0%	75.9%	4	8
92	68.8%	73.5%	4	8
93	65.4%	75.0%	4	8
112	19.2%	22.5%	1	0
113	59.5%	66.2%	4	8
114	24.7%	28.4%	3	0
115	52.1%	59.1%	4	8
116	58.1%	65.4%	4	8
117	36.6%	42.0%	3	0

	HD Atlanta Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
61	64.9%	74.5%	4	8
64	43.7%	52.4%	4	7
65	87.0%	90.2%	4	8
66	40.5%	48.1%	4	5
67	89.1%	94.7%	4	8
68	36.7%	44.4%	3	5
69	33.6%	40.3%	3	6
71	19.9%	26.1%	3	0
73	11.5%	17.9%	2	0
74	48.5%	54.7%	4	8
75	78.7%	90.0%	4	8
76	59.5%	76.4%	4	8
77	66.1%	80.0%	4	8
78	70.6%	79.9%	4	8
79	80.7%	91.3%	4	8
90	58.5%	62.8%	2	8
91	43.2%	48.3%	4	6
92	64.4%	71.2%	4	8
93	85.1%	92.0%	4	8
112	19.2%	22.5%	1	0
113	61.1%	66.9%	4	8
114	26.0%	30.0%	3	0
115	47.3%	53.9%	4	5
116	57.3%	65.3%	4	8
117	39.6%	45.8%	4	5

Table 33: HD Atlanta (25 districts).

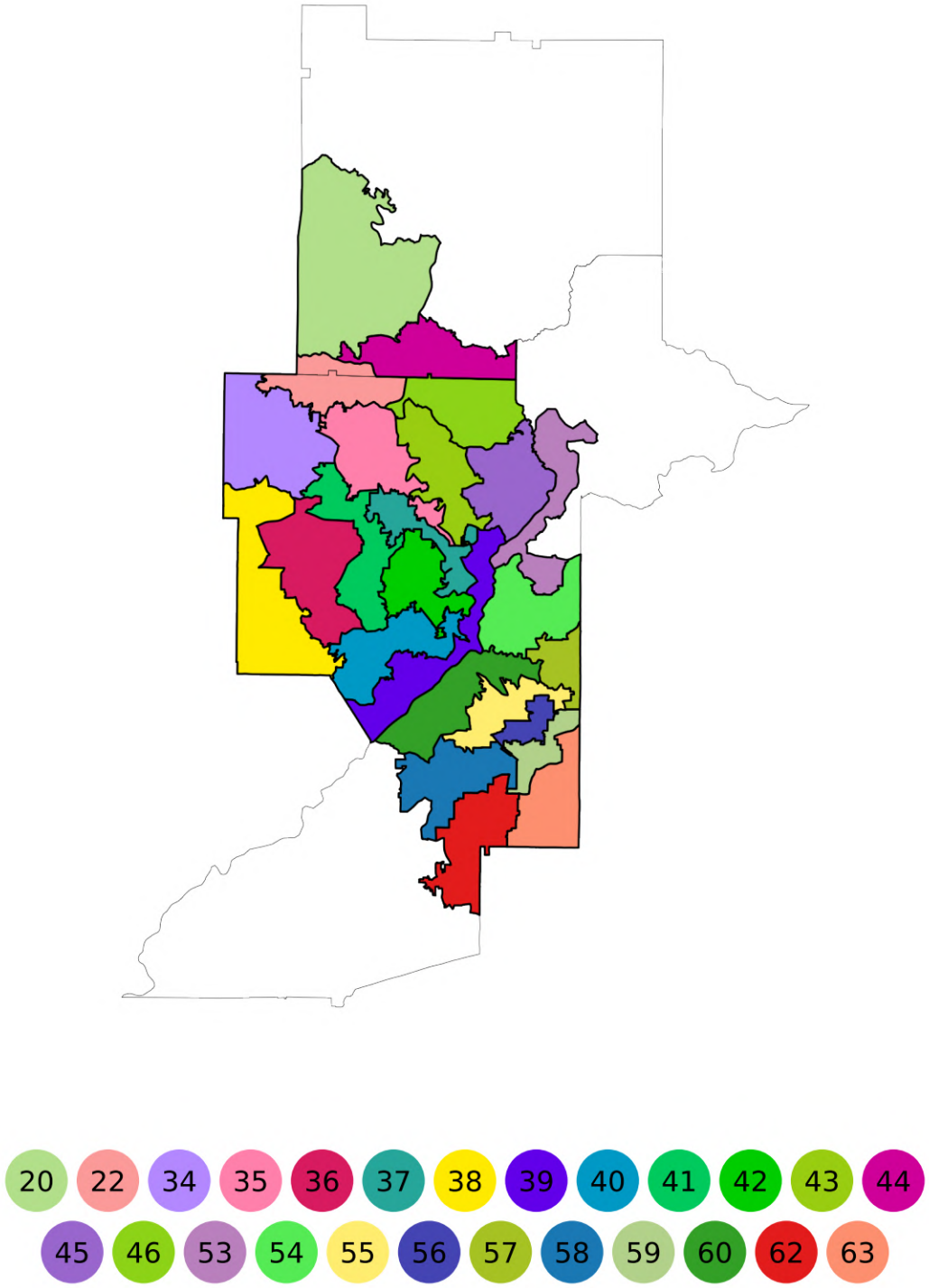


Figure 24: HD Cobb Alt Eff 3 plan.

	HD Cobb Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
20	9.3%	18.5%	1	0
22	15.1%	26.7%	3	0
34	15.7%	23.5%	3	0
35	28.4%	39.6%	3	8
36	17.0%	23.5%	3	0
37	28.2%	46.8%	3	8
38	54.2%	66.8%	4	8
39	55.3%	74.0%	4	8
40	33.0%	38.9%	3	8
41	39.4%	68.0%	4	8
42	33.7%	51.1%	3	8
43	26.5%	40.6%	3	8
44	12.0%	22.5%	2	0
45	5.3%	10.2%	0	0
46	8.1%	15.5%	0	0
53	14.5%	21.9%	0	1
54	15.5%	28.3%	0	7
55	55.4%	60.4%	3	8
56	45.5%	51.3%	3	8
57	18.1%	26.1%	0	8
58	63.0%	68.1%	3	8
59	70.1%	74.5%	3	8
60	63.9%	69.0%	3	8
62	72.3%	79.1%	3	8
63	69.3%	78.6%	3	8

	HD Cobb Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
20	6.9%	14.5%	1	0
22	22.9%	34.3%	3	5
34	15.5%	24.2%	3	0
35	31.2%	44.9%	3	8
36	38.9%	50.9%	3	8
37	33.7%	51.8%	3	8
38	41.9%	51.6%	3	8
39	45.5%	56.6%	3	8
40	39.9%	53.3%	3	8
41	32.3%	52.3%	3	8
42	28.4%	51.1%	3	8
43	16.2%	25.9%	3	5
44	11.2%	24.7%	1	0
45	5.0%	9.8%	0	0
46	9.2%	16.6%	0	0
53	17.5%	32.1%	0	7
54	12.4%	17.5%	0	1
55	50.6%	56.1%	3	8
56	44.2%	51.0%	3	8
57	18.9%	27.1%	0	8
58	93.1%	95.3%	4	8
59	51.2%	56.1%	3	8
60	57.0%	63.1%	3	8
62	81.5%	88.7%	3	8
63	61.6%	70.8%	3	8

Table 34: HD Cobb (25 districts).

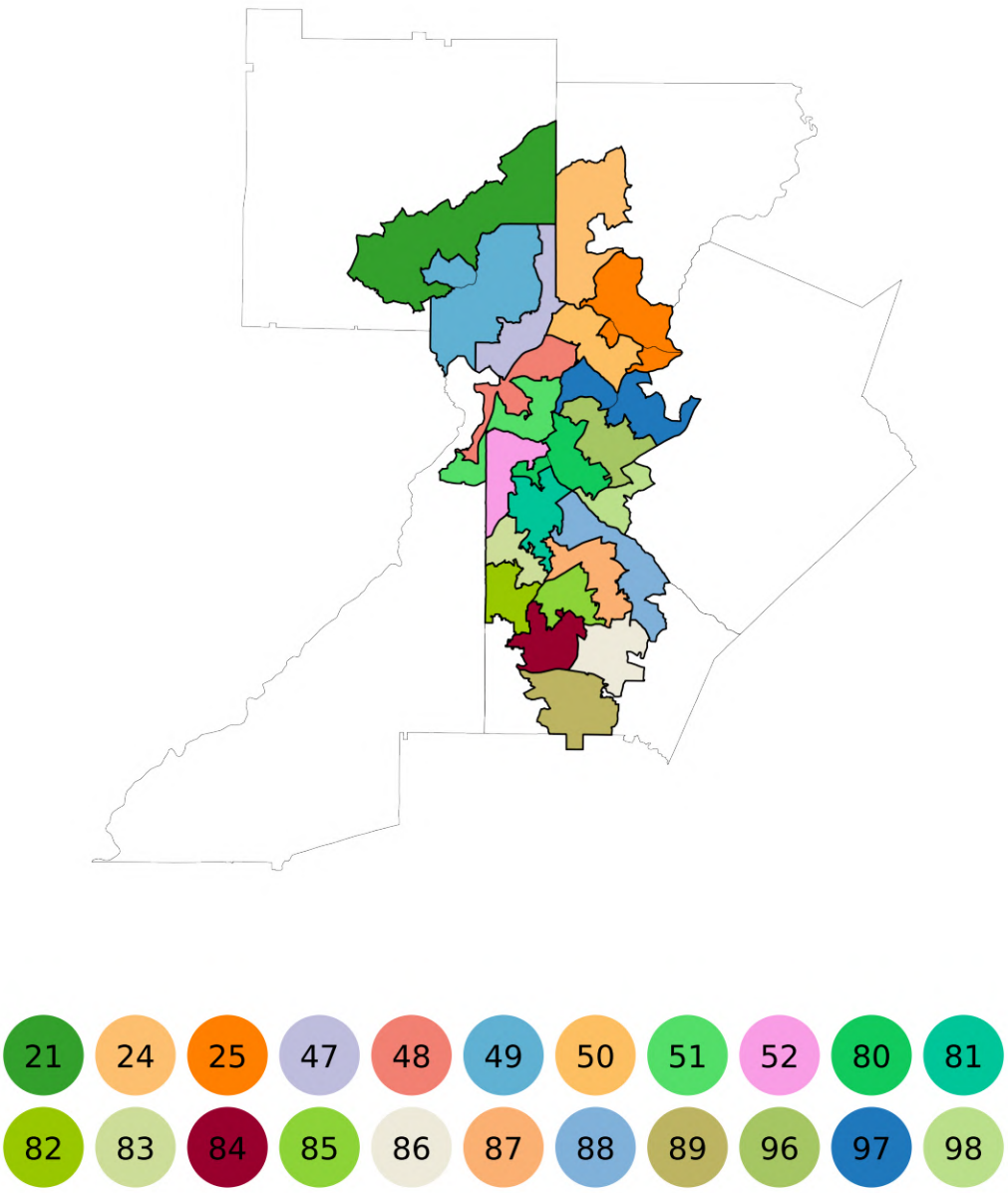


Figure 25: HD DeKalb Alt Eff 3 plan.

	HD DeKalb Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
21	5.1%	12.5%	1	0
24	7.0%	17.3%	1	0
25	5.9%	11.0%	0	0
47	10.7%	18.1%	2	0
48	11.8%	24.2%	0	1
49	8.4%	15.1%	0	0
50	12.4%	18.8%	2	8
51	23.7%	37.0%	0	8
52	16.0%	23.4%	0	8
80	14.2%	37.3%	0	8
81	21.8%	42.7%	0	8
82	16.8%	23.6%	0	8
83	15.1%	43.6%	0	8
84	73.7%	76.7%	3	8
85	62.7%	68.6%	3	8
86	75.1%	79.4%	3	8
87	73.1%	79.8%	4	8
88	63.3%	73.3%	3	8
89	62.5%	65.9%	2	8
96	23.0%	59.0%	3	8
97	26.8%	46.0%	3	8
98	23.2%	76.0%	3	8

	HD DeKalb Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
21	5.1%	12.4%	1	0
24	7.0%	17.3%	1	0
25	5.9%	10.7%	0	0
47	15.7%	31.4%	3	5
48	20.8%	32.2%	3	8
49	5.8%	11.0%	0	0
50	12.6%	19.7%	2	7
51	16.1%	24.4%	0	6
52	10.9%	16.4%	0	7
80	27.2%	60.1%	3	8
81	16.0%	49.2%	0	8
82	16.9%	23.2%	0	8
83	15.0%	36.5%	0	8
84	62.6%	67.7%	3	8
85	54.8%	59.4%	3	8
86	90.8%	94.5%	4	8
87	60.6%	68.7%	3	8
88	45.9%	59.3%	3	8
89	94.7%	97.0%	4	8
96	20.5%	50.2%	3	8
97	19.0%	32.8%	3	8
98	24.4%	71.2%	3	8

Table 35: HD DeKalb (22 districts).

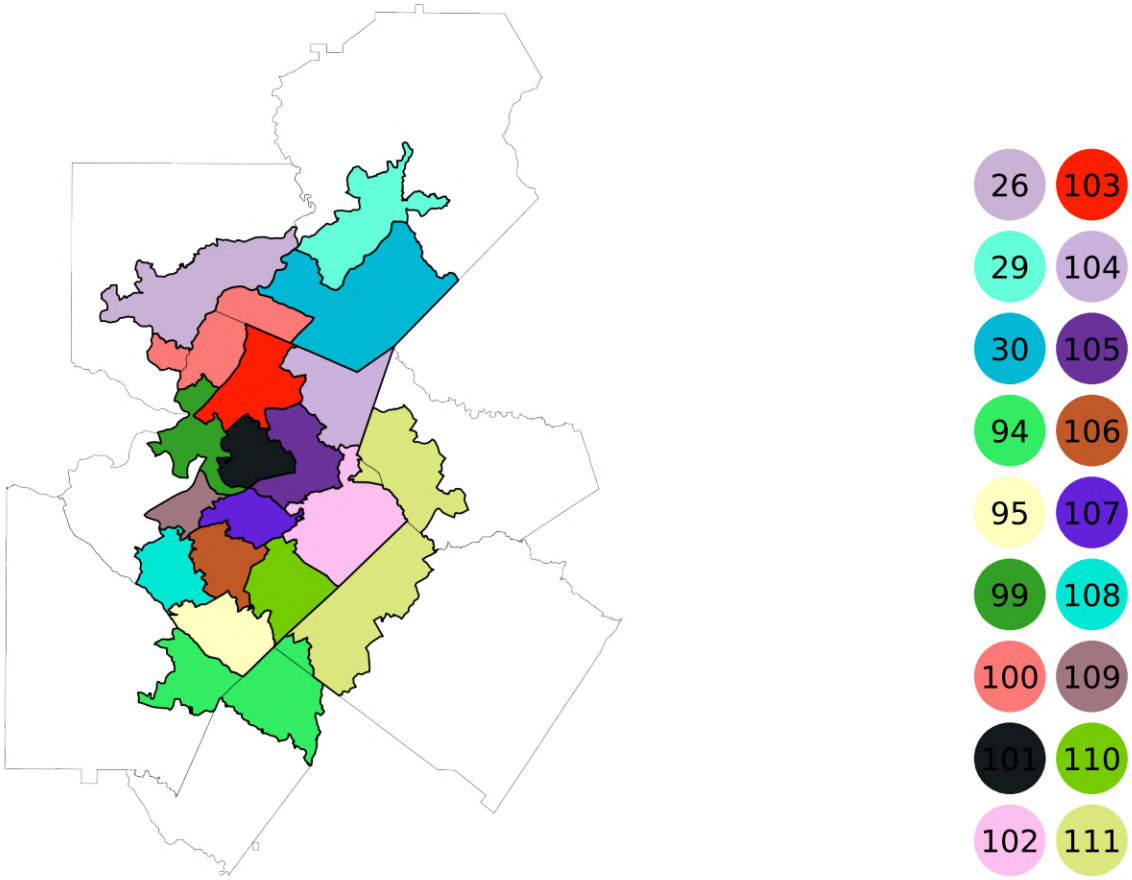


Figure 26: HD Gwinnett Alt Eff 3 plan.

	HD Gwinnett Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
26	4.0%	14.8%	0	0
29	13.6%	53.3%	2	0
30	8.1%	24.2%	0	0
94	69.0%	76.3%	4	8
95	67.2%	75.1%	4	8
99	14.7%	23.4%	3	3
100	10.0%	20.0%	1	0
101	24.2%	42.4%	3	7
102	37.6%	58.9%	3	8
103	16.8%	33.7%	3	0
104	17.0%	28.1%	3	0
105	29.0%	45.8%	3	6
106	36.3%	47.4%	3	7
107	29.6%	60.7%	3	8
108	18.4%	36.6%	3	6
109	32.5%	68.6%	3	8
110	47.2%	57.7%	4	8
111	22.3%	31.1%	3	0

	HD Gwinnett Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
26	4.1%	14.8%	0	0
29	13.6%	53.3%	2	0
30	6.6%	22.7%	0	0
94	79.8%	84.3%	4	8
95	59.7%	71.1%	4	8
99	16.9%	27.3%	3	5
100	10.1%	21.3%	2	0
101	24.4%	41.9%	3	7
102	40.2%	53.3%	4	7
103	19.5%	35.8%	3	3
104	18.9%	29.3%	3	0
105	33.2%	53.2%	3	8
106	25.4%	40.4%	3	6
107	30.2%	55.7%	3	8
108	19.8%	39.6%	3	6
109	33.5%	72.2%	4	8
110	47.5%	58.8%	4	8
111	14.1%	23.0%	3	0

Table 36: HD Gwinnett (18 districts).

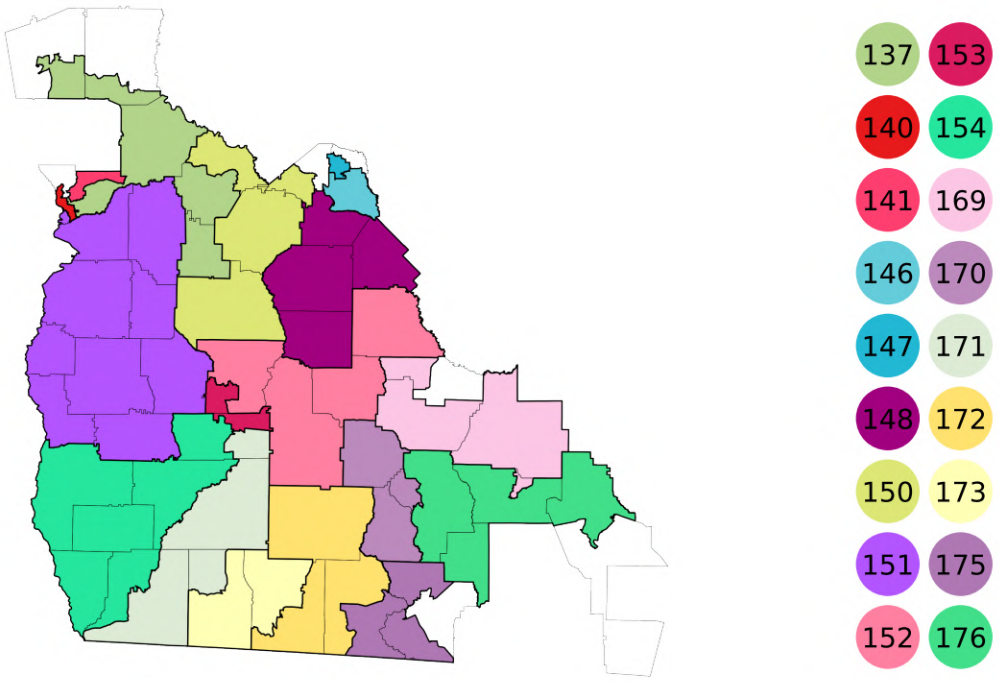


Figure 27: HD Southwest Alt Eff 3 plan.

	HD Southwest Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
137	52.1%	56.6%	4	8
140	57.6%	65.6%	4	8
141	57.5%	64.1%	4	8
146	27.6%	32.3%	4	0
147	30.1%	37.3%	4	0
148	34.0%	37.1%	4	0
150	53.6%	59.7%	4	8
151	42.4%	49.7%	4	0
152	26.1%	28.4%	4	0
153	67.9%	70.4%	4	8
154	54.8%	56.5%	4	7
169	29.0%	36.7%	3	0
170	24.2%	32.9%	3	0
171	39.6%	44.2%	4	0
172	23.3%	36.7%	4	0
173	36.3%	41.7%	4	0
175	24.2%	29.2%	4	0
176	22.7%	30.9%	4	0

	HD Southwest Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
137	55.2%	58.4%	4	8
140	59.3%	66.9%	4	8
141	49.2%	56.1%	4	8
146	23.9%	29.4%	4	0
147	31.2%	38.0%	4	0
148	39.2%	42.4%	4	0
150	55.0%	60.9%	4	8
151	45.7%	54.0%	4	7
152	28.3%	30.7%	4	0
153	60.3%	62.8%	4	8
154	50.7%	52.9%	4	6
169	27.2%	37.2%	3	0
170	27.7%	36.6%	2	0
171	47.5%	51.8%	4	0
172	23.2%	36.2%	4	0
173	34.5%	39.9%	4	0
175	24.1%	29.5%	4	0
176	20.3%	25.7%	4	0

Table 37: HD Southwest (18 districts).

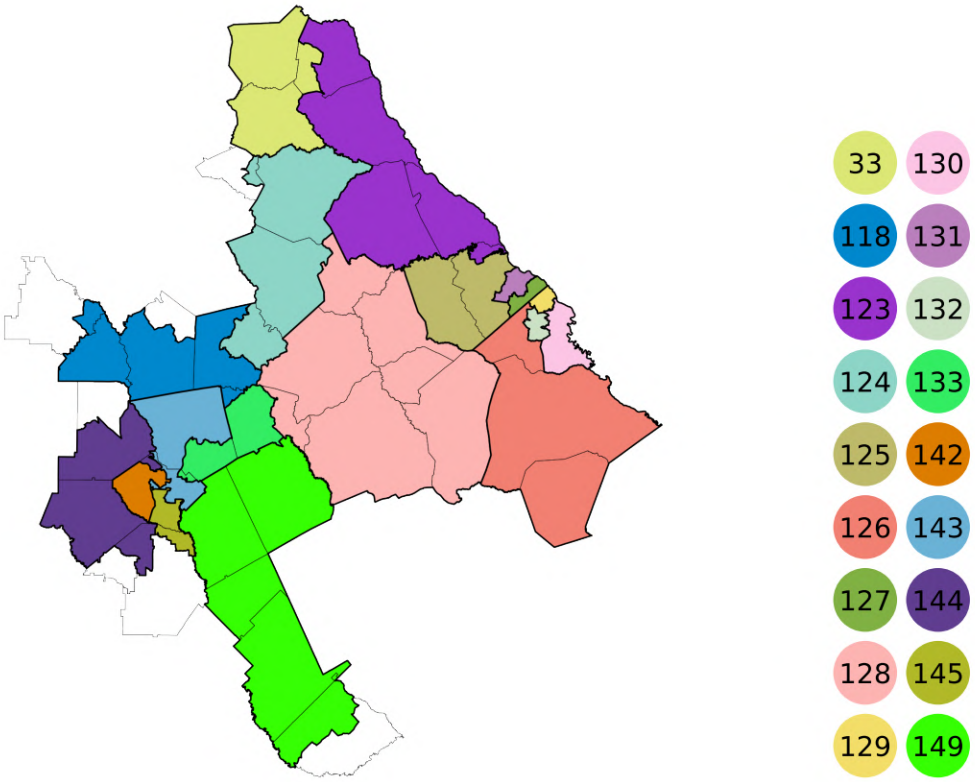


Figure 28: HD East Black Belt Alt Eff 3 plan.

	HD East Black Belt Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
33	11.2%	14.3%	3	0
118	23.6%	27.3%	3	0
123	24.3%	28.6%	3	0
124	25.6%	31.8%	2	0
125	23.7%	31.4%	3	0
126	54.5%	57.7%	4	8
127	18.5%	23.3%	3	0
128	50.4%	52.1%	2	4
129	54.9%	59.2%	3	8
130	59.9%	63.8%	4	8
131	17.6%	23.5%	3	0
132	52.3%	60.1%	4	8
133	36.8%	38.9%	3	0
142	59.5%	63.2%	3	8
143	60.8%	65.5%	3	8
144	29.3%	31.9%	3	0
145	35.7%	41.6%	3	0
149	32.1%	37.8%	2	0

	HD East Black Belt Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
33	9.3%	13.8%	3	0
118	22.8%	26.2%	3	0
123	25.5%	28.5%	3	0
124	25.3%	31.7%	2	0
125	30.7%	36.6%	3	0
126	41.0%	47.5%	4	8
127	17.2%	23.4%	3	0
128	51.9%	53.4%	2	7
129	38.2%	43.1%	3	5
130	60.6%	63.9%	4	8
131	18.0%	24.0%	3	0
132	74.7%	79.5%	4	8
133	45.4%	47.6%	3	8
142	42.1%	45.1%	3	6
143	54.8%	58.7%	3	8
144	26.0%	29.3%	3	0
145	55.1%	62.0%	4	8
149	32.1%	37.8%	2	0

Table 38: HD East Black Belt (18 districts).

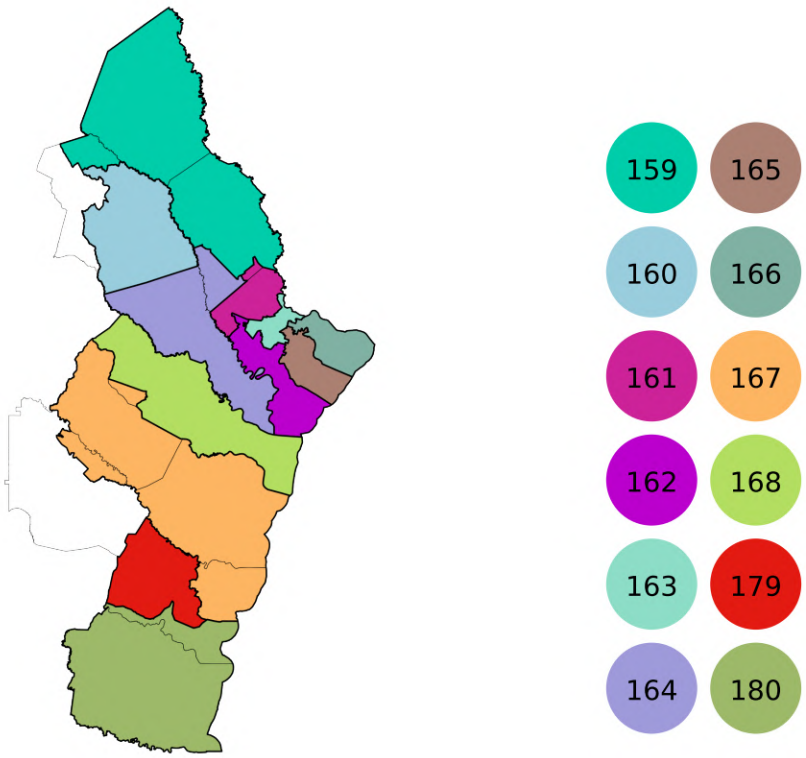


Figure 29: HD Southeast Alt Eff 3 plan.

	HD Southeast Enacted			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
159	24.5%	27.4%	2	0
160	22.6%	27.6%	2	0
161	27.1%	33.9%	4	0
162	43.7%	53.3%	4	8
163	45.5%	52.9%	3	8
164	23.5%	32.0%	3	0
165	50.3%	55.6%	4	8
166	5.7%	9.8%	3	0
167	22.3%	29.7%	3	0
168	46.3%	56.6%	4	8
179	27.0%	33.4%	3	0
180	18.2%	23.8%	3	0

	HD Southeast Alt Eff 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
159	22.3%	25.8%	3	0
160	26.4%	31.5%	1	0
161	34.1%	42.7%	4	6
162	38.9%	47.3%	4	8
163	50.0%	59.4%	4	8
164	13.6%	19.2%	3	0
165	27.1%	32.2%	3	5
166	29.9%	33.7%	3	8
167	18.7%	24.5%	3	0
168	45.9%	56.6%	4	8
179	31.8%	39.4%	4	0
180	18.2%	23.8%	3	0

Table 39: HD Southeast (12 districts).

10 Racial gerrymandering

10.1 Retention, displacement, and district disruption

In this section, I will examine the *core retention*, or conversely, the *population displacement*, of the districts in the enacted plan—that is, how much of the population retains the same district assignment before and after the redistricting? I will pay particular attention to the tendency to use racially imbalanced transfers of population in rebalancing the districts, and to the impact on the districts' effectiveness for electing Black and Latino candidates of choice.

10.1.1 Congress

In Congress, the ideal district population is 765,136. Of the fourteen districts, twelve are at least reasonably similar to their benchmark configuration, i.e., at least 2/3 of their population had been assigned to the same district before redistricting. The two with more than one-in-three new voters are districts 6 and 7.

District 6 was nearly at ideal size before the redistricting, having 771,431 residents enumerated in the Census—less than seven thousand off from the target size. However, it was subjected to major reconfiguration, with at least 40,000 people from the benchmark district reassigned to each of districts 4, 5, 7, and 11, while at least 40,000 different people were drawn in from each of districts 7, 9, and 11. In all, this represents reassignment of several hundred thousand people.

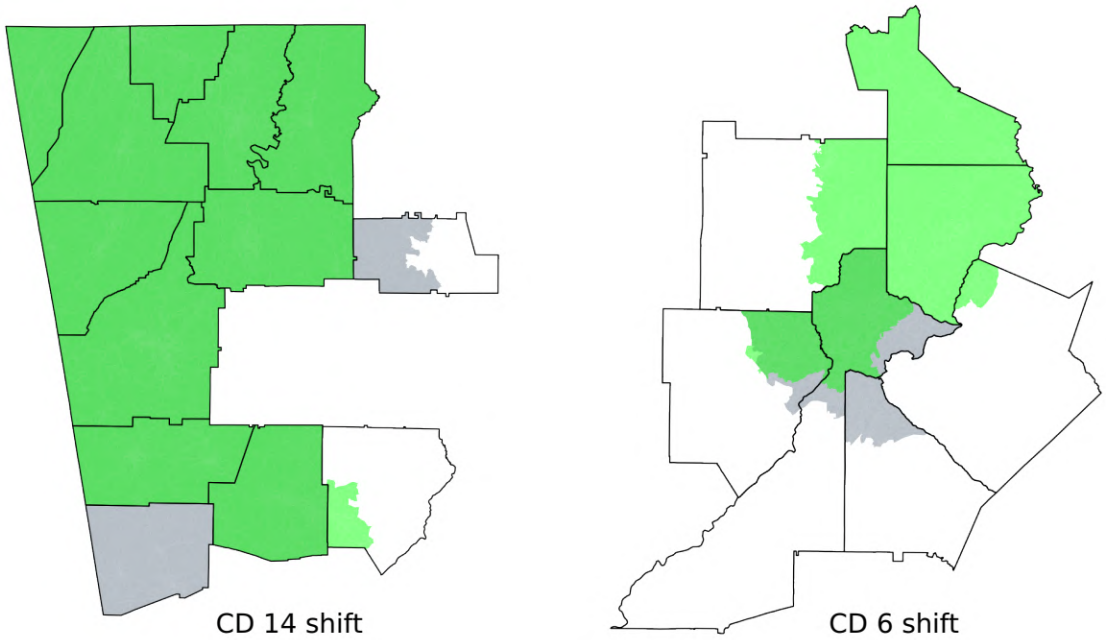


Figure 30: These before-and-after plots show benchmark configurations in gray, while new district placement is in light green. We can see that CD 14 made a new incursion into Cobb County while shedding rural Haralson and part of Pickens County. Meanwhile, CD 6 went sharply the other way, withdrawing from its metro Atlanta coverage and picking up rural counties to the north. Compare to Figure 31.

These swaps transfer more urban, more Black and Hispanic neighborhoods out of CD 6, while bringing in Whiter suburban areas. For instance, the largest reassignment out of the district goes from CD 6 to CD 4, and the largest reassignment into the district goes from CD 7 to CD 6—each of those moves roughly 200,000 Georgians to a new district, which is a massive shift. But the CD 6 to CD 4 transfer is 37.5% Black or Latino Georgians; by contrast, the CD 7 to CD 6 transfer is 16.1% Black or Latino. Since CD 6 was a performing district for the coalition of Black and Latino voters before its transformation, and none of the transfers improves representational prospects in non-performing districts, this transition looks to be plainly dilutive of voting power.

Meanwhile, the changes to CD 14 are smaller in terms of land area but are distinctive in terms of density and racial composition. CD 14 has expanded into Cobb to include two majority-Black cities—Powder Springs and Austell. Besides the further fracturing of Cobb County, Figure 31 makes it clear that the movement of those areas of Cobb into the district can't be justified in terms of compactness or respect for urban/rural communities of interest. (See §10.3 for references to the public record of community testimony.)

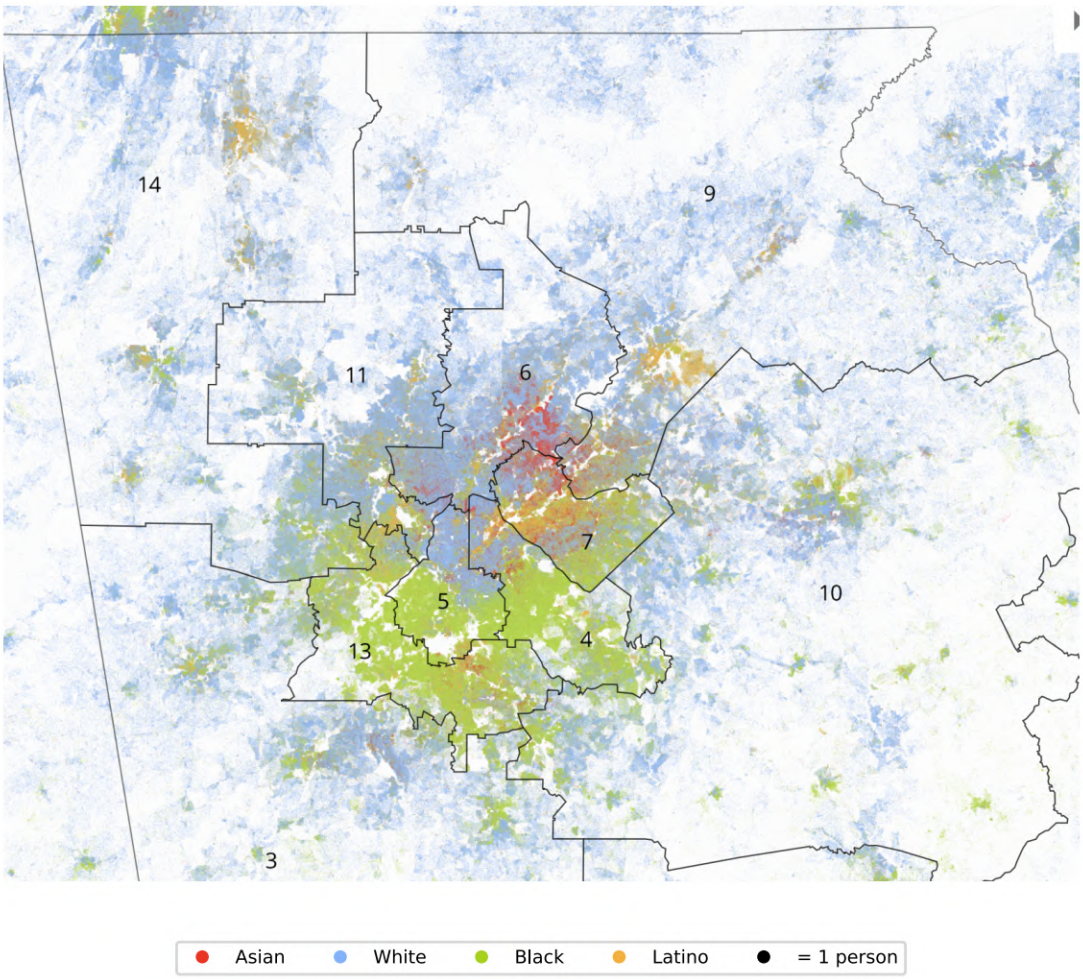


Figure 31: This dot density plot makes it clear—through thicker arrangement of dots, with green dots predominating—that dense African-American neighborhoods in Cobb were brought in at the southern tip of CD 14. These voters were therefore submerged among more numerous, dissimilar communities from CD 14. Meanwhile, the changes to district 6 added suburban/exurban/rural areas—seen with the sparsity at the north of CD 6 in the the dot density plot—unlike the bulk of the district.

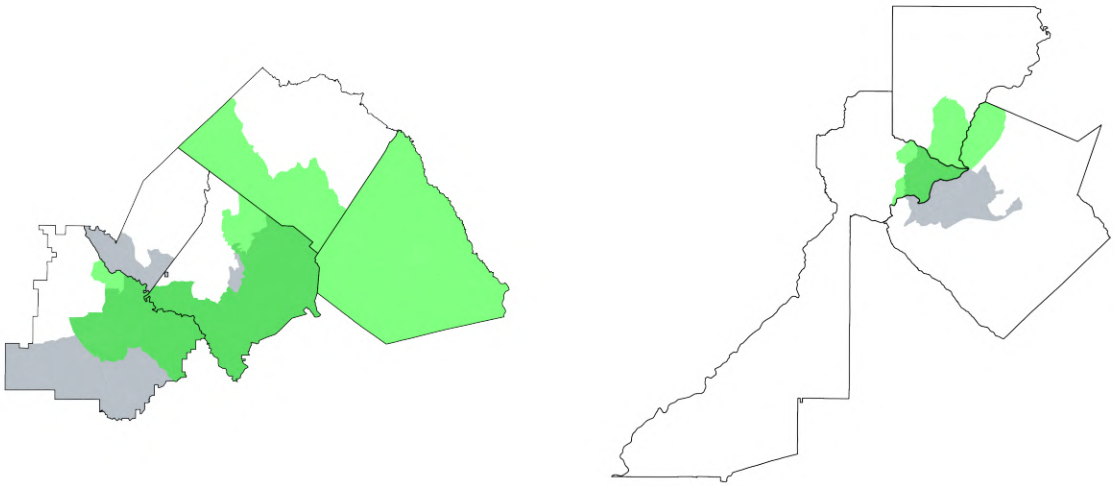
This incursion of CD 14 into Cobb is emphatically not required by adherence to traditional districting principles. For one vivid illustration of that, consider the comparison between the Duncan-Kennedy draft map and the map that was ultimately enacted. The benchmark plan from ten years ago had split Pickens County and included Haralson County in its construction of CD 14. Duncan-Kennedy retains Haralson, keeps Pickens whole in CD 9, and splits (low-density, mostly White) Bartow County to achieve population balance. Thus the shift in the final enacted plan—submerging a dense, majority-Black segment of Cobb in CD 14—was not necessary to balance population while keeping Pickens intact.

10.1.2 State Senate

When we move to smaller and more numerous districts in the Senate (ideal population 191,284), we might reasonably expect somewhat less core retention as line-drawers balance the traditional principles. However, the disruption in some cases is more than we would expect if retention were a highly prioritized goal. In the Senate, SD 7 and SD 14 have zero overlap with their previous population in the Benchmark configuration, and four other districts—SD 6, 32, 48, and 56—have less than half of their population retained.

New SD 14 is largely composed of benchmark SD 56, which was represented by Republican John Albers. The previous SD 56, which had become competitive over time (with four Republican victories and four Democratic victories across the elections in our probative dataset), was completely moved off of itself, to a new position that gave Biden only 43.7% support. Thus Albers could stay in the district numbered 56, facing largely new but very Republican-leaning voters, and win easily. This was achieved by racially imbalanced shifts: 56 → 14 has 35.5% BHVAP (substantial but still failing to secure electoral alignment in SD 14 with Black and Latino candidates of choice), while each group moved into SD 56 has under 19% BHVAP.

Another consequential district disruption occurred in benchmark district 48, which was represented by Democrat Michelle Au. Roughly two-thirds of the previous population of SD 48 was reassigned into SD 7 (see Figure 32 for geographical displacement). But the 7th district was already Democratic-controlled and was now facing the candidacy of progressive Nabilah Islam, who had been endorsed by civil rights groups including GALEO. The new SD 48 was built to be highly ineffective for Black and Latino preferences (aligned in only one of four primaries and zero of eight general elections from our probative dataset). Rather than run in the new district, Au switched to a run for the lower chamber, ultimately winning HD 50 in 2022. This district makeover was carried out with highly racially imbalanced transfers of population. Of more than 130,000 people moved from SD 48 to SD 7, 37.8% are Black and Latino, while the retained population has only 17.8% BHVAP share; and no territory reassigned into the district has BHVAP share exceeding 23.5%.



SD 17 shift SD 48 shift

Figure 32: These before-and-after plots show benchmark configurations in gray, while new district placement is in light green. The new configurations are clearly not made to improve compactness, and they increase the number of county traversals.

SD 17 also underwent a makeover: the district had become mildly overpopulated but was changed much more than needed, retaining only about half of its residents. (See, again, Figure 32.) Meanwhile, the district was transformed from effective (4/4 primaries, 5/8 generals) to ineffective (3/4 primaries, 0/8 generals). Outgoing population was roughly half Black and Latino (17 → 10 has 52.6% BHVAP, 17 → 25 has 49.0%, and 17 → 43 has 51.3%) while the significant incoming reassignments have much lower shares (25 → 17 has 20.9% and 46 → 17 has 23.8%). Notably, none of the districts that received population from SD 17 thereby became effective.

10.1.3 State House

At the House level, the ideal district size of just 59,511 necessitates substantial shifts to the districts, but once again the state's enacted map is highly disruptive, well beyond what is required. Fully 57 districts out of 180 were moved to positions completely disjoint from their benchmark locations. Furthermore, a startling 32 districts were not only moved or relabeled but effectively *dismantled*, with fewer than 30,000 prior residents assigned to any single district, so that no candidate can have the usual benefits of incumbency in terms of familiarity to their voters.

One notable category within these "dismantled" districts is those for which the ten-year demographic shifts had made the benchmark districts amenable to political swings, so that candidates from each major party would have won 2-6 out of 8 general contests in the dataset of probative elections. This includes seven districts: HD 35, 44, 48, 49, 52, 104, and 109. *Zero* of these remain in this "swingy" category after redrawing. Yet five are rebuilt to be ineffective for Black and Latino voters, while only two are made effective. Those that are rebuilt to be ineffective are subjected to racially imbalanced population transfers.

Benchmark HD	Outward	Inward
44	.425 (to HD 35)	.226 (from HD 20)
48	.464 (to HD 51)	.201 (from HD 49)
49	.227 (to HD 47)	.127 (from HD 48)
52	.436 (to HD 54)	.245 (from HD 79)
104	.715 (to HD 102)	.363 (from HD 103)

Table 40: This table records the BHVAP share of the largest district-to-district reassignment for the five "dismantled" House districts that were formerly swingy, now made ineffective. Compare Figure 33.

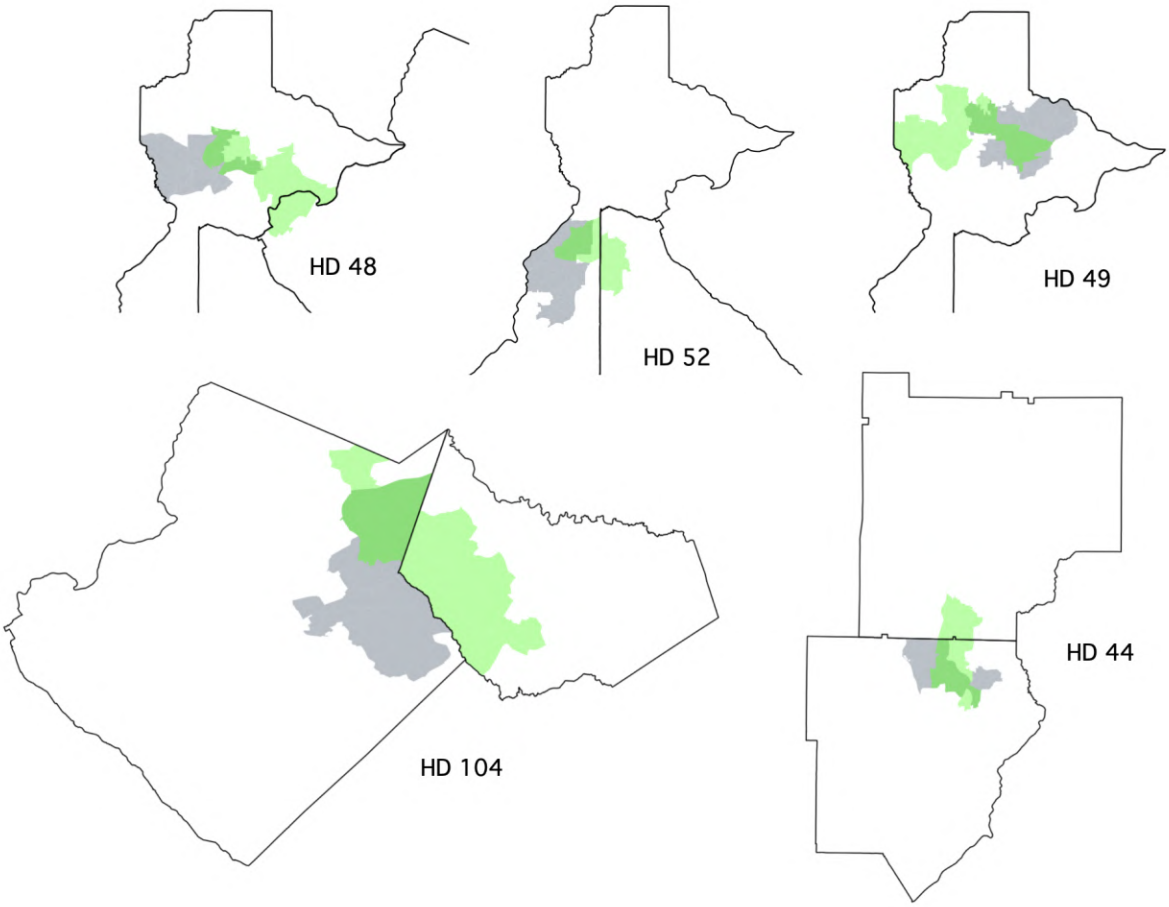


Figure 33: Each of these "dismantled" House districts from the metro Atlanta area (Table 40) was moved in such a way that the previous residents are scattered across multiple districts in the new plan. These districts had become politically swingy in the time since the last Census but are now rebuilt to be likely out of reach for Black and Latino voters' candidates of choice. The images make it clear that the shifts are not explained by traditional districting principles like compactness or respect for county lines. They is not explained by respect for municipal boundaries, as the new locations split small and midsized cities.

10.2 Splitting of geographical units

10.2.1 Congress

Most counties that are split in the enacted plan show marked racial disparity across the pieces. For instance, Cobb County is split across four districts, with CD 13 and 14 receiving parts of Cobb that are collectively over 60% Black and Latino by voting age population, while CD 6 contains a part of Cobb that is about 18.5% BHVAP—consistent with a packing and cracking strategy. Fayette, Fulton, Douglas, Newton, Gwinnett, Muscogee, and Bibb are likewise all split in a way that puts pieces into different districts with at least 20 percentage points disparity in BHVAP across the split.

County	District	BVAP	BHVAP
Bibb	CD 2	.6349	.6710
	CD 8	.3098	.3394

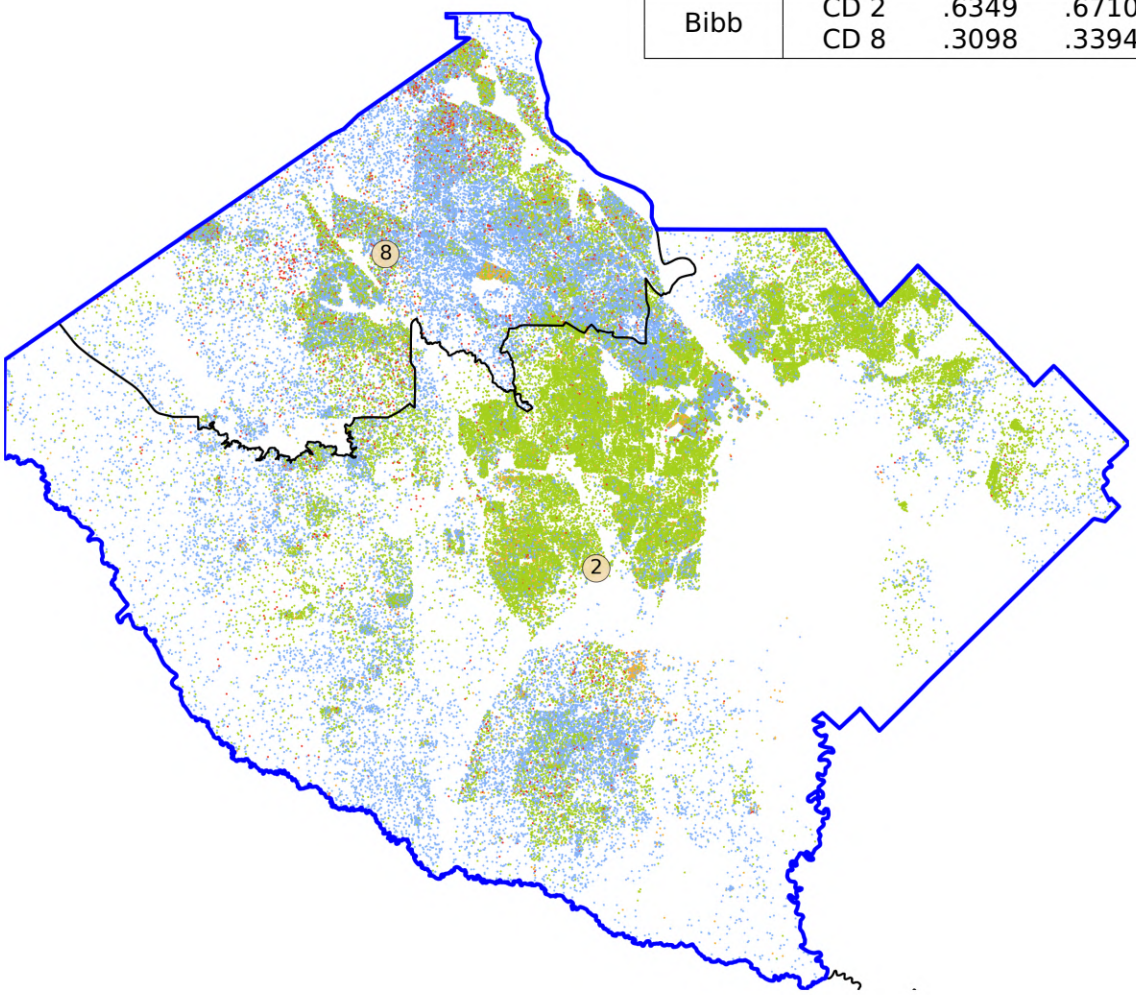


Figure 34: Minutely race-conscious decisions are evident along the boundary of CD 2 and CD 8 in Bibb County.

County	District	BVAP	BHVAP
Cherokee	CD 6	.0304	.0814
	CD 11	.0817	.1902
Clayton	CD 5	.7280	.8649
	CD 13	.7190	.8266
Cobb	CD 6	.1092	.1848
	CD 11	.2654	.3850
	CD 13	.4458	.6271
	CD 14	.4646	.5644
Douglas	CD 3	.2970	.3719
	CD 13	.5762	.6647
Fayette	CD 3	.2094	.2720
	CD 13	.5762	.6647
Fulton	CD 5	.4769	.5379
	CD 6	.1574	.2568
	CD 7	.1175	.1777
	CD 13	.8829	.9171
Gwinnett	CD 6	.1336	.2645
	CD 7	.3234	.5450
	CD 9	.2061	.3433
Henry	CD 3	.4678	.5259
	CD 10	.4414	.4948
	CD 13	.5710	.6324
Muscogee	CD 2	.5262	.5851
	CD 3	.1909	.2578

Table 41: All county splits involving CD 3, 6, 13, and 14. With the exception of the Clayton split, which is unremarkable in demographic terms, each of these is consistent with an overall pattern of cracking in CD 3 and CD 6, packing in CD 13, and submerging a small and diverse urban community in CD 14. See Appendix C for a complete list of county splits.

County	District	BVAP	BHVAP
Newton	CD 4	.6098	.6644
	CD 10	.2631	.2960

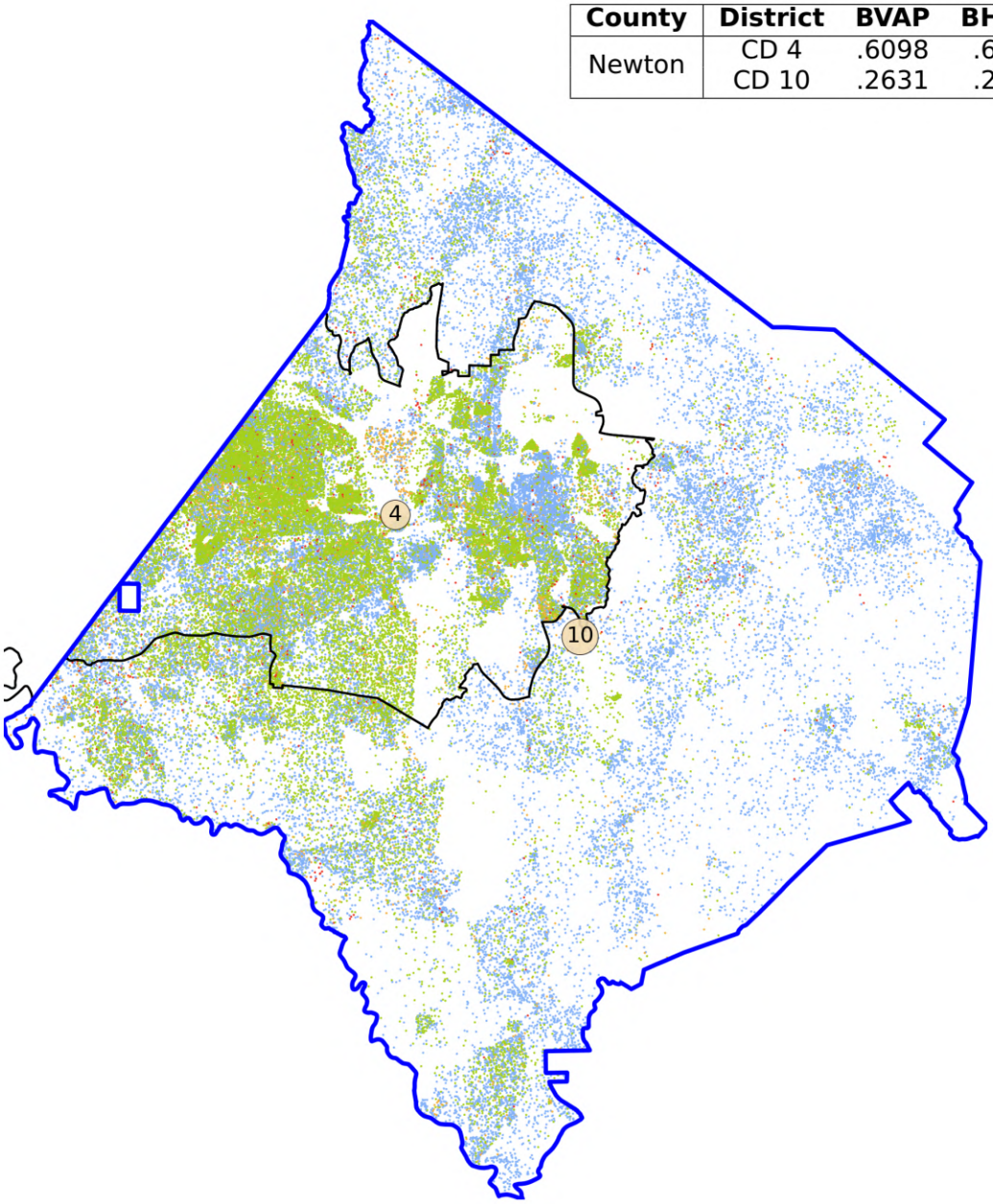


Figure 35: In Newton County, CD 4 and CD 10 are divided by a line that is consistent with packing the former district and cracking the latter.

For the purposes of investigating racial gerrymandering, the splits to state precincts can be especially revealing: these are the units at which cast votes are reported, so finer divisions are usually made in view of demographics but not voting behavior—that is, these highlight the predominance of race over even partisan concerns.[12]

Several pairs of bordering districts show significant demographic disparity across precinct splits in the Congressional plan, especially on the border of CD 4 and CD 10 (in Newton County, as in Figure 35), and on the border of CD 6 and CD 11 (in Cobb and Cherokee counties).

In particular, each precinct split with a sizeable demographic gap on the CD 6/11 border is consistent with the overall theme that CD 6 was targeted to reduce electoral opportunity for Black and Latino voters—and for Black voters, in particular.

State precinct	District	BVAP	BHVAP
MARIETTA 5A	CD 6	.1975	.4938
	CD 11	.4232	.5803
MARIETTA 6A	CD 6	.1391	.6607
	CD 11	.4738	.5464
SEWELL MILL 03	CD 6	.2225	.3042
	CD 11	.4064	.5548

Table 42: Three examples of split precincts on the CD 6 / CD 11 border that show significant racial disparity, consistent with an effort to diminish the electoral effectiveness of CD 6 for Black voters. (Note that CD 6 receives a higher share of BHVAP in Marietta 6A, but a far lower share of BVAP.)

Though the disparity in numbers is suggestive, the previous splits are geographically unremarkable. By contrast, several precinct splits on the CD 4 / CD 10 border stand out both in demographic and geographic terms.

State precinct	District	BVAP	BHVAP
ALCOVY	CD 4	.4010	.4499
	CD 10	.0512	.0620
CITY POND	CD 4	.5912	.6554
	CD 10	.3923	.4192
OXFORD	CD 4	.6444	.6932
	CD 10	.0929	.1213
DOWNS	CD 4	.6429	.7024
	CD 10	.4429	.4930

Table 43: Four examples of split precincts on the CD 4 / CD 10 border, all consistent with packing of CD 4 and cracking of CD 10.

[12] Of course, it is possible to incorporate registered voter data at the block level or to purchase commercial products with partisan modeling, but official state mappers frequently claim not to use this more fine-grained data.

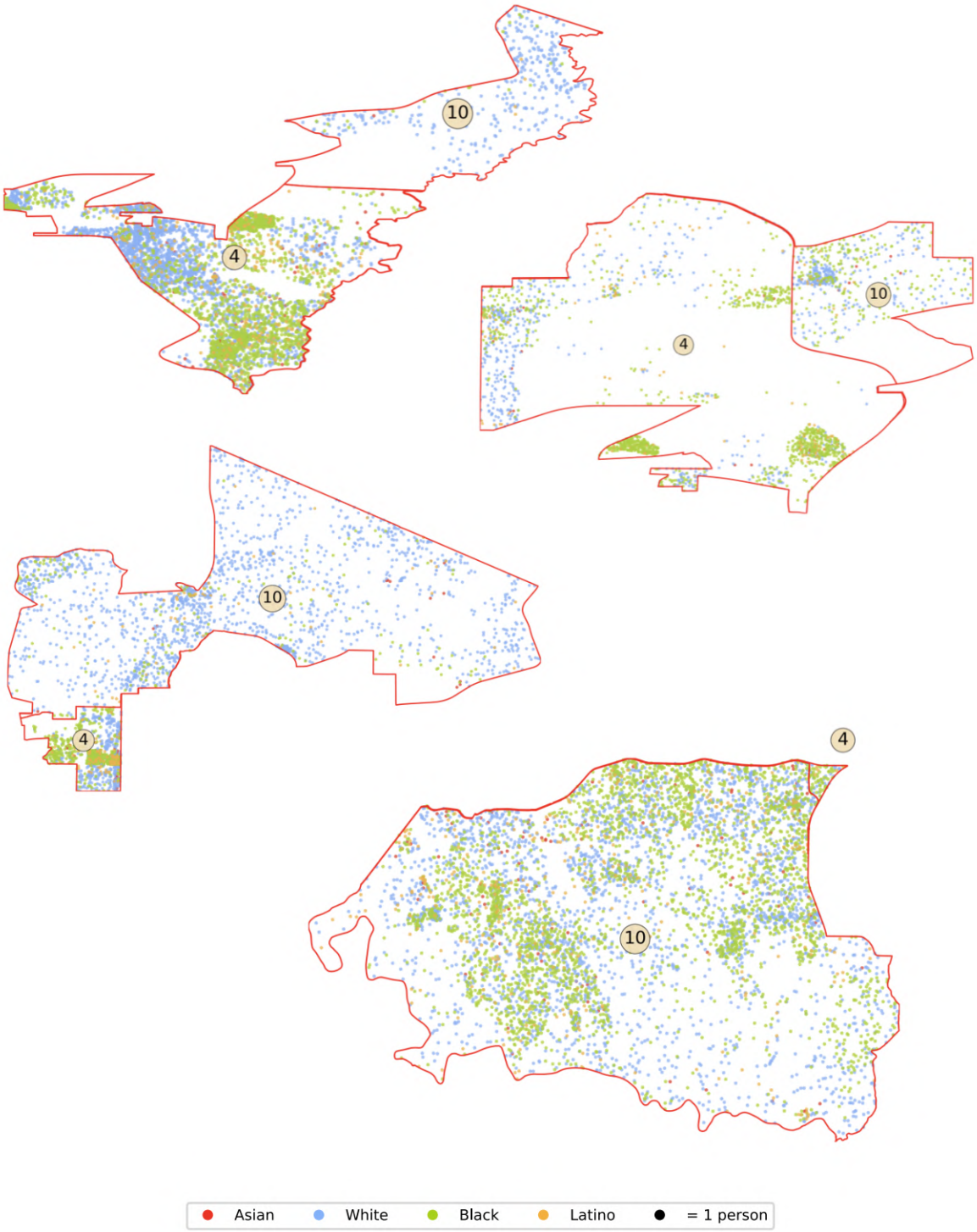


Figure 36: Split precincts on the CD 4 / CD 10 border.

10.2.2 State Senate

Similarly, numerous counties are split into unnecessarily many pieces in the Senate plan. Fourteen counties have at least a 20-point disparity in the BHVAP across the splits: Fulton (10 pieces), Gwinnett (9 pieces), DeKalb (7 pieces), Cobb (6 pieces), Bibb, Chatham, Douglas, and Houston (3 pieces each), and Newton, Clarke, Hall, Muscogee, Fayette, and Richmond (2 pieces each). Thirteen state precincts are split with a significant racial disparity between the pieces placed in different districts.

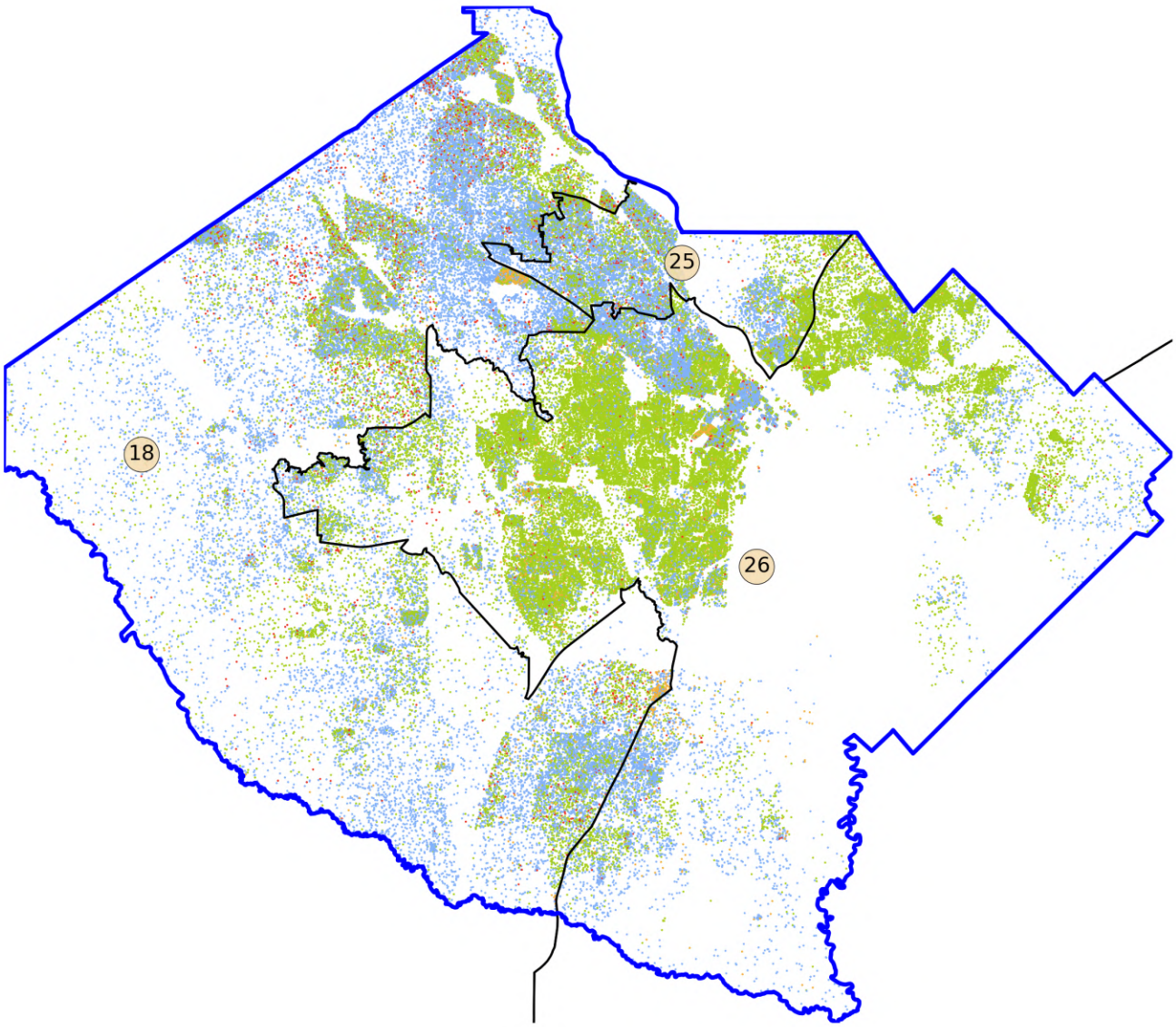


Figure 37: This figure shows the separation of Bibb County in a way that packs SD 26.

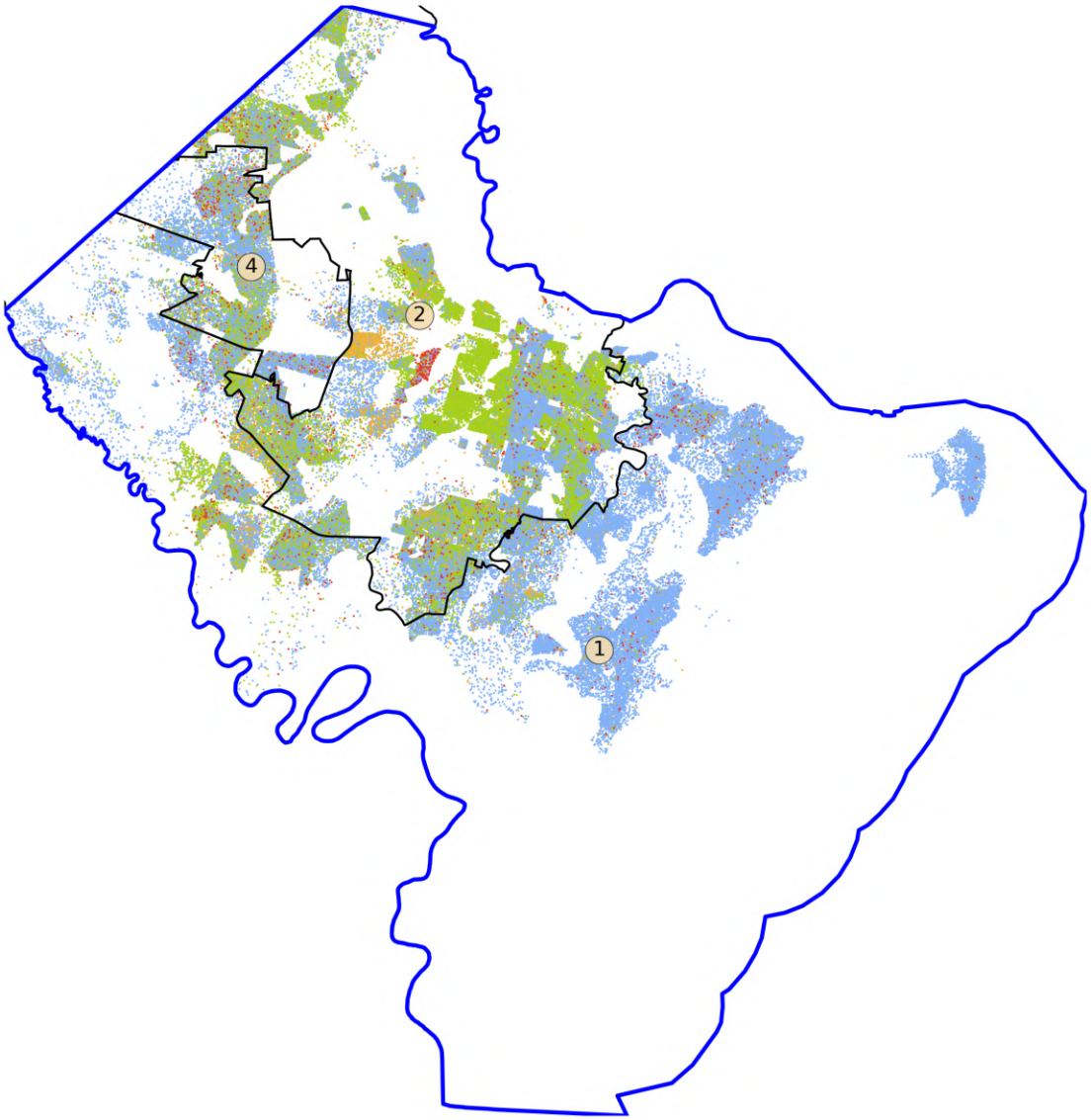


Figure 38: The pieces of Chatham County look to be clearly racially sorted into Senate districts in a way that ensures that Black and Latino voters can only have effective influence in one of the constituent districts. Indeed, SD 2 is an effective district, while SD 1 and SD 4 are not.

10.2.3 State House

In the enacted House plan, thirty counties are fractured in a racially sorted way. Besides the large counties that take the brunt of the splitting—Fulton (22 pieces), Gwinnett (21 piecees), DeKalb (17 pieces), Cobb (14 pieces)—there are also Chatham, Henry, Muscogee, Richmond, Hall, Paulding, Houston, Bibb, Coweta, Douglas, Fayette, Lowndes, Newton, Whitfield, Floyd, Rockdale, Carroll, Dougherty, Troup, Thomas, Tift, Peach, Gradie, McDuffie, Lamar, and Telfair, each with 2-7 pieces.

A striking number of state precincts—47 of them—are split with a heavy racial disparity across the division. In the case of dividing up state precincts, legislators can't use cast votes to choose a splitting optimized for partisan performance, so racially distinctive precinct splits provide particularly strong evidence that race has predominated over other principles in the creation of the map.

10.3 Community narratives

There was voluminous public input into the record when it comes to the communities of interest around the state and the impacts of redistricting decisions on their access to effective representation.

At the highest level, **County** identity and **Urban** versus **Rural** interests were the most frequent themes of the testimony, with thousands of mentions in the record. Geographically delimited regions that received frequent mention included the **Mountain** region in the Northwest and the **Black Belt** across the state's middle. Less specific geographic terms like **Lake** and **River** recur as well. **University** (or **College**) and specifically **HBCU** get plentiful mentions, and **Language** (in the sense of language accessibility) is a frequent concern.

Other frequent keywords recur in patterns that largely disaggregate by urban/suburban/rural focus. Here is a sample of terms that occur ten or more times and fall largely along lines of that classification.

- Urban: Rent/Renters, Affordable, Housing, Utilities (esp. Water)
- Urban: Poverty, Healthcare, Safety
- Urban: MARTA, Transit
- Suburban/Exurban: Corridor, Car
- Suburban/Exurban: Family, Diversity, Immigrant
- Suburban/Exurban: Park, Church, Restaurant
- Rural: Agriculture, Poultry/Chicken, Onion (incl. Vidalia, Onion Belt)
- Rural: Manufacturing, Carpet, Flooring, Industry
- Rural: Hospital, Internet, Elderly

These community testimonials are helpful for clarifying the issues around the changes to CD 6 and CD 14 that have received considerable attention above. New areas brought in to CD 6 on its north side (all of Forsyth and Dawson counties and half of Cherokee) cite interests frequently cited in suburban areas, blending to rural. By contrast, CD 6 shed population from Fulton and the northern tip of DeKalb County.

- Forsyth, Cherokee, Dawson: road infrastructure, Lake Lanier, Army Corps of Engineers, immigration (esp. Asian) and language, rural identity
- Fulton, DeKalb: public transportation, MARTA, safety net, COVID disparities, food insecurity

As we have seen, the shift in CD 14 is arguably a ripple effect from the targeting of CD 6, and residents of the new district are likewise vocal, with a sharp split between the narrative elements in the core of CD 14 and in its new protrusion into Cobb.

- Northwest counties: mountain, rural, flooring, agriculture, manufacturing
- Western Cobb: urban, metro Atlanta, housing, living wage

These community testimonies make it clear that the changes to CD 6 and CD 14 lack justification by community-of-interest reasoning, in addition to the shortfalls in other traditional districting principles detailed above.

References

[1] Amariah Becker, Moon Duchin, Dara Gold, and Sam Hirsch, *Computational Redistricting and the Voting Rights Act*. **Election Law Journal**, Volume 20, Number 4 (2021), 407–441.

[2] Erin Chambers, Moon Duchin, Ranthony Edmonds, Parker Edwards, JN Matthews, Anthony Pizzimenti, Chanel Richardson, Parker Rule, and Ari Stern, *Aggregating Community Maps*. **ACM Conference on Advances in Geographic Information Systems (SIGSPATIAL)**, 2022.

[3] Daryl DeFord, Moon Duchin, and Justin Solomon, *Recombination: A family of Markov chains for redistricting.* **Harvard Data Science Review**, Issue 3.1, Winter 2021.

[4] Daryl DeFord, Moon Duchin, and Justin Solomon, *A computational approach to measuring vote elasticity and competitiveness.* **Statistics and Public Policy**. Vol 7, No. 1 (2020), 69–86.

[5] Moon Duchin and Doug Spencer, *Models, Race, and the Law*. **Yale Law Journal Forum**, Volume 130 (March 2021), 744–797.

[6] MGGG Redistricting Lab, *GerryChain Python Library*. GitHub Repository. `github.com/mggg/gerrychain`

A Race, ethnicity, and citizenship

In this report, I have used the abbreviation BVAP to denote the share of voting age population that is Black alone or in combination, sometimes called "Any Part Black" (or APB). I have similarly used BHVAP for the share of VAP that is Black and/or Latino, which corresponds to the coalition of Black and Hispanic voters (sometimes called the "BH Coalition") identified in the Georgia NAACP complaint. WVAP refers to non-Hispanic single-race White population, and POCVAP is the broader designation for people of color, i.e., the complement of WVAP.

To be precise, I construct use two data columns directly from the Table P4 of the 2020 Decennial PL 94-171 block-level summary files and construct two more data columns as combinations. Hispanic voting age population ("HVAP") and non-Hispanic single-race White voting age population ("WVAP") are directly found in the P4. The combination columns are non-Hispanic (Any Part) Black VAP ("BVAP") and Other VAP, i.e., VAP not covered by any of these other categories ("OVAP"). By construction, these columns are exhaustive and non-overlapping: they sum to total VAP on each geographic unit.

- HVAP: `P4_002N`
- WVAP: `P4_005N`
- BVAP: `P4_006N, P4_013N, P4_018N, P4_019N, P4_020N, P4_021N, P4_029N, P4_030N, P4_031N, P4_032N, P4_039N, P4_040N, P4_041N, P4_042N, P4_043N, P4_044N, P4_050N, P4_051N, P4_052N, P4_053N, P4_054N, P4_055N, P4_060N, P4_061N, P4_062N, P4_063N, P4_066N, P4_067N, P4_068N, P4_069N, P4_071N, P4_073N`
- OVAP: `P4_007N, P4_008N, P4_009N, P4_010N, P4_014N, P4_015N, P4_016N, P4_017N, P4_022N, P4_023N, P4_024N, P4_025N, P4_026N, P4_027N, P4_033N, P4_034N, P4_035N, P4_036N, P4_037N, P4_038N, P4_045N, P4_046N, P4_047N, P4_048N, P4_056N, P4_057N, P4_058N, P4_059N, P4_064N, P4_070N`

To provide the best available estimate of 2020 citizen voting age population (CVAP) at the Census block level, I am using a method based combining 2020 Decennial block-level data and 2016–2020 American Community Survey (ACS) tract-level data. Any use of CVAP with block-based districting plans will require some process of estimation and disaggregation, since no ACS data product is released at that fine of a geographical resolution.

To estimate CVAP within each census block, I have applied a fractional ratio to each of these VAP columns using the citizenship rate pulled from the ACS data on the tract containing that block. Because the ACS race and ethnicity categories are different from the PL, computing this ratio requires the use of slightly different categories. All of this is done at the tract level.

- Black citizenship ratios are computed by dividing Black-alone VAP from Table B01001B by Black-alone CVAP from Table B05003B.
- Hispanic citizenship ratios are computed by dividing Hispanic VAP from Table B03002 by Black-alone CVAP from Table B05003I.
- White citizenship ratios are computed by dividing non-Hispanic White-alone VAP obtained from Table B01001H by non-Hispanic White-alone CVAP from Table B05003H.
- Citizenship ratios for the remaining ("Other") population are computed by dividing VAP from Tables B01001C (American Indian and Alaska Native alone), B01001D (Asian alone), B01001E (Native Hawaiian and Other Pacific Islander alone), B01001F (some other race alone), and B01001G (two or more races) by CVAP from Tables B05003C (American Indian and Alaska Native alone), B05003D (Asian alone), B05003E (Native Hawaiian and Other Pacific Islander alone), B05003F (some other race alone), and B05003G (two or more races).

B Electoral alignment in enacted legislative districts

SD	James18P	Thornton18P	Thornton18R	Robinson18P
overall	0.4475	0.4387	0.5914	0.6286
1	0.4433	0.4957	0.7139	0.6752
2	0.5568	0.5374	0.7615	0.7245
3	0.4584	0.4566	0.6166	0.6647
4	0.4623	0.4170	0.6421	0.6800
5	0.4936	0.4604	0.6270	0.6329
6	0.2972	0.3624	0.4717	0.4602
7	0.3938	0.4327	0.5822	0.5709
8	0.5279	0.4223	0.6146	0.7182
9	0.4538	0.4486	0.6139	0.6232
10	0.5598	0.5108	0.6838	0.7221
11	0.5288	0.4219	0.5478	0.7098
12	0.5799	0.4771	0.6412	0.7634
13	0.5179	0.4354	0.6145	0.6956
14	0.3038	0.3703	0.4698	0.4570
15	0.5986	0.4502	0.5850	0.7338
16	0.4067	0.3965	0.5079	0.6065
17	0.4657	0.4581	0.6708	0.6715
18	0.4640	0.4891	0.6682	0.6932
19	0.5054	0.3997	0.6575	0.7214
20	0.4927	0.4921	0.6914	0.7050
21	0.2963	0.3435	0.5124	0.5157
22	0.5166	0.4377	0.6833	0.8227
23	0.4968	0.4249	0.6008	0.7456
24	0.4130	0.4463	0.7078	0.6693
25	0.4637	0.4260	0.6856	0.6932
26	0.4774	0.4439	0.6412	0.7312
27	0.2496	0.3162	0.4106	0.4904
28	0.4009	0.4143	0.4920	0.6198
29	0.4688	0.4364	0.5429	0.6639
30	0.3894	0.4034	0.4942	0.5762
31	0.4240	0.4460	0.5191	0.6237
32	0.3194	0.3952	0.5222	0.5230
33	0.5027	0.5156	0.6489	0.6470
34	0.5442	0.4912	0.6096	0.7214
35	0.6049	0.5417	0.7203	0.7344
36	0.3695	0.4134	0.5483	0.5050
37	0.3844	0.4495	0.5609	0.5796
38	0.5098	0.5168	0.7062	0.6948
39	0.4440	0.4444	0.6169	0.6187
40	0.2682	0.3327	0.4241	0.4099
41	0.4428	0.4385	0.5589	0.5968
42	0.2535	0.3351	0.4253	0.3403
43	0.5653	0.5018	0.6758	0.7202
44	0.5251	0.4527	0.5758	0.6902
45	0.4180	0.4387	0.6042	0.6031
46	0.3485	0.3946	0.5390	0.4958
47	0.3936	0.4419	0.6317	0.5378
48	0.3193	0.3488	0.5000	0.5144
49	0.2888	0.3402	0.4099	0.5269
50	0.2810	0.3220	0.4726	0.5497
51	0.2086	0.2667	0.3339	0.4437
52	0.3299	0.3271	0.4704	0.5792
53	0.3509	0.2385	0.3498	0.5729
54	0.3703	0.2679	0.3982	0.5208
55	0.5590	0.5016	0.6908	0.6938
56	0.2273	0.3277	0.4283	0.4432

Table 44: Vote shares for the minority candidate of choice across enacted Senate districts, in probative primary and primary runoff elections.

SD	Clinton16	Abrams18	Thornton18	Biden20	Blackman20	Ossoff21	Warnock21	Abrams22
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
1	0.3977	0.4165	0.3963	0.4339	0.4099	0.4311	0.4331	0.3858
2	0.7278	0.7447	0.7248	0.7304	0.7221	0.7420	0.7434	0.7147
3	0.3229	0.3285	0.3163	0.3399	0.3273	0.3382	0.3379	0.2963
4	0.3117	0.3132	0.2988	0.3342	0.3181	0.3377	0.3379	0.2911
5	0.7486	0.7767	0.7503	0.7347	0.7395	0.7698	0.7727	0.7034
6	0.5632	0.5785	0.5153	0.6174	0.5559	0.5662	0.5799	0.5438
7	0.5212	0.5621	0.5250	0.5855	0.5618	0.5848	0.5909	0.5308
8	0.3339	0.3362	0.3253	0.3520	0.3407	0.3507	0.3507	0.3009
9	0.5277	0.5723	0.5426	0.6035	0.5873	0.6158	0.6215	0.5702
10	0.7684	0.8024	0.7852	0.7981	0.8013	0.8195	0.8220	0.8060
11	0.3484	0.3360	0.3236	0.3526	0.3418	0.3512	0.3511	0.3039
12	0.5805	0.5771	0.5618	0.5816	0.5746	0.5894	0.5903	0.5448
13	0.2836	0.2791	0.2623	0.2964	0.2821	0.3023	0.3036	0.2581
14	0.5421	0.5624	0.5077	0.6012	0.5528	0.5666	0.5763	0.5314
15	0.6650	0.6714	0.6544	0.6680	0.6621	0.6801	0.6822	0.6461
16	0.3199	0.3332	0.3126	0.3586	0.3371	0.3568	0.3615	0.3225
17	0.3337	0.3650	0.3507	0.3978	0.3870	0.4080	0.4110	0.3883
18	0.3656	0.3743	0.3608	0.3893	0.3766	0.3965	0.3990	0.3559
19	0.2458	0.2345	0.2314	0.2516	0.2459	0.2568	0.2574	0.2109
20	0.3251	0.3238	0.3122	0.3437	0.3311	0.3499	0.3523	0.3094
21	0.2865	0.3041	0.2721	0.3369	0.3009	0.3235	0.3316	0.2773
22	0.6911	0.7080	0.6884	0.7123	0.7013	0.7168	0.7189	0.6855
23	0.4069	0.4078	0.3962	0.4254	0.4125	0.4307	0.4322	0.3864
24	0.3010	0.2990	0.2907	0.3274	0.3034	0.3240	0.3249	0.2740
25	0.3816	0.3938	0.3806	0.4089	0.3982	0.4205	0.4234	0.3818
26	0.6410	0.6479	0.6326	0.6434	0.6399	0.6560	0.6585	0.6157
27	0.2306	0.2612	0.2360	0.3076	0.2768	0.2975	0.3039	0.2511
28	0.2846	0.2997	0.2817	0.3250	0.3060	0.3286	0.3331	0.2939
29	0.3501	0.3549	0.3378	0.3749	0.3569	0.3773	0.3798	0.3372
30	0.2961	0.3061	0.2948	0.3150	0.3076	0.3274	0.3314	0.2807
31	0.2768	0.3101	0.3029	0.3328	0.3244	0.3459	0.3490	0.3132
32	0.3634	0.4061	0.3744	0.4355	0.4082	0.4287	0.4363	0.3836
33	0.6767	0.7146	0.6898	0.7124	0.7092	0.7252	0.7293	0.6895
34	0.8201	0.8472	0.8304	0.8271	0.8331	0.8498	0.8518	0.8280
35	0.7785	0.8159	0.7983	0.8186	0.8210	0.8382	0.8411	0.8255
36	0.9069	0.9164	0.8686	0.8962	0.8771	0.8925	0.8996	0.8846
37	0.3742	0.4120	0.3838	0.4453	0.4177	0.4387	0.4462	0.4002
38	0.8220	0.8415	0.8121	0.8282	0.8156	0.8320	0.8379	0.8082
39	0.8862	0.8936	0.8506	0.8816	0.8621	0.8753	0.8824	0.8574
40	0.5980	0.6152	0.5592	0.6483	0.5997	0.6141	0.6255	0.5808
41	0.8169	0.8319	0.8047	0.8254	0.8228	0.8350	0.8393	0.8062
42	0.8317	0.8430	0.7839	0.8482	0.8179	0.8295	0.8377	0.8234
43	0.6835	0.7249	0.7088	0.7349	0.7364	0.7558	0.7580	0.7420
44	0.8673	0.8878	0.8682	0.8702	0.8751	0.8906	0.8928	0.8748
45	0.3367	0.3775	0.3525	0.4139	0.3932	0.4170	0.4229	0.3773
46	0.3751	0.3889	0.3666	0.4078	0.3816	0.4034	0.4088	0.3555
47	0.3959	0.4052	0.3904	0.4072	0.3912	0.4156	0.4199	0.3668
48	0.4010	0.4363	0.3920	0.4836	0.4411	0.4685	0.4762	0.4131
49	0.2335	0.2530	0.2350	0.2763	0.2523	0.2718	0.2773	0.2211
50	0.1716	0.1672	0.1626	0.1855	0.1710	0.1867	0.1898	0.1443
51	0.1568	0.1558	0.1503	0.1751	0.1617	0.1759	0.1790	0.1420
52	0.2450	0.2550	0.2437	0.2659	0.2519	0.2723	0.2767	0.2241
53	0.1837	0.1858	0.1826	0.2012	0.1916	0.2054	0.2045	0.1628
54	0.2193	0.2168	0.2098	0.2346	0.2247	0.2371	0.2374	0.1745
55	0.7579	0.7925	0.7743	0.7945	0.7936	0.8113	0.8143	0.7873
56	0.3639	0.3944	0.3503	0.4373	0.3894	0.4108	0.4210	0.3738

Table 45: Vote shares for the minority candidate of choice across enacted Senate districts, in probative general and general runoff elections.

SD	Primaries out of 4	Generals out of 8	Effective?
1	3	0	N
2	4	8	Y
3	3	0	N
4	3	0	N
5	3	8	Y
6	0	8	N
7	3	8	Y
8	4	0	N
9	3	8	Y
10	4	8	Y
11	4	0	N
12	4	8	Y
13	4	0	N
14	0	8	N
15	4	8	Y
16	3	0	N
17	3	0	N
18	3	0	N
19	4	0	N
20	3	0	N
21	2	0	N
22	4	8	Y
23	3	0	N
24	3	0	N
25	3	0	N
26	3	8	Y
27	0	0	N
28	2	0	N
29	3	0	N
30	2	0	N
31	3	0	N
32	3	0	N
33	4	8	Y
34	4	8	Y
35	4	8	Y
36	3	8	Y
37	3	0	N
38	4	8	Y
39	3	8	Y
40	0	8	N
41	3	8	Y
42	0	8	N
43	4	8	Y
44	4	8	Y
45	3	0	N
46	1	0	N
47	3	0	N
48	1	0	N
49	1	0	N
50	1	0	N
51	0	0	N
52	1	0	N
53	1	0	N
54	1	0	N
55	4	8	Y
56	0	0	N

Table 46: By the standard of requiring that the candidate of choice could win or advance in at least three out of four primaries and win or advance in at least five out of eight generals, the enacted plan has 19 districts that present an effective opportunity.

HD	James18P	Thornton18P	Thornton18R	Robinson18P
overall	0.4475	0.4387	0.5914	0.6286
1	0.3468	0.2773	0.4029	0.5806
2	0.3558	0.2650	0.3670	0.5476
3	0.3294	0.2937	0.3945	0.5330
4	0.3601	0.2721	0.5187	0.5229
5	0.3824	0.2760	0.4076	0.5266
6	0.3668	0.2496	0.3206	0.5430
7	0.2157	0.2572	0.3352	0.4173
8	0.2022	0.2644	0.3595	0.4717
9	0.1832	0.2701	0.3345	0.4496
10	0.2252	0.3163	0.4472	0.5031
11	0.2662	0.2961	0.3401	0.4568
12	0.3671	0.1692	0.3117	0.6227
13	0.3179	0.3260	0.4630	0.5670
14	0.3256	0.3317	0.5040	0.5218
15	0.3293	0.3518	0.4445	0.5811
16	0.3558	0.3730	0.5240	0.6086
17	0.4020	0.4363	0.4991	0.6145
18	0.3103	0.3091	0.5047	0.5511
19	0.4618	0.4869	0.5659	0.6279
20	0.2834	0.3785	0.3855	0.5275
21	0.2883	0.3326	0.3384	0.5194
22	0.3529	0.4129	0.5129	0.5635
23	0.2889	0.3204	0.3621	0.5709
24	0.2767	0.3541	0.4194	0.5259
25	0.2764	0.2928	0.4603	0.4945
26	0.2398	0.2986	0.4209	0.4735
27	0.2327	0.3044	0.2517	0.5148
28	0.2492	0.3220	0.3758	0.4683
29	0.3352	0.3795	0.5442	0.5610
30	0.3077	0.3530	0.4525	0.4958
31	0.3087	0.3400	0.4837	0.5963
32	0.3446	0.3195	0.5192	0.6330
33	0.3395	0.4244	0.6565	0.5794
34	0.3583	0.4446	0.5187	0.5655
35	0.3881	0.4507	0.5930	0.5815
36	0.4031	0.4559	0.5856	0.5964
37	0.3663	0.4527	0.5860	0.5523
38	0.5367	0.5168	0.6730	0.6903
39	0.5356	0.5345	0.7106	0.6796
40	0.4201	0.4639	0.6151	0.5695
41	0.5164	0.5317	0.6492	0.6384
42	0.4493	0.4890	0.6054	0.5755
43	0.3315	0.4079	0.5049	0.5117
44	0.3052	0.3869	0.5337	0.5195
45	0.1732	0.3021	0.3752	0.3676
46	0.2382	0.3411	0.4515	0.4440
47	0.3159	0.3542	0.5339	0.5053
48	0.2947	0.3582	0.4743	0.4679
49	0.2675	0.3343	0.4887	0.4863
50	0.3267	0.3767	0.5004	0.5151
51	0.3394	0.3852	0.4882	0.4737
52	0.2679	0.3387	0.4328	0.4053
53	0.2273	0.3048	0.4342	0.3910
54	0.2550	0.3444	0.4524	0.4081
55	0.4218	0.4596	0.6718	0.6275
56	0.4356	0.4518	0.6229	0.6142
57	0.2056	0.3076	0.3972	0.2914
58	0.4452	0.4517	0.6291	0.6105
59	0.4683	0.4632	0.6531	0.6383
60	0.4578	0.4647	0.6671	0.6606

HD	James18P	Thornton18P	Thornton18R	Robinson18P
overall	0.4475	0.4387	0.5914	0.6286
61	0.5937	0.5530	0.7215	0.7307
62	0.4559	0.4616	0.6297	0.6200
63	0.4227	0.4396	0.5712	0.6002
64	0.4859	0.4774	0.5232	0.6528
65	0.5996	0.5377	0.7249	0.7187
66	0.5615	0.5117	0.6402	0.7097
67	0.5783	0.5225	0.7261	0.7275
68	0.5142	0.5104	0.6439	0.6898
69	0.5196	0.5166	0.6831	0.7079
70	0.4308	0.4351	0.5046	0.6431
71	0.3445	0.4125	0.5560	0.5556
72	0.3181	0.3598	0.4040	0.5030
73	0.3412	0.3844	0.4659	0.5790
74	0.4855	0.4752	0.6443	0.6397
75	0.5667	0.4732	0.5439	0.7273
76	0.5726	0.4532	0.5774	0.7483
77	0.5372	0.4834	0.6259	0.7376
78	0.5592	0.4792	0.5407	0.7231
79	0.5561	0.4554	0.5713	0.7240
80	0.2507	0.3075	0.3904	0.4083
81	0.2273	0.3192	0.4007	0.3411
82	0.1811	0.2948	0.3296	0.2414
83	0.2499	0.3328	0.4322	0.4258
84	0.4411	0.4548	0.6076	0.5958
85	0.4561	0.4392	0.5883	0.6138
86	0.4939	0.4612	0.6058	0.6512
87	0.5020	0.4629	0.5948	0.6599
88	0.4783	0.4613	0.6055	0.6211
89	0.3875	0.4030	0.5645	0.4889
90	0.3812	0.3969	0.5629	0.5003
91	0.5621	0.5012	0.7033	0.7132
92	0.5777	0.5069	0.6954	0.7293
93	0.5503	0.5024	0.6621	0.7124
94	0.5467	0.4912	0.6849	0.6899
95	0.5813	0.5091	0.7039	0.7160
96	0.4407	0.4533	0.6048	0.5762
97	0.3851	0.4260	0.5636	0.5440
98	0.4638	0.4516	0.6475	0.5829
99	0.3827	0.4466	0.5993	0.5637
100	0.3268	0.3356	0.4947	0.5489
101	0.4195	0.4367	0.5873	0.6026
102	0.4902	0.4578	0.6445	0.6531
103	0.3989	0.4094	0.5857	0.5902
104	0.4202	0.4445	0.5931	0.6166
105	0.4694	0.4604	0.6632	0.6422
106	0.4768	0.4844	0.6458	0.6273
107	0.4858	0.4463	0.6147	0.6542
108	0.3738	0.4246	0.5554	0.5502
109	0.4988	0.4650	0.5979	0.6304
110	0.5429	0.5042	0.6857	0.7014
111	0.4343	0.4549	0.6179	0.6180
112	0.3802	0.3856	0.4628	0.6032
113	0.5592	0.4986	0.6538	0.7211
114	0.3566	0.3820	0.5553	0.6116
115	0.5470	0.5100	0.6995	0.7163
116	0.5613	0.5113	0.6805	0.7260
117	0.4806	0.4765	0.6946	0.6856
118	0.4420	0.3747	0.5819	0.6716
119	0.3654	0.3998	0.4785	0.5577
120	0.3310	0.3982	0.5499	0.5099

HD	James18P	Thornton18P	Thornton18R	Robinson18P
overall	0.4475	0.4387	0.5914	0.6286
121	0.3056	0.3610	0.4634	0.4318
122	0.4470	0.4828	0.7316	0.5336
123	0.4482	0.4759	0.8210	0.6795
124	0.3929	0.3945	0.5134	0.6158
125	0.4979	0.4484	0.5532	0.7290
126	0.5713	0.4653	0.7136	0.8431
127	0.3885	0.4146	0.5601	0.6759
128	0.4836	0.3572	0.6819	0.7292
129	0.4788	0.4262	0.6829	0.7876
130	0.5291	0.4322	0.6676	0.8300
131	0.4561	0.4564	0.6071	0.6988
132	0.5114	0.4534	0.7072	0.8308
133	0.4708	0.4428	0.7327	0.7101
134	0.4537	0.3415	0.4744	0.6571
135	0.4414	0.3509	0.4942	0.6575
136	0.4119	0.4498	0.5770	0.6639
137	0.5831	0.4497	0.6210	0.7196
138	0.4087	0.4060	0.4642	0.6087
139	0.4801	0.3999	0.4545	0.6473
140	0.6020	0.4426	0.5277	0.7298
141	0.6424	0.4599	0.5801	0.7533
142	0.4658	0.4625	0.6520	0.7214
143	0.4642	0.4872	0.6748	0.7412
144	0.4126	0.4350	0.6166	0.6729
145	0.4565	0.5158	0.6740	0.7167
146	0.5166	0.5594	0.7649	0.6930
147	0.5096	0.5585	0.7068	0.6984
148	0.5185	0.4879	0.6815	0.6956
149	0.4570	0.3824	0.5110	0.6894
150	0.5420	0.5120	0.7376	0.7507
151	0.5465	0.4851	0.6725	0.7150
152	0.5542	0.4701	0.6164	0.7292
153	0.6069	0.4804	0.6392	0.7999
154	0.5679	0.4636	0.6112	0.7543
155	0.4790	0.4310	0.6517	0.6845
156	0.5283	0.4362	0.6620	0.7356
157	0.4885	0.3890	0.6939	0.7202
158	0.4889	0.3914	0.6253	0.7098
159	0.4596	0.3947	0.6056	0.6965
160	0.4117	0.3911	0.5455	0.6332
161	0.5543	0.5195	0.7135	0.7036
162	0.6043	0.5636	0.7874	0.7517
163	0.4945	0.5148	0.7413	0.6811
164	0.4995	0.5290	0.7585	0.6963
165	0.5689	0.5359	0.7661	0.7381
166	0.2755	0.4103	0.6313	0.5219
167	0.4840	0.4765	0.6980	0.7241
168	0.5505	0.5425	0.7834	0.7886
169	0.5063	0.3686	0.5592	0.6991
170	0.4510	0.4272	0.5020	0.6678
171	0.5049	0.4272	0.5864	0.7274
172	0.5519	0.4134	0.5872	0.6544
173	0.5511	0.4509	0.6016	0.7408
174	0.5238	0.3752	0.5566	0.6716
175	0.5392	0.3988	0.5253	0.7350
176	0.5464	0.4061	0.6065	0.7292
177	0.5448	0.4450	0.6370	0.7407
178	0.4627	0.4045	0.6920	0.6940
179	0.4151	0.4621	0.5945	0.6310
180	0.4609	0.4587	0.6255	0.6534

Table 47: Vote shares for the minority candidate of choice across enacted House districts, in probative primary and primary runoff elections.

HD	Clinton16	Abrams18	Thornton18	Biden20	Blackman20	Ossoff21	Warnock21	Abrams22
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
1	0.1933	0.1964	0.1938	0.2104	0.2009	0.2160	0.2146	0.1736
2	0.1696	0.1670	0.1635	0.1901	0.1768	0.1895	0.1876	0.1425
3	0.1908	0.2018	0.1943	0.2221	0.2099	0.2233	0.2222	0.1816
4	0.3589	0.3633	0.3440	0.3835	0.3672	0.3806	0.3808	0.2906
5	0.1716	0.1733	0.1685	0.1855	0.1785	0.1926	0.1950	0.1482
6	0.1564	0.1457	0.1481	0.1641	0.1586	0.1679	0.1671	0.1177
7	0.1661	0.1629	0.1575	0.1807	0.1687	0.1815	0.1850	0.1469
8	0.1659	0.1600	0.1576	0.1819	0.1701	0.1815	0.1840	0.1422
9	0.1473	0.1523	0.1457	0.1695	0.1522	0.1705	0.1732	0.1391
10	0.1672	0.1675	0.1588	0.1859	0.1688	0.1864	0.1913	0.1485
11	0.1461	0.1550	0.1446	0.1868	0.1694	0.1863	0.1912	0.1552
12	0.1978	0.1895	0.1887	0.1945	0.1906	0.2069	0.2083	0.1607
13	0.3298	0.3437	0.3215	0.3537	0.3310	0.3571	0.3629	0.3015
14	0.1708	0.1768	0.1703	0.1916	0.1809	0.1941	0.1984	0.1604
15	0.2542	0.2749	0.2634	0.2863	0.2749	0.2949	0.2993	0.2417
16	0.2016	0.2083	0.2047	0.2237	0.2152	0.2305	0.2332	0.1941
17	0.2784	0.3264	0.3170	0.3580	0.3498	0.3747	0.3780	0.3411
18	0.1598	0.1479	0.1441	0.1598	0.1563	0.1653	0.1678	0.1314
19	0.3142	0.3525	0.3443	0.3762	0.3661	0.3887	0.3918	0.3614
20	0.2608	0.2975	0.2696	0.3349	0.3055	0.3261	0.3332	0.2815
21	0.2096	0.2398	0.2148	0.2772	0.2455	0.2657	0.2720	0.2304
22	0.3498	0.4004	0.3760	0.4163	0.3967	0.4206	0.4264	0.3756
23	0.2017	0.2210	0.2039	0.2563	0.2340	0.2535	0.2591	0.2129
24	0.2901	0.3324	0.2988	0.3727	0.3386	0.3622	0.3678	0.2989
25	0.3541	0.3882	0.3448	0.4409	0.3962	0.4224	0.4298	0.3655
26	0.2422	0.2709	0.2435	0.3235	0.2896	0.3113	0.3189	0.2710
27	0.1564	0.1633	0.1496	0.1884	0.1667	0.1841	0.1893	0.1452
28	0.1767	0.1985	0.1815	0.2357	0.2110	0.2273	0.2329	0.1893
29	0.3920	0.4240	0.3990	0.4239	0.4015	0.4255	0.4307	0.3557
30	0.2252	0.2501	0.2331	0.2841	0.2603	0.2785	0.2838	0.2300
31	0.2004	0.2126	0.2029	0.2409	0.2226	0.2442	0.2488	0.1925
32	0.1592	0.1546	0.1529	0.1702	0.1564	0.1731	0.1750	0.1345
33	0.1991	0.1743	0.1765	0.1948	0.1799	0.1959	0.1953	0.1486
34	0.3454	0.3777	0.3462	0.4205	0.3864	0.4055	0.4157	0.3698
35	0.5063	0.5603	0.5316	0.5726	0.5567	0.5802	0.5855	0.5361
36	0.3216	0.3596	0.3321	0.4022	0.3696	0.3928	0.3994	0.3632
37	0.5623	0.5933	0.5531	0.6113	0.5847	0.5981	0.6078	0.5507
38	0.6765	0.7229	0.7053	0.7243	0.7253	0.7453	0.7473	0.7174
39	0.7614	0.7930	0.7682	0.7876	0.7846	0.7991	0.8049	0.7703
40	0.6071	0.6417	0.5949	0.6673	0.6238	0.6387	0.6495	0.6207
41	0.6887	0.7199	0.6951	0.7105	0.7106	0.7256	0.7296	0.6856
42	0.6871	0.7282	0.6885	0.7158	0.6889	0.7108	0.7182	0.6714
43	0.5624	0.5885	0.5483	0.6073	0.5730	0.5827	0.5927	0.5436
44	0.3820	0.4236	0.3907	0.4598	0.4305	0.4536	0.4613	0.4096
45	0.4039	0.4203	0.3637	0.4792	0.4134	0.4354	0.4477	0.3997
46	0.3774	0.4098	0.3682	0.4495	0.4039	0.4254	0.4351	0.3895
47	0.3868	0.4048	0.3595	0.4440	0.3963	0.4171	0.4276	0.3688
48	0.4381	0.4625	0.4120	0.5147	0.4624	0.4779	0.4885	0.4344
49	0.4092	0.4330	0.3806	0.4801	0.4246	0.4420	0.4538	0.4029
50	0.5185	0.5558	0.5026	0.5939	0.5521	0.5784	0.5861	0.5154
51	0.5509	0.5728	0.5274	0.6082	0.5683	0.5811	0.5899	0.5407
52	0.5759	0.5938	0.5291	0.6361	0.5801	0.5957	0.6081	0.5697
53	0.4972	0.4992	0.4281	0.5478	0.4745	0.4843	0.4998	0.4548
54	0.5540	0.5641	0.4946	0.6104	0.5455	0.5555	0.5673	0.5443
55	0.8132	0.8121	0.7562	0.8169	0.7764	0.7909	0.8021	0.7662
56	0.9113	0.9249	0.8807	0.8971	0.8775	0.8976	0.9038	0.8875
57	0.7942	0.8025	0.7157	0.8092	0.7539	0.7714	0.7843	0.7610
58	0.9398	0.9511	0.9154	0.9213	0.9117	0.9269	0.9321	0.9165
59	0.9503	0.9603	0.9291	0.9337	0.9292	0.9425	0.9466	0.9307
60	0.8139	0.8069	0.7617	0.8065	0.7758	0.7868	0.7968	0.7698

HD	Clinton16	Abrams18	Thornton18	Biden20	Blackman20	Ossoff21	Warnock21	Abrams22
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
61	0.8241	0.8575	0.8407	0.8504	0.8538	0.8683	0.8707	0.8555
62	0.9354	0.9434	0.9127	0.9254	0.9223	0.9341	0.9382	0.9188
63	0.9197	0.9279	0.8967	0.9085	0.9071	0.9182	0.9243	0.9017
64	0.3449	0.3899	0.3757	0.4259	0.4177	0.4440	0.4476	0.4247
65	0.6646	0.6994	0.6807	0.6976	0.6952	0.7127	0.7158	0.6883
66	0.6077	0.6610	0.6389	0.6899	0.6851	0.7115	0.7159	0.6952
67	0.6289	0.6633	0.6473	0.6617	0.6560	0.6770	0.6798	0.6488
68	0.5991	0.6305	0.6067	0.6502	0.6395	0.6468	0.6521	0.6215
69	0.7034	0.7388	0.7190	0.7409	0.7350	0.7550	0.7586	0.7380
70	0.3758	0.3878	0.3663	0.3830	0.3655	0.3904	0.3953	0.3484
71	0.3046	0.3209	0.3107	0.3286	0.3192	0.3466	0.3510	0.3045
72	0.2982	0.2866	0.2703	0.2858	0.2713	0.2873	0.2928	0.2350
73	0.2814	0.3012	0.2764	0.3612	0.3306	0.3509	0.3572	0.3125
74	0.3228	0.3558	0.3379	0.3842	0.3665	0.3878	0.3907	0.3604
75	0.8667	0.8906	0.8739	0.8644	0.8755	0.8929	0.8952	0.8733
76	0.8631	0.8796	0.8639	0.8499	0.8607	0.8808	0.8811	0.8610
77	0.9074	0.9236	0.9083	0.8944	0.9071	0.9221	0.9225	0.9037
78	0.7907	0.8215	0.8039	0.8163	0.8228	0.8375	0.8394	0.8223
79	0.8973	0.9123	0.8980	0.8806	0.8897	0.9056	0.9076	0.8831
80	0.5608	0.5777	0.5197	0.6162	0.5677	0.5827	0.5954	0.5473
81	0.6692	0.6877	0.6319	0.7157	0.6752	0.6884	0.6986	0.6678
82	0.7751	0.7927	0.7267	0.8052	0.7682	0.7819	0.7896	0.7828
83	0.6124	0.6329	0.5664	0.6586	0.5979	0.6178	0.6302	0.5951
84	0.9388	0.9450	0.9161	0.9332	0.9290	0.9364	0.9400	0.9210
85	0.9148	0.9267	0.9000	0.9007	0.9017	0.9161	0.9205	0.8964
86	0.9067	0.9202	0.9000	0.8970	0.9028	0.9143	0.9164	0.8891
87	0.8855	0.8969	0.8781	0.8808	0.8870	0.8973	0.9008	0.8691
88	0.8094	0.8265	0.8039	0.8184	0.8179	0.8302	0.8349	0.8024
89	0.9211	0.9255	0.8819	0.9191	0.9027	0.9116	0.9178	0.8978
90	0.9421	0.9516	0.9131	0.9405	0.9290	0.9385	0.9436	0.9290
91	0.7506	0.7869	0.7695	0.7855	0.7884	0.8036	0.8059	0.7915
92	0.6898	0.7382	0.7204	0.7609	0.7621	0.7773	0.7799	0.7717
93	0.7088	0.7398	0.7225	0.7465	0.7464	0.7659	0.7673	0.7439
94	0.7994	0.8186	0.8009	0.8198	0.8178	0.8312	0.8348	0.8076
95	0.7589	0.7961	0.7794	0.7942	0.7960	0.8103	0.8128	0.7867
96	0.6513	0.6831	0.6515	0.6687	0.6620	0.6836	0.6874	0.6247
97	0.6033	0.6323	0.5956	0.6397	0.6211	0.6376	0.6447	0.5854
98	0.7760	0.7949	0.7669	0.7465	0.7543	0.7825	0.7838	0.7174
99	0.4465	0.4861	0.4466	0.5278	0.4934	0.5205	0.5277	0.4671
100	0.3134	0.3485	0.3175	0.3988	0.3652	0.3912	0.3971	0.3392
101	0.4962	0.5465	0.5164	0.5636	0.5501	0.5769	0.5820	0.5249
102	0.5983	0.6426	0.6164	0.6569	0.6486	0.6771	0.6822	0.6240
103	0.3596	0.4033	0.3775	0.4331	0.4076	0.4308	0.4375	0.3809
104	0.2771	0.3149	0.2929	0.3617	0.3402	0.3650	0.3717	0.3332
105	0.4671	0.5206	0.4938	0.5442	0.5317	0.5602	0.5643	0.5130
106	0.4991	0.5508	0.5231	0.5940	0.5767	0.6043	0.6103	0.5715
107	0.6770	0.7132	0.6840	0.6943	0.6943	0.7215	0.7255	0.6621
108	0.4720	0.5095	0.4750	0.5523	0.5274	0.5540	0.5613	0.5046
109	0.7727	0.7966	0.7724	0.7461	0.7521	0.7864	0.7876	0.7234
110	0.5260	0.5994	0.5794	0.6408	0.6309	0.6597	0.6628	0.6410
111	0.2454	0.2958	0.2852	0.3471	0.3360	0.3544	0.3570	0.3372
112	0.2275	0.2296	0.2196	0.2397	0.2282	0.2442	0.2475	0.2099
113	0.6532	0.6987	0.6850	0.6957	0.6991	0.7251	0.7280	0.7106
114	0.2932	0.2988	0.2835	0.3142	0.2978	0.3200	0.3230	0.2860
115	0.5282	0.5709	0.5501	0.6104	0.6051	0.6234	0.6266	0.6147
116	0.6253	0.6895	0.6709	0.7015	0.7027	0.7221	0.7253	0.7196
117	0.3607	0.4204	0.4064	0.4769	0.4683	0.4937	0.4975	0.4951
118	0.2642	0.2664	0.2585	0.2726	0.2618	0.2850	0.2880	0.2507
119	0.2336	0.2457	0.2336	0.2721	0.2574	0.2797	0.2837	0.2422
120	0.4324	0.4353	0.4134	0.4490	0.4169	0.4440	0.4503	0.3964

HD	Clinton16	Abrams18	Thornton18	Biden20	Blackman20	Ossoff21	Warnock21	Abrams22
overall	0.4734	0.4930	0.4697	0.5013	0.4848	0.5061	0.5104	0.4620
121	0.4383	0.4382	0.4077	0.4598	0.4194	0.4425	0.4503	0.3852
122	0.7829	0.7982	0.7689	0.7877	0.7720	0.7958	0.8010	0.7655
123	0.3145	0.3023	0.3153	0.3195	0.3085	0.3193	0.3201	0.2736
124	0.3911	0.3841	0.3675	0.3980	0.3772	0.3936	0.3977	0.3395
125	0.3124	0.3380	0.3252	0.3750	0.3549	0.3784	0.3799	0.3423
126	0.6195	0.6212	0.6115	0.6197	0.6170	0.6298	0.6306	0.5894
127	0.3225	0.3389	0.3158	0.3749	0.3415	0.3649	0.3670	0.3174
128	0.5105	0.4989	0.4858	0.5025	0.4954	0.5098	0.5121	0.4545
129	0.6726	0.6733	0.6496	0.6856	0.6669	0.6835	0.6858	0.6342
130	0.6627	0.6813	0.6665	0.6839	0.6797	0.6947	0.6961	0.6730
131	0.2932	0.3217	0.2997	0.3670	0.3357	0.3639	0.3641	0.3232
132	0.6975	0.7065	0.6918	0.7024	0.6986	0.7175	0.7190	0.6724
133	0.4584	0.4527	0.4383	0.4561	0.4454	0.4705	0.4721	0.4204
134	0.3675	0.3622	0.3475	0.3672	0.3605	0.3794	0.3828	0.3402
135	0.2684	0.2653	0.2567	0.2640	0.2550	0.2713	0.2743	0.2254
136	0.3509	0.3549	0.3395	0.3499	0.3372	0.3571	0.3602	0.3056
137	0.5805	0.5883	0.5698	0.5897	0.5831	0.5999	0.6011	0.5656
138	0.2761	0.2729	0.2548	0.2985	0.2726	0.2949	0.2984	0.2546
139	0.3343	0.3473	0.3308	0.3915	0.3689	0.3872	0.3890	0.3475
140	0.7512	0.7692	0.7519	0.7471	0.7411	0.7654	0.7690	0.7451
141	0.7217	0.7419	0.7220	0.7370	0.7310	0.7494	0.7512	0.7280
142	0.6564	0.6705	0.6484	0.6687	0.6552	0.6724	0.6763	0.6316
143	0.7177	0.7223	0.7033	0.7099	0.7054	0.7228	0.7259	0.6915
144	0.3572	0.3620	0.3428	0.3923	0.3715	0.3905	0.3925	0.3457
145	0.4030	0.4083	0.3992	0.4182	0.4120	0.4290	0.4312	0.3886
146	0.3306	0.3558	0.3402	0.3840	0.3693	0.3930	0.3953	0.3570
147	0.3990	0.4414	0.4271	0.4662	0.4544	0.4793	0.4812	0.4429
148	0.3283	0.3167	0.2980	0.3276	0.3106	0.3286	0.3313	0.2913
149	0.3423	0.3256	0.3176	0.3348	0.3292	0.3441	0.3469	0.2964
150	0.5595	0.5496	0.5339	0.5455	0.5386	0.5543	0.5562	0.5107
151	0.4838	0.4720	0.4577	0.4809	0.4740	0.4877	0.4887	0.4452
152	0.2738	0.2855	0.2758	0.3017	0.2909	0.3123	0.3129	0.2793
153	0.6728	0.6798	0.6597	0.6825	0.6741	0.6887	0.6899	0.6593
154	0.5464	0.5383	0.5280	0.5377	0.5321	0.5504	0.5500	0.4931
155	0.3457	0.3279	0.3206	0.3489	0.3391	0.3541	0.3561	0.3130
156	0.2945	0.2829	0.2767	0.2976	0.2881	0.3012	0.3035	0.2486
157	0.2481	0.2370	0.2320	0.2511	0.2443	0.2572	0.2571	0.2076
158	0.3531	0.3412	0.3271	0.3492	0.3342	0.3512	0.3518	0.3047
159	0.3003	0.2928	0.2800	0.3045	0.2930	0.3104	0.3109	0.2651
160	0.3265	0.3052	0.2884	0.3178	0.2973	0.3121	0.3135	0.2560
161	0.3246	0.3679	0.3595	0.4068	0.3958	0.4200	0.4201	0.3897
162	0.6504	0.6870	0.6742	0.6721	0.6678	0.6893	0.6901	0.6576
163	0.7214	0.7313	0.7059	0.7266	0.7115	0.7291	0.7314	0.7008
164	0.3635	0.4190	0.4034	0.4286	0.4113	0.4347	0.4347	0.4062
165	0.7896	0.7899	0.7685	0.7803	0.7735	0.7851	0.7863	0.7540
166	0.3116	0.3135	0.2834	0.3470	0.3045	0.3300	0.3332	0.2844
167	0.3045	0.3125	0.3004	0.3268	0.3189	0.3377	0.3379	0.3008
168	0.6098	0.6350	0.6245	0.6225	0.6212	0.6460	0.6479	0.6024
169	0.2743	0.2641	0.2464	0.2767	0.2666	0.2806	0.2818	0.2370
170	0.2733	0.2610	0.2441	0.2846	0.2676	0.2881	0.2895	0.2362
171	0.3926	0.3819	0.3710	0.3957	0.3904	0.3953	0.3957	0.3469
172	0.2734	0.2564	0.2462	0.2732	0.2611	0.2760	0.2768	0.2273
173	0.4058	0.4008	0.3840	0.4191	0.4031	0.4133	0.4130	0.3706
174	0.2137	0.1984	0.1977	0.2076	0.2026	0.2085	0.2081	0.1994
175	0.3533	0.3524	0.3397	0.3565	0.3446	0.3541	0.3540	0.3100
176	0.2848	0.2806	0.2734	0.2866	0.2793	0.2936	0.2944	0.2505
177	0.5211	0.5375	0.5169	0.5718	0.5553	0.5697	0.5701	0.4892
178	0.1589	0.1447	0.1453	0.1585	0.1527	0.1624	0.1611	0.1272
179	0.3945	0.3937	0.3756	0.4203	0.4002	0.4030	0.4039	0.3524
180	0.3210	0.3373	0.3262	0.3423	0.3286	0.3438	0.3420	0.2955

Table 48: Vote shares for the minority candidate of choice across enacted House districts, in probative general and general runoff elections.

HD	Pri (4)	Gen (8)	Eff?
1	1	0	N
2	1	0	N
3	1	0	N
4	2	0	N
5	1	0	N
6	1	0	N
7	0	0	N
8	0	0	N
9	0	0	N
10	1	0	N
11	0	0	N
12	1	0	N
13	1	0	N
14	2	0	N
15	2	0	N
16	3	0	N
17	2	0	N
18	2	0	N
19	3	0	N
20	1	0	N
21	1	0	N
22	3	0	N
23	1	0	N
24	1	0	N
25	0	0	N
26	0	0	N
27	1	0	N
28	0	0	N
29	2	0	N
30	0	0	N
31	1	0	N
32	2	0	N
33	3	0	N
34	3	0	N
35	3	8	Y
36	3	0	N
37	3	8	Y
38	4	8	Y
39	4	8	Y
40	3	8	Y
41	4	8	Y
42	3	8	Y
43	3	8	Y
44	2	0	N
45	0	0	N
46	0	0	N
47	2	0	N
48	0	1	N
49	0	0	N
50	2	8	N
51	0	8	N
52	0	8	N
53	0	1	N
54	0	7	N
55	3	8	Y
56	3	8	Y
57	0	8	N
58	3	8	Y
59	3	8	Y
60	3	8	Y

HD	Pri (4)	Gen (8)	Eff?
61	4	8	Y
62	3	8	Y
63	3	8	Y
64	3	0	N
65	4	8	Y
66	4	8	Y
67	4	8	Y
68	4	8	Y
69	4	8	Y
70	3	0	N
71	3	0	N
72	1	0	N
73	2	0	N
74	3	0	N
75	4	8	Y
76	4	8	Y
77	4	8	Y
78	4	8	Y
79	4	8	Y
80	0	8	N
81	0	8	N
82	0	8	N
83	0	8	N
84	3	8	Y
85	3	8	Y
86	3	8	Y
87	4	8	Y
88	3	8	Y
89	2	8	N
90	2	8	N
91	4	8	Y
92	4	8	Y
93	4	8	Y
94	4	8	Y
95	4	8	Y
96	3	8	Y
97	3	8	Y
98	3	8	Y
99	3	3	N
100	1	0	N
101	3	7	Y
102	3	8	Y
103	3	0	N
104	3	0	N
105	3	6	Y
106	3	7	Y
107	3	8	Y
108	3	6	Y
109	3	8	Y
110	4	8	Y
111	3	0	N
112	1	0	N
113	4	8	Y
114	3	0	N
115	4	8	Y
116	4	8	Y
117	3	0	N
118	3	0	N
119	2	0	N
120	2	0	N

HD	Pri (4)	Gen (8)	Eff?
121	0	0	N
122	3	8	Y
123	3	0	N
124	2	0	N
125	3	0	N
126	4	8	Y
127	3	0	N
128	2	4	N
129	3	8	Y
130	4	8	Y
131	3	0	N
132	4	8	Y
133	3	0	N
134	1	0	N
135	1	0	N
136	3	0	N
137	4	8	Y
138	2	0	N
139	2	0	N
140	4	8	Y
141	4	8	Y
142	3	8	Y
143	3	8	Y
144	3	0	N
145	3	0	N
146	4	0	N
147	4	0	N
148	4	0	N
149	2	0	N
150	4	8	Y
151	4	0	N
152	4	0	N
153	4	8	Y
154	4	7	Y
155	3	0	N
156	4	0	N
157	3	0	N
158	2	0	N
159	2	0	N
160	2	0	N
161	4	0	N
162	4	8	Y
163	3	8	Y
164	3	0	N
165	4	8	Y
166	3	0	N
167	3	0	N
168	4	8	Y
169	3	0	N
170	3	0	N
171	4	0	N
172	4	0	N
173	4	0	N
174	3	0	N
175	4	0	N
176	4	0	N
177	4	7	Y
178	3	0	N
179	3	0	N
180	3	0	N

Table 49: Of 180 enacted House districts, 69 are rated as providing an effective opportunity to elect coalition candidates of choice.

	CD Alt			
CD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	30.3%	37.2%	3	0
2	47.7%	52.4%	4	8
3	51.2%	58.4%	4	8
4	50.6%	58.8%	3	8
5	50.1%	61.5%	3	8
6	13.7%	24.6%	0	3
7	34.3%	56.7%	3	8
8	27.3%	34.2%	4	0
9	4.6%	16.1%	0	0
10	17.6%	24.5%	3	0
11	17.6%	25.2%	2	0
12	39.2%	43.8%	3	0
13	52.0%	58.8%	4	8
14	7.6%	18.6%	1	0

Table 50: CD Alt effectiveness.

	SD Alt Eff 1			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	25.1%	32.6%	3	0
2	46.9%	54.4%	4	8
3	21.2%	27.4%	3	0
4	23.5%	29.0%	3	0
5	20.3%	54.9%	3	8
6	50.1%	56.2%	3	8
7	17.1%	31.4%	3	3
8	30.4%	36.6%	4	0
9	29.3%	56.3%	3	8
10	59.5%	70.5%	4	8
11	31.0%	38.6%	4	0
12	58.0%	61.5%	4	8
13	27.0%	33.0%	4	0
14	18.1%	29.5%	0	8
15	54.0%	60.6%	4	8
16	50.2%	56.4%	4	8
17	51.1%	57.7%	4	8
18	30.4%	34.9%	3	0
19	25.7%	34.1%	4	0
20	34.4%	39.5%	3	0
21	7.5%	16.3%	2	0
22	50.5%	54.3%	4	8
23	23.0%	28.6%	3	0
24	25.0%	28.5%	3	0
25	50.0%	54.0%	3	8
26	50.1%	53.8%	4	8
27	4.7%	14.9%	0	0
28	50.6%	57.4%	4	8
29	26.9%	31.4%	3	0
30	14.3%	19.4%	1	0
31	19.7%	26.9%	3	0
32	14.9%	25.4%	3	0
33	50.4%	68.5%	4	8
34	72.2%	83.8%	4	8
35	50.9%	58.9%	4	8
36	50.0%	55.7%	1	8
37	19.3%	28.0%	3	0
38	27.9%	43.3%	3	8
39	51.2%	56.6%	4	8
40	50.1%	67.8%	3	8
41	57.3%	67.3%	3	8
42	35.8%	45.4%	0	8
43	52.0%	59.0%	4	8
44	61.6%	65.2%	3	8
45	19.8%	31.9%	3	0
46	16.5%	21.5%	2	0
47	16.7%	25.4%	3	0
48	10.1%	16.5%	0	1
49	8.1%	32.7%	1	0
50	5.4%	11.5%	1	0
51	1.2%	5.5%	0	0
52	13.0%	21.2%	1	0
53	5.1%	8.3%	1	0
54	3.8%	26.4%	1	0
55	50.0%	63.9%	4	8
56	7.6%	15.3%	0	0

Table 51: Effectiveness in SD Alt Eff 1, which includes the Alt 1 Gingles maps.

	SD Alt Eff 2			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	25.1%	32.6%	3	0
2	46.9%	54.4%	4	8
3	21.2%	27.4%	3	0
4	23.4%	28.9%	3	0
5	29.9%	71.6%	3	8
6	23.9%	32.1%	0	8
7	21.4%	38.0%	3	8
8	30.4%	36.6%	4	0
9	29.5%	48.3%	3	8
10	71.5%	76.7%	4	8
11	31.0%	38.6%	4	0
12	58.0%	61.5%	4	8
13	27.0%	33.0%	4	0
14	19.0%	31.1%	0	8
15	54.0%	60.6%	4	8
16	22.7%	27.7%	3	0
17	32.0%	37.1%	3	0
18	30.4%	34.9%	3	0
19	25.7%	34.1%	4	0
20	31.3%	34.8%	3	0
21	7.5%	16.3%	2	0
22	56.5%	61.8%	4	8
23	35.5%	40.0%	3	0
24	19.9%	24.3%	3	0
25	33.5%	37.2%	3	0
26	57.0%	61.2%	3	8
27	5.0%	15.2%	0	0
28	19.5%	25.9%	2	0
29	26.9%	31.4%	3	0
30	20.9%	27.0%	2	0
31	20.7%	28.1%	3	0
32	14.9%	25.4%	3	0
33	43.0%	65.9%	4	8
34	69.5%	82.2%	4	8
35	71.9%	79.4%	4	8
36	51.3%	58.4%	3	8
37	19.3%	28.0%	3	0
38	65.3%	73.7%	4	8
39	60.7%	66.3%	3	8
40	19.2%	40.8%	0	8
41	62.6%	69.3%	3	8
42	30.8%	39.4%	0	8
43	64.3%	71.2%	4	8
44	71.3%	79.9%	4	8
45	18.6%	31.7%	3	0
46	16.9%	23.9%	1	0
47	17.4%	27.0%	3	0
48	9.5%	16.5%	1	0
49	8.0%	29.9%	1	0
50	5.6%	14.4%	1	0
51	1.2%	5.5%	0	0
52	13.0%	21.2%	1	0
53	5.1%	8.3%	1	0
54	3.8%	26.4%	1	0
55	66.0%	74.7%	4	8
56	7.6%	15.3%	0	0

Table 52: Effectiveness in SD Alt Eff 2, which includes the Alt 2 Gingles maps.

	HD Alt Eff 1 Part 1			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	4.2%	6.3%	1	0
2	3.2%	10.8%	1	0
3	3.4%	6.4%	1	0
4	5.4%	49.5%	2	0
5	4.6%	17.2%	1	0
6	1.5%	13.5%	1	0
7	0.6%	6.1%	0	0
8	1.4%	4.1%	0	0
9	1.6%	6.3%	0	0
10	3.7%	13.7%	1	0
11	1.8%	6.0%	0	0
12	9.7%	15.9%	1	0
13	19.2%	30.0%	1	0
14	6.8%	12.7%	2	0
15	14.2%	23.9%	2	0
16	11.7%	20.3%	3	0
17	23.0%	29.9%	2	0
18	8.0%	10.4%	2	0
19	24.1%	30.9%	3	0
20	9.3%	18.5%	1	0
21	5.1%	12.5%	1	0
22	15.1%	26.7%	3	0
23	6.5%	20.7%	1	0
24	7.0%	17.3%	1	0
25	5.9%	11.0%	0	0
26	4.0%	14.8%	0	0
27	3.7%	13.3%	1	0
28	3.9%	15.3%	0	0
29	13.6%	53.3%	2	0
30	8.1%	24.2%	0	0
31	7.6%	26.5%	1	0
32	8.0%	12.9%	2	0
33	11.2%	14.3%	3	0
34	15.7%	23.5%	3	0
35	28.4%	39.6%	3	8
36	17.0%	23.5%	3	0
37	28.2%	46.8%	3	8
38	54.2%	66.8%	4	8
39	55.3%	74.0%	4	8
40	33.0%	38.9%	3	8
41	39.4%	68.0%	4	8
42	33.7%	51.1%	3	8
43	26.5%	40.6%	3	8
44	12.0%	22.5%	2	0
45	5.3%	10.2%	0	0
46	8.1%	15.5%	0	0
47	10.7%	18.1%	2	0
48	11.8%	24.2%	0	1
49	8.4%	15.1%	0	0
50	12.4%	18.8%	2	8
51	23.7%	37.0%	0	8
52	16.0%	23.4%	0	8
53	14.5%	21.9%	0	1
54	15.5%	28.3%	0	7
55	55.4%	60.4%	3	8
56	45.5%	51.3%	3	8
57	18.1%	26.1%	0	8
58	63.0%	68.1%	3	8
59	70.1%	74.5%	3	8
60	63.9%	69.0%	3	8

	HD Alt Eff 1 Part 2			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
61	74.3%	81.9%	4	8
62	72.3%	79.1%	3	8
63	69.3%	78.6%	3	8
64	30.7%	38.1%	3	0
65	62.0%	66.5%	4	8
66	53.4%	62.9%	4	8
67	58.9%	66.7%	4	8
68	55.7%	62.0%	4	8
69	63.6%	69.0%	4	8
70	27.8%	35.8%	3	0
71	19.9%	26.1%	3	0
72	20.9%	27.8%	1	0
73	12.1%	19.1%	2	0
74	25.5%	31.1%	3	0
75	74.4%	85.7%	4	8
76	67.2%	80.4%	4	8
77	76.1%	88.3%	4	8
78	71.6%	80.5%	4	8
79	71.6%	87.6%	4	8
80	14.2%	37.3%	0	8
81	21.8%	42.7%	0	8
82	16.8%	23.6%	0	8
83	15.1%	43.6%	0	8
84	73.7%	76.7%	3	8
85	62.7%	68.6%	3	8
86	75.1%	79.4%	3	8
87	73.1%	79.8%	4	8
88	63.3%	73.3%	3	8
89	62.5%	65.9%	2	8
90	58.5%	62.8%	2	8
91	70.0%	75.9%	4	8
92	68.8%	73.5%	4	8
93	65.4%	75.0%	4	8
94	69.0%	76.3%	4	8
95	67.2%	75.1%	4	8
96	23.0%	59.0%	3	8
97	26.8%	46.0%	3	8
98	23.2%	76.0%	3	8
99	14.7%	23.4%	3	3
100	10.0%	20.0%	1	0
101	24.2%	42.4%	3	7
102	37.6%	58.9%	3	8
103	16.8%	33.7%	3	0
104	17.0%	28.1%	3	0
105	29.0%	45.8%	3	6
106	36.3%	47.4%	3	7
107	29.6%	60.7%	3	8
108	18.4%	36.6%	3	6
109	32.5%	68.6%	3	8
110	47.2%	57.7%	4	8
111	22.3%	31.1%	3	0
112	19.2%	22.5%	1	0
113	59.5%	66.2%	4	8
114	24.7%	28.4%	3	0
115	52.1%	59.1%	4	8
116	58.1%	65.4%	4	8
117	36.6%	42.0%	3	0
118	23.6%	27.3%	3	0
119	13.5%	23.9%	2	0
120	14.3%	21.4%	2	0

	HD Alt Eff 1 Part 3			
SD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
121	9.6%	15.2%	0	0
122	28.4%	40.1%	3	8
123	24.3%	28.6%	3	0
124	25.6%	31.8%	2	0
125	23.7%	31.4%	3	0
126	54.5%	57.7%	4	8
127	18.5%	23.3%	3	0
128	50.4%	52.1%	2	4
129	54.9%	59.2%	3	8
130	59.9%	63.8%	4	8
131	17.6%	23.5%	3	0
132	52.3%	60.1%	4	8
133	36.8%	38.9%	3	0
134	33.6%	37.3%	1	0
135	23.8%	25.6%	1	0
136	28.7%	32.3%	3	0
137	52.1%	56.6%	4	8
138	19.3%	22.6%	2	0
139	20.3%	26.7%	2	0
140	57.6%	65.6%	4	8
141	57.5%	64.1%	4	8
142	59.5%	63.2%	3	8
143	60.8%	65.5%	3	8
144	29.3%	31.9%	3	0
145	35.7%	41.6%	3	0
146	27.6%	32.3%	4	0
147	30.1%	37.3%	4	0
148	34.0%	37.1%	4	0
149	32.1%	37.8%	2	0
150	53.6%	59.7%	4	8
151	42.4%	49.7%	4	0
152	26.1%	28.4%	4	0
153	67.9%	70.4%	4	8
154	54.8%	56.5%	4	7
155	35.9%	38.1%	3	0
156	30.3%	37.2%	4	0
157	24.7%	33.7%	3	0
158	31.2%	35.7%	2	0
159	24.5%	27.4%	2	0
160	22.6%	27.6%	2	0
161	27.1%	33.9%	4	0
162	43.7%	53.3%	4	8
163	45.5%	52.9%	3	8
164	23.5%	32.0%	3	0
165	50.3%	55.6%	4	8
166	5.7%	9.8%	3	0
167	22.3%	29.7%	3	0
168	46.3%	56.6%	4	8
169	29.0%	36.7%	3	0
170	24.2%	32.9%	3	0
171	39.6%	44.2%	4	0
172	23.3%	36.7%	4	0
173	36.3%	41.7%	4	0
174	17.4%	25.4%	3	0
175	24.2%	29.2%	4	0
176	22.7%	30.9%	4	0
177	53.9%	60.0%	4	7
178	14.8%	19.9%	3	0
179	27.0%	33.4%	3	0
180	18.2%	23.8%	3	0

Table 53: Effectiveness in HD Alt Eff 1, which includes the Alt 1 Gingles maps.

	HD Alt Eff 2 Part 1			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
1	4.2%	6.3%	1	0
2	3.2%	10.8%	1	0
3	3.4%	6.4%	1	0
4	5.4%	49.5%	2	0
5	4.6%	17.2%	1	0
6	1.5%	13.5%	1	0
7	0.6%	6.1%	0	0
8	1.4%	4.1%	0	0
9	1.6%	6.3%	0	0
10	3.7%	13.7%	1	0
11	1.8%	6.0%	0	0
12	9.7%	15.9%	1	0
13	19.2%	30.0%	1	0
14	6.8%	12.7%	2	0
15	14.2%	23.9%	2	0
16	11.7%	20.3%	3	0
17	23.0%	29.9%	2	0
18	8.0%	10.4%	2	0
19	24.1%	30.9%	3	0
20	9.3%	18.5%	1	0
21	5.1%	12.5%	1	0
22	15.1%	26.7%	3	0
23	6.5%	20.7%	1	0
24	7.0%	17.3%	1	0
25	5.9%	11.0%	0	0
26	4.0%	14.8%	0	0
27	3.7%	13.3%	1	0
28	3.9%	15.3%	0	0
29	13.6%	53.3%	2	0
30	8.1%	24.2%	0	0
31	7.6%	26.5%	1	0
32	8.0%	12.9%	2	0
33	11.2%	14.3%	3	0
34	15.7%	23.5%	3	0
35	28.4%	39.6%	3	8
36	17.0%	23.5%	3	0
37	28.2%	46.8%	3	8
38	54.2%	66.8%	4	8
39	55.3%	74.0%	4	8
40	33.0%	38.9%	3	8
41	39.4%	68.0%	4	8
42	33.7%	51.1%	3	8
43	26.5%	40.6%	3	8
44	12.0%	22.5%	2	0
45	5.3%	10.2%	0	0
46	8.1%	15.5%	0	0
47	10.7%	18.1%	2	0
48	11.8%	24.2%	0	1
49	8.4%	15.1%	0	0
50	12.4%	18.8%	2	8
51	23.7%	37.0%	0	8
52	16.0%	23.4%	0	8
53	14.5%	21.9%	0	1
54	15.5%	28.3%	0	7
55	55.4%	60.4%	3	8
56	45.5%	51.3%	3	8
57	18.1%	26.1%	0	8
58	63.0%	68.1%	3	8
59	70.1%	74.5%	3	8
60	63.9%	69.0%	3	8

	HD Alt Eff 2 Part 2			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
61	74.3%	81.9%	4	8
62	72.3%	79.1%	3	8
63	69.3%	78.6%	3	8
64	30.7%	38.1%	3	0
65	62.0%	66.5%	4	8
66	53.4%	62.9%	4	8
67	58.9%	66.7%	4	8
68	55.7%	62.0%	4	8
69	63.6%	69.0%	4	8
70	27.8%	35.8%	3	0
71	19.9%	26.1%	3	0
72	20.9%	27.8%	1	0
73	12.1%	19.1%	2	0
74	25.5%	31.1%	3	0
75	74.4%	85.7%	4	8
76	67.2%	80.4%	4	8
77	76.1%	88.3%	4	8
78	71.6%	80.5%	4	8
79	71.6%	87.6%	4	8
80	14.2%	37.3%	0	8
81	21.8%	42.7%	0	8
82	16.8%	23.6%	0	8
83	15.1%	43.6%	0	8
84	73.7%	76.7%	3	8
85	62.7%	68.6%	3	8
86	75.1%	79.4%	3	8
87	73.1%	79.8%	4	8
88	63.3%	73.3%	3	8
89	62.5%	65.9%	2	8
90	58.5%	62.8%	2	8
91	70.0%	75.9%	4	8
92	68.8%	73.5%	4	8
93	65.4%	75.0%	4	8
94	69.0%	76.3%	4	8
95	67.2%	75.1%	4	8
96	23.0%	59.0%	3	8
97	26.8%	46.0%	3	8
98	23.2%	76.0%	3	8
99	14.7%	23.4%	3	3
100	10.0%	20.0%	1	0
101	24.2%	42.4%	3	7
102	37.6%	58.9%	3	8
103	16.8%	33.7%	3	0
104	17.0%	28.1%	3	0
105	29.0%	45.8%	3	6
106	36.3%	47.4%	3	7
107	29.6%	60.7%	3	8
108	18.4%	36.6%	3	6
109	32.5%	68.6%	3	8
110	47.2%	57.7%	4	8
111	22.3%	31.1%	3	0
112	19.2%	22.5%	1	0
113	59.5%	66.2%	4	8
114	24.7%	28.4%	3	0
115	52.1%	59.1%	4	8
116	58.1%	65.4%	4	8
117	36.6%	42.0%	3	0
118	23.6%	27.3%	3	0
119	13.5%	23.9%	2	0
120	14.3%	21.4%	2	0

	HD Alt Eff 2 Part 3			
HD	BVAP	BHVAP	Primaries out of 4	Generals out of 8
121	9.6%	15.2%	0	0
122	28.4%	40.1%	3	8
123	24.3%	28.6%	3	0
124	25.6%	31.8%	2	0
125	23.7%	31.4%	3	0
126	54.5%	57.7%	4	8
127	18.5%	23.3%	3	0
128	50.4%	52.1%	2	4
129	54.9%	59.2%	3	8
130	59.9%	63.8%	4	8
131	17.6%	23.5%	3	0
132	52.3%	60.1%	4	8
133	36.8%	38.9%	3	0
134	33.6%	37.3%	1	0
135	23.8%	25.6%	1	0
136	28.7%	32.3%	3	0
137	52.1%	56.6%	4	8
138	19.3%	22.6%	2	0
139	20.3%	26.7%	2	0
140	57.6%	65.6%	4	8
141	57.5%	64.1%	4	8
142	59.5%	63.2%	3	8
143	60.8%	65.5%	3	8
144	29.3%	31.9%	3	0
145	35.7%	41.6%	3	0
146	27.6%	32.3%	4	0
147	30.1%	37.3%	4	0
148	34.0%	37.1%	4	0
149	32.1%	37.8%	2	0
150	53.6%	59.7%	4	8
151	42.4%	49.7%	4	0
152	26.1%	28.4%	4	0
153	67.9%	70.4%	4	8
154	54.8%	56.5%	4	7
155	35.9%	38.1%	3	0
156	30.3%	37.2%	4	0
157	24.7%	33.7%	3	0
158	31.2%	35.7%	2	0
159	24.5%	27.4%	2	0
160	22.6%	27.6%	2	0
161	27.1%	33.9%	4	0
162	43.7%	53.3%	4	8
163	45.5%	52.9%	3	8
164	23.5%	32.0%	3	0
165	50.3%	55.6%	4	8
166	5.7%	9.8%	3	0
167	22.3%	29.7%	3	0
168	46.3%	56.6%	4	8
169	29.0%	36.7%	3	0
170	24.2%	32.9%	3	0
171	39.6%	44.2%	4	0
172	23.3%	36.7%	4	0
173	36.3%	41.7%	4	0
174	17.4%	25.4%	3	0
175	24.2%	29.2%	4	0
176	22.7%	30.9%	4	0
177	53.9%	60.0%	4	7
178	14.8%	19.9%	3	0
179	27.0%	33.4%	3	0
180	18.2%	23.8%	3	0

Table 54: Effectiveness in HD Alt Eff 2, which includes the Alt 2 Gingles maps.

C Splits of geographical units

County	CD	TOTPOP	VAP	BVAP	BHVAP	Biden20	Abrams18
Bibb	2	108371	82489	0.6349	0.6710	0.7139	0.7250
Bibb	8	48975	38413	0.3098	0.3394	0.4596	0.4202
Cherokee	6	40881	31202	0.0304	0.0814	0.2172	0.1862
Cherokee	11	225739	171726	0.0817	0.1902	0.3233	0.2905
Clayton	5	37919	27885	0.7280	0.8649	0.8849	0.9200
Clayton	13	259676	192693	0.7190	0.8266	0.8548	0.8773
Cobb	6	165925	125728	0.1092	0.1848	0.4913	0.4476
Cobb	11	397281	313106	0.2654	0.3850	0.5535	0.5309
Cobb	13	125029	94104	0.4458	0.6271	0.7316	0.7310
Cobb	14	77914	58910	0.4646	0.5644	0.6421	0.6263
DeKalb	4	601451	465661	0.5316	0.6302	0.8171	0.8166
DeKalb	5	162931	129615	0.5145	0.5480	0.9148	0.9203
Douglas	3	42970	32601	0.2970	0.3719	0.4220	0.3803
Douglas	13	101267	75827	0.5762	0.6647	0.7230	0.7055
Effingham	1	47208	34272	0.1276	0.1756	0.2462	0.2167
Effingham	12	17561	13023	0.1887	0.2129	0.2608	0.2521
Fayette	3	102685	78539	0.2094	0.2720	0.4272	0.3914
Fayette	13	16509	13259	0.5492	0.6082	0.6394	0.6271
Fulton	5	564287	464015	0.4769	0.5379	0.8077	0.8108
Fulton	6	245494	190172	0.1574	0.2568	0.5433	0.5069
Fulton	7	92558	69229	0.1175	0.1777	0.5527	0.5060
Fulton	13	164371	123766	0.8829	0.9171	0.9291	0.9474
Gwinnett	6	34755	25061	0.1336	0.2645	0.4320	0.3889
Gwinnett	7	672579	497705	0.3234	0.5450	0.6487	0.6332
Gwinnett	9	249728	186718	0.2061	0.3433	0.5045	0.4697
Henry	3	23975	17964	0.4678	0.5259	0.5731	0.5484
Henry	10	118452	86869	0.4414	0.4948	0.5093	0.4413
Henry	13	98285	75140	0.5710	0.6324	0.7013	0.6898
Houston	2	48521	36233	0.4321	0.5075	0.5511	0.5393
Houston	8	115112	85885	0.2788	0.3276	0.3996	0.3741
Muscogee	2	175155	132158	0.5262	0.5851	0.6625	0.6625
Muscogee	3	31767	24894	0.1909	0.2578	0.3973	0.3371
Newton	4	70114	52306	0.6098	0.6644	0.7470	0.7502
Newton	10	42369	32442	0.2631	0.2960	0.3764	0.3546
Wilkes	10	1802	1491	0.3273	0.3628	0.3556	0.3607
Wilkes	12	7763	6160	0.4193	0.4481	0.4191	0.3810

Table 55: All county splits in the enacted Congressional map.

County	SD	TOTPOP	VAP	BVAP	BHVAP	Biden20	Abrams18
Bibb	18	53182	42225	0.3079	0.3413	0.4239	0.3967
Bibb	25	15513	12080	0.4120	0.4384	0.5678	0.5256
Bibb	26	88651	66597	0.6951	0.7309	0.7939	0.8072
Chatham	1	81408	65586	0.1486	0.2032	0.3982	0.3743
Chatham	2	190408	150843	0.4686	0.5368	0.7304	0.7447
Chatham	4	23475	18286	0.2596	0.3331	0.4748	0.4463
Clarke	46	52016	45312	0.1485	0.2062	0.6611	0.6499
Clarke	47	76655	61518	0.2933	0.4111	0.7355	0.7329
Cobb	6	92249	75423	0.2527	0.3229	0.5988	0.5665
Cobb	32	101467	80689	0.1946	0.2934	0.5310	0.5013
Cobb	33	192694	146415	0.4296	0.6488	0.7124	0.7146
Cobb	37	181541	138961	0.2018	0.2812	0.4547	0.4203
Cobb	38	108305	83807	0.4264	0.5438	0.7289	0.7235
Cobb	56	89893	66553	0.0706	0.1257	0.4685	0.4177
DeKalb	10	75906	58884	0.9500	0.9605	0.9600	0.9783
DeKalb	40	164997	127423	0.1719	0.3807	0.6490	0.6138
DeKalb	41	183560	139591	0.6449	0.7009	0.8404	0.8492
DeKalb	42	190940	153952	0.3078	0.3875	0.8487	0.8451
DeKalb	43	32212	24150	0.9135	0.9384	0.9394	0.9582
DeKalb	44	51049	40820	0.7415	0.7714	0.9490	0.9654
DeKalb	55	65718	50456	0.9248	0.9473	0.9511	0.9698
Douglas	28	25889	19664	0.2400	0.3042	0.3485	0.3050
Douglas	30	23454	17242	0.5045	0.5920	0.6386	0.6270
Douglas	35	94894	71522	0.5587	0.6479	0.7084	0.6871
Fayette	16	87134	66132	0.1605	0.2249	0.4142	0.3812
Fayette	34	32060	25666	0.5111	0.5670	0.6424	0.6262
Fulton	6	99152	80358	0.2261	0.3060	0.6333	0.5887
Fulton	14	192533	155340	0.1897	0.3044	0.6012	0.5624
Fulton	21	83538	62497	0.1058	0.1749	0.4711	0.4310
Fulton	28	6963	5456	0.4646	0.5403	0.6541	0.6506
Fulton	35	97945	73153	0.8757	0.9161	0.9293	0.9449
Fulton	36	192282	161385	0.5134	0.5749	0.8962	0.9164
Fulton	38	84850	64560	0.9472	0.9672	0.9589	0.9831
Fulton	39	191500	156022	0.6070	0.6549	0.8816	0.8935
Fulton	48	83219	61631	0.1140	0.1697	0.5609	0.5128
Fulton	56	34728	26780	0.0764	0.1341	0.4753	0.4280
Gwinnett	5	191921	139394	0.2994	0.7018	0.7503	0.7914
Gwinnett	7	189709	147425	0.2144	0.3714	0.5941	0.5728
Gwinnett	9	192915	142054	0.2953	0.4730	0.6008	0.5667
Gwinnett	40	25547	19577	0.3258	0.5294	0.6840	0.6640
Gwinnett	41	7463	5687	0.1662	0.2427	0.5323	0.4821
Gwinnett	45	151475	110999	0.2039	0.3351	0.4571	0.4167
Gwinnett	46	27298	19469	0.3273	0.4631	0.4781	0.4201
Gwinnett	48	46297	33367	0.1244	0.2355	0.4312	0.3849
Gwinnett	55	124437	91512	0.5135	0.6159	0.7078	0.6833
Hall	49	189355	144123	0.0796	0.2954	0.2832	0.2646
Hall	50	13781	9721	0.0637	0.5322	0.4380	0.4661
Houston	18	42875	32630	0.2983	0.3609	0.4437	0.4176
Houston	20	74275	54626	0.2606	0.3022	0.3680	0.3405
Houston	26	46483	34862	0.4485	0.5232	0.5831	0.5711
Muscogee	15	142205	107284	0.5931	0.6521	0.7443	0.7508
Muscogee	29	64717	49768	0.2144	0.2771	0.4287	0.3868
Newton	17	45536	34660	0.3080	0.3453	0.3845	0.3582
Newton	43	66947	50088	0.5941	0.6466	0.7456	0.7531
Richmond	22	193163	150450	0.5650	0.6105	0.6912	0.6838
Richmond	23	13444	10449	0.2795	0.3129	0.3975	0.3659

Table 56: Counties with more than 15 points BHVAP differential across Senate districts.

County	HD	TOTPOP	VAP	BVAP	BHVAP share	Biden20	Abrams18
Bibb	142	59608	44584	0.5952	0.6249	0.6687	0.6705
Bibb	143	59469	46390	0.6079	0.6501	0.7099	0.7223
Bibb	144	33948	26547	0.3263	0.3545	0.4642	0.4220
Bibb	145	4321	3381	0.2576	0.2828	0.3445	0.3323
Carroll	18	18789	14467	0.1147	0.1479	0.1918	0.1808
Carroll	70	2854	2259	0.0469	0.0668	0.1414	0.1308
Carroll	71	59538	44582	0.1992	0.2572	0.3247	0.3170
Carroll	72	37967	29688	0.2419	0.3312	0.3361	0.3285
Chatham	161	28269	21359	0.3988	0.4739	0.6095	0.6037
Chatham	162	60308	46733	0.4373	0.5246	0.6721	0.6870
Chatham	163	60123	48461	0.4549	0.5242	0.7266	0.7313
Chatham	164	38681	30732	0.2607	0.3401	0.4644	0.4676
Chatham	165	59978	48247	0.5033	0.5506	0.7803	0.7899
Chatham	166	47932	39183	0.0481	0.0851	0.3527	0.3205
Clarke	120	30095	25090	0.1937	0.2693	0.6432	0.6235
Clarke	121	26478	22991	0.1359	0.1979	0.7010	0.6934
Clarke	122	59632	48840	0.2842	0.3977	0.7990	0.8078
Clarke	124	12466	9909	0.2940	0.3941	0.7018	0.6980
Cobb	22	28586	22350	0.2048	0.2980	0.5020	0.4894
Cobb	34	59875	45758	0.1567	0.2306	0.4198	0.3770
Cobb	35	59889	48312	0.2840	0.3856	0.5726	0.5603
Cobb	36	59994	44911	0.1698	0.2300	0.4022	0.3596
Cobb	37	59176	46223	0.2818	0.4599	0.6113	0.5933
Cobb	38	59317	44839	0.5423	0.6568	0.7243	0.7229
Cobb	39	59381	44436	0.5529	0.7293	0.7876	0.7930
Cobb	40	59044	47976	0.3298	0.3798	0.6673	0.6417
Cobb	41	60122	45271	0.3935	0.6699	0.7105	0.7199
Cobb	42	59620	48525	0.3370	0.5014	0.7158	0.7282
Cobb	43	59464	47033	0.2653	0.3973	0.6073	0.5885
Cobb	44	38013	29631	0.1281	0.2176	0.4855	0.4445
Cobb	45	59738	44023	0.0528	0.0988	0.4788	0.4200
Cobb	46	43930	32560	0.0782	0.1348	0.4656	0.4206
Coweta	65	13008	9714	0.1225	0.1650	0.3213	0.2874
Coweta	67	17272	13061	0.0763	0.1352	0.2416	0.2057
Coweta	70	56267	42990	0.2904	0.3678	0.4376	0.5036
Coweta	73	31608	24269	0.1336	0.2015	0.4070	0.3136
Coweta	136	28003	21121	0.1081	0.1469	0.2325	0.2141
DeKalb	52	28300	21991	0.1398	0.1987	0.6358	0.5815
DeKalb	80	59461	44784	0.1418	0.3654	0.6100	0.5681
DeKalb	81	59007	46259	0.2183	0.4191	0.7180	0.6918
DeKalb	82	59724	50238	0.1683	0.2309	0.8035	0.7923
DeKalb	83	59416	46581	0.1512	0.4284	0.6572	0.6316
DeKalb	84	59862	47350	0.7366	0.7561	0.9324	0.9440
DeKalb	85	59373	46308	0.6271	0.6765	0.8981	0.9246
DeKalb	86	59205	44614	0.7505	0.7832	0.8931	0.9160
DeKalb	87	59709	45615	0.7308	0.7866	0.8798	0.8936
DeKalb	88	47844	37310	0.7117	0.7652	0.8359	0.8377
DeKalb	89	59866	46198	0.6254	0.6519	0.9214	0.9284
DeKalb	90	59812	48015	0.5849	0.6205	0.9401	0.9508
DeKalb	91	19700	14941	0.9586	0.9683	0.9581	0.9793
DeKalb	92	15607	11794	0.9309	0.9453	0.9403	0.9581
DeKalb	93	11690	8476	0.9040	0.9412	0.9411	0.9598
DeKalb	94	31207	23817	0.9289	0.9513	0.9523	0.9703
DeKalb	95	14599	10985	0.8971	0.9250	0.9413	0.9607
Dougherty	151	6268	4791	0.5917	0.6022	0.6466	0.6213
Dougherty	152	6187	4906	0.4855	0.5298	0.5372	0.5517
Dougherty	153	59299	45692	0.6795	0.7010	0.7454	0.7566
Dougherty	154	14036	10877	0.8612	0.8694	0.8896	0.9081

County	HD	TOTPOP	VAP	BVAP	BHVAP share	Biden20	Abrams18
Douglas	61	30206	23160	0.5396	0.6574	0.6995	0.6949
Douglas	64	35576	26860	0.2958	0.3662	0.4137	0.3741
Douglas	65	19408	14130	0.6572	0.7146	0.7568	0.7413
Douglas	66	59047	44278	0.5341	0.6181	0.6899	0.6610
Fayette	68	29719	22798	0.2259	0.3098	0.4218	0.3753
Fayette	69	37303	29554	0.4700	0.5270	0.5903	0.5574
Fayette	73	28428	21467	0.1070	0.1718	0.3793	0.3349
Fayette	74	23744	17979	0.1329	0.1724	0.3872	0.3373
Floyd	5	5099	4048	0.0336	0.0684	0.1566	0.1349
Floyd	12	34335	27071	0.0836	0.1607	0.2351	0.2152
Floyd	13	59150	45176	0.1918	0.2979	0.3687	0.3564
Fulton	25	13280	9828	0.1043	0.1651	0.5348	0.4723
Fulton	47	55235	40829	0.1130	0.1834	0.4647	0.4241
Fulton	48	43976	33385	0.1231	0.2615	0.5322	0.4840
Fulton	49	59153	45263	0.0842	0.1480	0.4815	0.4342
Fulton	50	59523	43940	0.1240	0.1826	0.5939	0.5558
Fulton	51	58952	47262	0.2368	0.3623	0.6082	0.5728
Fulton	52	31511	26534	0.1765	0.2543	0.6372	0.6074
Fulton	53	59953	46944	0.1453	0.2143	0.5485	0.4998
Fulton	54	60083	50338	0.1547	0.2766	0.6104	0.5641
Fulton	55	59971	49255	0.5538	0.5960	0.8169	0.8121
Fulton	56	58929	52757	0.4548	0.5055	0.8971	0.9249
Fulton	57	59969	52097	0.1806	0.2543	0.8092	0.8025
Fulton	58	59057	50514	0.6304	0.6732	0.9213	0.9511
Fulton	59	59434	49179	0.7009	0.7332	0.9337	0.9603
Fulton	60	59709	45490	0.6388	0.6820	0.8065	0.8069
Fulton	61	29096	22287	0.9541	0.9658	0.9654	0.9789
Fulton	62	59450	46426	0.7226	0.7807	0.9254	0.9434
Fulton	63	59381	45043	0.6933	0.7761	0.9085	0.9279
Fulton	65	27048	20542	0.8293	0.8473	0.8952	0.9088
Fulton	67	41863	31238	0.8036	0.8785	0.8985	0.9164
Fulton	68	29758	22037	0.9004	0.9274	0.9278	0.9482
Fulton	69	21379	15994	0.9415	0.9655	0.9561	0.9811
Grady	171	8115	6461	0.1696	0.2131	0.2238	0.2074
Grady	173	18121	13501	0.3394	0.4507	0.4454	0.4338
Gwinnett	30	8620	6301	0.1584	0.2484	0.3775	0.3234
Gwinnett	48	15027	11394	0.1026	0.1660	0.4955	0.4395
Gwinnett	88	11845	8763	0.3005	0.5402	0.7198	0.7597
Gwinnett	94	28004	20992	0.4197	0.5235	0.6869	0.6571
Gwinnett	95	34221	25212	0.6639	0.7452	0.8115	0.8122
Gwinnett	96	59515	44671	0.2300	0.5797	0.6579	0.6661
Gwinnett	97	59072	46339	0.2677	0.4490	0.6617	0.6608
Gwinnett	98	59998	42734	0.2325	0.7459	0.7610	0.8075
Gwinnett	99	59850	45004	0.1471	0.2279	0.5261	0.4833
Gwinnett	100	35204	25378	0.1307	0.2425	0.4252	0.3789
Gwinnett	101	59938	46584	0.2419	0.4143	0.5632	0.5431
Gwinnett	102	58959	42968	0.3762	0.5767	0.6626	0.6503
Gwinnett	103	51691	38022	0.1879	0.3607	0.4796	0.4471
Gwinnett	104	35117	25457	0.2096	0.3042	0.3993	0.3442
Gwinnett	105	59344	43474	0.2905	0.4482	0.5553	0.5328
Gwinnett	106	59112	43890	0.3627	0.4648	0.5858	0.5390
Gwinnett	107	59702	44509	0.2963	0.5937	0.6884	0.6965
Gwinnett	108	59577	44308	0.1835	0.3578	0.5536	0.5107
Gwinnett	109	59630	44140	0.3251	0.6708	0.7711	0.8246
Gwinnett	110	59951	43226	0.4719	0.5645	0.6405	0.5965
Gwinnett	111	22685	16118	0.3307	0.4520	0.4726	0.4142
Hall	27	54508	42712	0.0386	0.1354	0.1804	0.1550
Hall	28	8108	6799	0.0284	0.1772	0.2527	0.2270
Hall	29	59200	43131	0.1359	0.5284	0.4485	0.4704
Hall	30	50646	39113	0.0685	0.2374	0.2707	0.2393
Hall	31	14349	9789	0.1036	0.6834	0.4858	0.5209
Hall	100	7819	5923	0.0653	0.1867	0.2453	0.2134
Hall	103	8506	6377	0.0486	0.1396	0.2653	0.2319

County	HD	TOTPOP	VAP	BVAP	BHVAP share	Biden20	Abrams18
Henry	74	18397	13441	0.4742	0.5356	0.5834	0.5642
Henry	78	3847	2965	0.6921	0.7292	0.8470	0.8768
Henry	91	35569	27415	0.5887	0.6628	0.7223	0.7183
Henry	115	60174	44807	0.5213	0.5797	0.6153	0.5443
Henry	116	55759	42471	0.5808	0.6380	0.6848	0.6669
Henry	117	54737	40246	0.3841	0.4324	0.4416	0.3759
Henry	118	12229	8628	0.1868	0.2258	0.2874	0.2449
Houston	145	28132	20686	0.5239	0.6021	0.6151	0.6114
Houston	146	60203	44589	0.2761	0.3192	0.3840	0.3558
Houston	147	59178	44902	0.3012	0.3678	0.4662	0.4414
Houston	148	16120	11941	0.2453	0.2778	0.3271	0.3070
Lamar	134	5026	3864	0.0970	0.1198	0.1786	0.1839
Lamar	135	13474	10677	0.3411	0.3603	0.3798	0.3906
Lowndes	174	9770	7472	0.1453	0.1935	0.2019	0.1828
Lowndes	175	43692	31957	0.2018	0.2494	0.3784	0.4034
Lowndes	176	4797	3588	0.2717	0.3743	0.4485	0.4632
Lowndes	177	59992	46014	0.5388	0.5936	0.5139	0.5285
McDuffie	125	4748	3805	0.1198	0.1532	0.2199	0.1901
McDuffie	128	16884	12810	0.4660	0.4938	0.4365	0.4312
Muscogee	137	30443	22797	0.6269	0.6746	0.6665	0.6618
Muscogee	138	12190	9628	0.1224	0.1692	0.3389	0.2796
Muscogee	139	45976	35539	0.2128	0.2770	0.4306	0.3842
Muscogee	140	59294	44411	0.5763	0.6468	0.7471	0.7692
Muscogee	141	59019	44677	0.5746	0.6305	0.7368	0.7428
Newton	93	15515	12080	0.5094	0.5404	0.5824	0.5743
Newton	113	60053	44538	0.5953	0.6533	0.7534	0.7636
Newton	114	36915	28130	0.2760	0.3104	0.3491	0.3299
Paulding	16	16549	11771	0.0981	0.1406	0.2447	0.2194
Paulding	17	59120	42761	0.2302	0.2934	0.3580	0.3264
Paulding	18	10627	7838	0.1069	0.1355	0.1902	0.1750
Paulding	19	58955	44299	0.2415	0.3025	0.3762	0.3525
Paulding	64	23410	17329	0.3249	0.3881	0.4450	0.4147
Peach	145	14093	11209	0.2211	0.2688	0.3275	0.3039
Peach	150	13888	10902	0.6643	0.7715	0.7004	0.7216
Richmond	126	25990	19714	0.6887	0.7181	0.7709	0.7804
Richmond	127	19152	15842	0.2599	0.2945	0.4192	0.3905
Richmond	129	58829	46873	0.5487	0.5835	0.6537	0.6344
Richmond	130	59203	44019	0.5991	0.6308	0.6388	0.6298
Richmond	132	43433	34451	0.5267	0.6146	0.7759	0.7966
Rockdale	91	4781	3817	0.4923	0.5179	0.5997	0.5626
Rockdale	92	44666	34757	0.6054	0.6511	0.7185	0.6871
Rockdale	93	32913	24178	0.6379	0.7670	0.8062	0.8013
Rockdale	95	11210	8751	0.4101	0.4845	0.5276	0.4859
Spalding	74	16815	13276	0.1990	0.2531	0.3220	0.3121
Spalding	117	5393	4727	0.2128	0.2520	0.4014	0.3618
Spalding	134	45098	34120	0.4063	0.4443	0.4206	0.4157
Telfair	149	9486	7884	0.3950	0.5747	0.3762	0.3533
Telfair	156	2991	2306	0.3001	0.3157	0.4131	0.4024
Thomas	172	4176	3246	0.1497	0.1753	0.2050	0.2061
Thomas	173	41622	31791	0.3726	0.3977	0.4351	0.4150
Tift	169	6730	5219	0.1129	0.1590	0.1807	0.1494
Tift	170	34614	26005	0.3220	0.4365	0.3806	0.3429
Troup	72	10281	7843	0.2076	0.2372	0.2844	0.3005
Troup	136	17913	13414	0.5139	0.5540	0.5738	0.6049
Troup	137	16144	12084	0.3974	0.4346	0.3855	0.3868
Troup	138	25088	19240	0.2535	0.2783	0.3040	0.2878
Whitfield	2	27861	21447	0.0331	0.1741	0.2209	0.1926
Whitfield	4	59070	42798	0.0538	0.4915	0.3551	0.3367
Whitfield	6	15933	12017	0.0280	0.1597	0.2017	0.1727

Table 57: Counties with more than 15 points BHVAP differential across House districts (table in three parts).

I reserve the right to continue to supplement my report in light of additional facts, testimony and/or materials that may come to light. Pursuant to 28 U.S.C. 1746, I declare under penalty of perjury of the laws of the United States that the foregoing is true and correct according to the best of my knowledge, information, and belief.

Executed this 13th day of January, 2023.

Moon Duchin

Rebuttal and Supplemental Report

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

February 15, 2023

In this report, I will rebut certain opinions contained in the Expert Report of John Morgan on behalf of defendants, dated December 5, 2022. I will also supplement my own expert report of January 13, 2023 (and further rebut the Morgan Report) in light of the deposition transcript of Gina Wright, Executive Director of the Legislative and Congressional Reapportionment Office of the Georgia General Assembly, dated January 26, 2023. Appendix C below also makes a minor correction to an Appendix from my January 13 report.

1 Response to Morgan Report

1.1 Intent can not be reliably inferred from a single alternative map

The report of John Morgan is based on the following premise: by drawing a single alternative plan for each chamber of the Georgia legislature, he can illuminate the intent behind the enacted plans and their balancing of numerous criteria in play for electoral maps.[1]

In Mr. Morgan's words,

> I was asked to draw a "blind" plan that did not consider race or incumbency or past redistricting plans for Georgia. This plan did consider other traditional redistricting principles. Using my expertise, I proceeded to draw a plan for the House and then a plan for the Senate. I then compared the illustrative plans to the enacted plans and drew conclusions about the impact of racial considerations on the enacted plans. (¶5, page 3)

Comparison techniques are well established in the scholarly literature to illuminate the intent and/or effects of a particular choice of district boundaries. In particular, there is a long tradition of using a collection of publicly available alternative maps as a comparator for a proposed plan; to give just one example from a published article, Altman–McDonald [2] use a batch of alternative plans to illustrate different tradeoffs facing line-drawers in Virginia in a law review article from 2013. Altman and McDonald present numerous plans for each map they consider, including enacted plans, draft plans by the legislature, draft plans by an advisory commission, and alternatives generated by students in the context of a competition. Citing that article, DeFord–Duchin [3] approach the same problem but leverage more recent algorithmic techniques, offering collections (called *ensembles*) containing tens of thousands of alternative plans made under explicit interpretations of the rules and priorities in the Virginia guidelines. Whether armed with dozens or thousands of alternatives, authors can then conclude with varying degrees of persuasive strength about the interaction of different principles: Does a priority on county preservation tend to have an impact on compactness scores? Did

[1] In Mr. Morgan's accounting, the principles he set aside are race, incumbency, and consideration of prior district boundaries. "Other" principles that he mentions—and presumably did consider in making his maps—include population balance, compactness by at least two measures, contiguity, "civic boundaries" (particularly those of counties, municipalities, and precincts), geographic features, and respect for communities of interest.

EXHIBIT
4

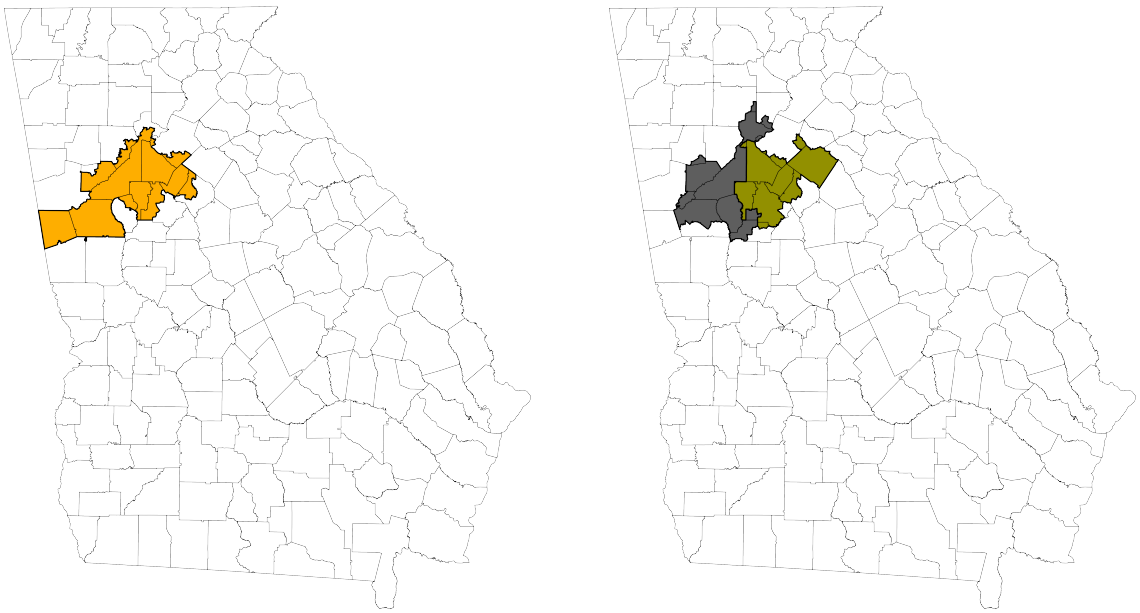
the special master's choice of how to break down the state into zones impose a partisan skew, relative to plans made without that zoning? And so on. Authors whose work uses comparisons with dozens, hundreds, or thousands of maps to make inferences of intent include, but are not limited to, Grofman, Mattingly, Imai, Chen, Clelland, Randall, as well as myself in collaboration with numerous co-authors.

In my opinion, based on my experience both with computational redistricting and through examining maps prepared by people with competing priorities in play, it would be impossible to draw any reliable conclusions as to lack of intent based on comparing a plan to a single alternative. This is especially true when the single comparator plan is drawn with a vague aim to pursue a long list of "other traditional redistricting principles" without differentiation or prioritization.

Below, I will take up Mr. Morgan's proposed method and execute it in a more scientific and systematic way, by using algorithmic generation of plans with varied priorities to better illuminate the choices and tradeoffs in the enacted plans.

The Morgan report identifies three regions of Georgia for analysis, each of which is replaced with an alternative map covering roughly (but not exactly) the same terrain. The regions are

- `Senate Metro Region`, made up of enacted districts 6, 10, 14, 28, 34, 35, 36, 38, 39, 40, 41, 42, 43, 44, 55 (15 districts);
- `House Region 1`, made up of enacted districts 52, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 111, 112, 113, 115, 116, 117 (28 districts);
- `House Region 2`, made up of enacted districts 25, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 73, 74 (26 districts).

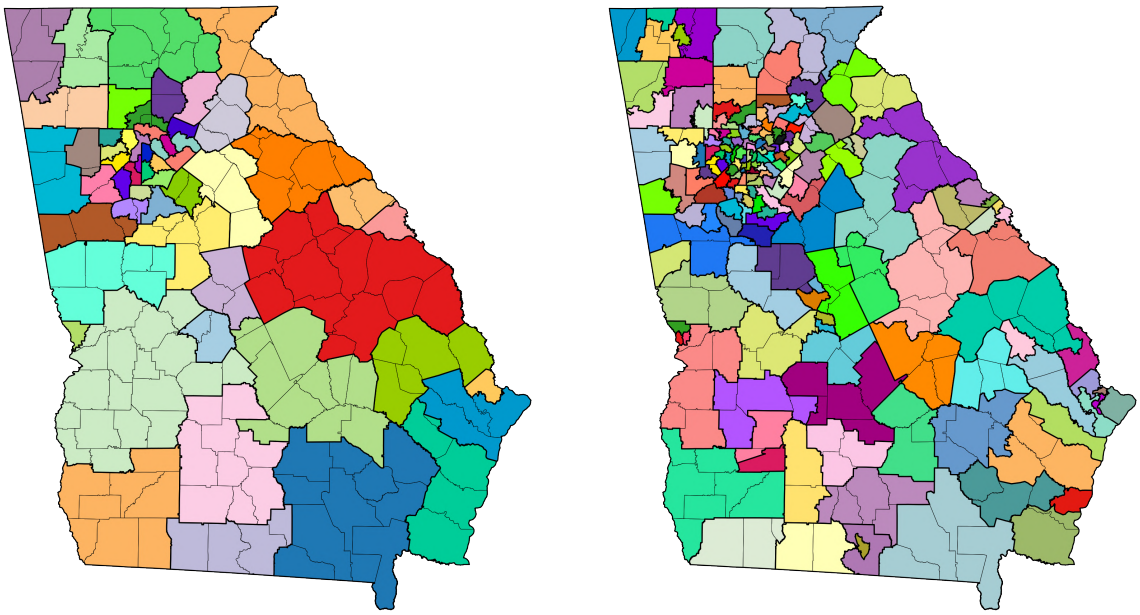


`Senate Metro Region`

`House Region 1` (olive green) and `House Region 2` (gray)

Figure 1: Regions from the enacted legislative plans, as designated in the Morgan Report.

The alternative plans presented in the Morgan report are not limited to these regions but are drawn statewide.



Morgan Senate Plan Morgan House Plan

Figure 2: Statewide alternative plans presented in the Morgan Report for the chambers of the state legislature.

1.2 Majority-minority districts and effective opportunity-to-elect

	majority BVAP	**majority BHVAP**	**majority BHCVAP**	**effective opportunity**
EnactedCD	2	5	4	5
CD Alt	4	6	6	6
EnactedSD	14	17	17	19
MorganSD	11	19	17	20
SD Alt Eff 1	17	23	22	23
EnactedHD	49	62	60	68
MorganHD	35	48	44	67
HD Alt Eff 1	50	77	74	77

Table 1: The first three columns report the number of majority-BVAP, majority-BHVAP, and majority-BHCVAP districts, in the plans under discussion in this report—this counts majority-minority districts by Black voting age population, Black and Hispanic voting age population, nad Black and Hispanic citizen voting age population, respectively. The final column reports the number of districts labeled as "effective" for Black and Latino opportunity to elect candidates of choice. CD Alt, SD Alt Eff 1, and HD Alt Eff 1 are my own alternative plans that were proposed in my January 13 report.

Table 1 shows a few remarkable facts about the Morgan plans. One is that Mr. Morgan's race-blind Senate plan actually has a *greater* number of districts with a majority of Black and Hispanic VAP (19 rather than 17), and an equal number by CVAP (17), relative to the enacted plan. Another striking contrast can be drawn from examining Mr. Morgan's plans in terms of *effectiveness* in providing electoral opportunity for Black and Latino voters to elect candidates of choice.[2] Here, the Morgan alternative plans are remarkably similar to the enacted plan. MorganHD has 67 effective districts to the enacted plan's 68, and MorganSD actually outperforms the state, with 20 effective districts to the enacted plan's 19.

In other words, the enacted legislative plans do indeed have more majority-Black districts than the Morgan plans, but this is achieved while slightly *diminishing* opportunity to elect in the Senate plan and offering the barest increase in the House plan relative to Mr. Morgan's "blind" plans.

In particular, the state's Senate plan, which is required to comply with the Voting Rights Act, offers Black and Latino voters less electoral opportunity than a plan drawn "blind" by the state's own expert with no regard to the VRA.

1.3 Experiment: Pursuing majority-Black districts

By comparing the enacted districts with his alternative districts, Mr. Morgan makes the following conclusions:

- "In my opinion, the creation of additional black majority districts in [House] region 1 [led] to lower compactness scores in this region." (¶30, p23)
- "In my opinion, the creation of additional black majority districts in [House] region 2 [led] to lower compactness scores in this region." (¶34, p29)
- "In my opinion, the creation of an additional black majority district in the [Senate Metro] region [led] to lower compactness scores in this region." (¶46, p42)

I have conducted a simple experiment to examine whether there is evidence of the causality that is ascribed by Mr. Morgan. To do so, I have run an algorithmic procedure that randomly alters districting plans, with a specification favoring plans with more majority-Black districts. I ran this chain of districting plans for 100,000 steps on the regions `House Region 1`, `House Region 2`, and `Senate Metro Region` from the Morgan report. With these outputs, I can ask whether plans with more majority-Black districts are necessarily less compact.

I do not find that this is the case; on the contrary, an exploratory search turns up tens of thousands of examples that are at least as compact as the enacted plan with at least as many majority-BVAP districts.[3] Notably, the alternatives I am considering are an exact match for the region covered by the enacted districts Mr. Morgan has selected, whereas his own alternatives are only approximate, and do not cover the same terrain.

[2] As detailed in §5 of my January 13 report (p15-19), an "effective" district is one in which the coalition candidate of choice would have won at least three out of four primary contests and five out of eight general contests from a dataset of probative elections.

[3] It is important to emphasize that this experiment was conducted to test a hypothesis about the relationship between majority-Black districts and compactness in the state's plan, not to maximize the number of majority-Black districts. Use of algorithmic techniques known as *heuristic optimization* or *local search* can find many examples with 4 majority-BVAP Congressional districts, 21 majority-BVAP Senate districts, and 66 majority-BVAP House districts. In Figure 3, I use block cut edges as a compactness score. Since the transcript of Director Wright's deposition indicated that the state did not use any particular compactness score, but favored the "eyeball test," I have also provided a visual comparison in Appendix B to demonstrate that these techniques also produce districts that are compact by informal, visual standards.

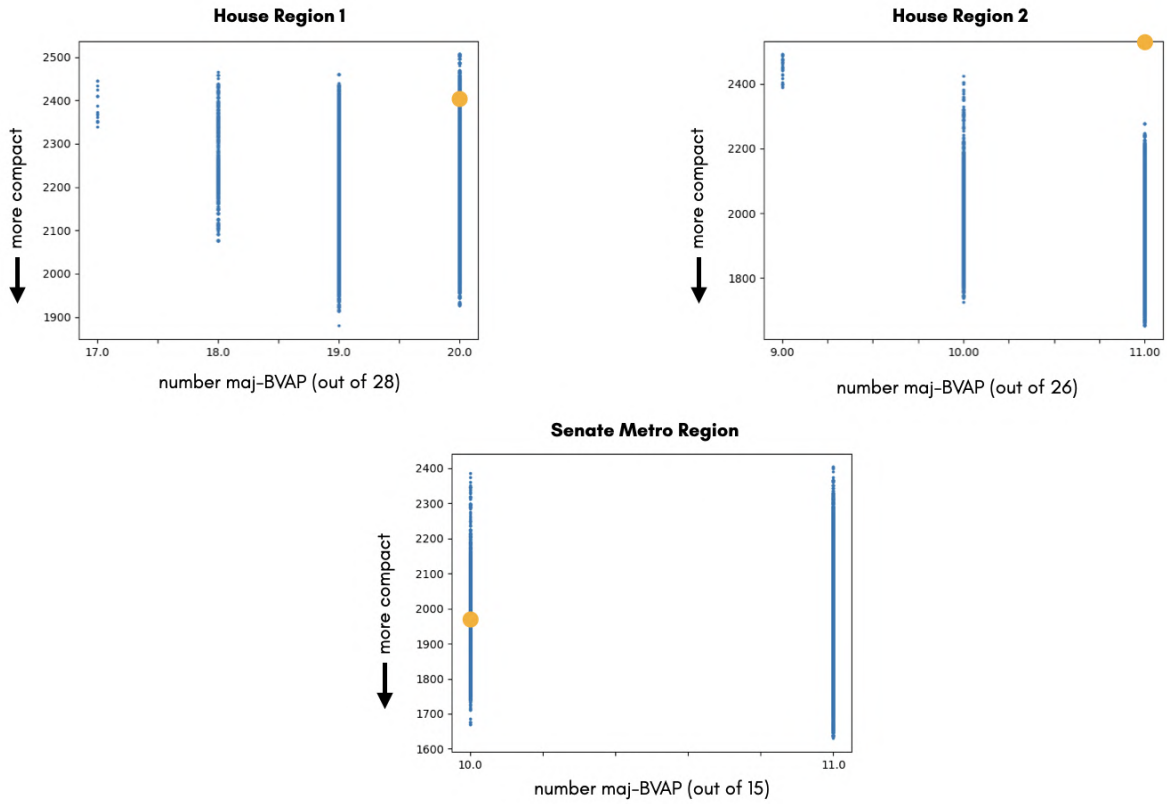


Figure 3: To test the hypothesis in the Morgan report, I generated 100,000 plans in each region with an exploratory algorithm. These runs show no evidence that there is a cost to compactness in matching the number of majority-BVAP districts in the state's enacted plan; if anything, the correlation goes the other way. Large dots mark the position of the enacted plan on the plot (though in House Region 2, the enacted plan is so much less compact than these alternatives that it is out of range). I am unable to locate the Morgan alternative plan on these plots because it does not cover the same terrain.

1.4 Summary discussion of Morgan report

- Comparison to a single alternative plan is plainly inadequate to probe the tradeoffs and incentives in the enacted plan.
- Even though the regions under consideration are composed of whole districts from the enacted plan—28 districts in `House Region 1`, 26 districts in `House Region 2`, and 15 districts in `Senate Metro Region`—Mr. Morgan's replacement districts do not cover the same terrain. This means that the alternative districts do not have the same collective contour and do not have the same demographics as the districts they replace, so it is not an apples-to-apples comparison.

- Mr. Morgan erroneously concludes from a consideration of his own maps that lower compactness scores are *required* to create additional majority-BVAP districts.[4]
- The Morgan plan for Senate (MorganSD), which is described as being created "blind" to race and ethnicity, has more districts with a majority of voting age population that is Black and Latino (19) than the state's enacted plan (17). The Morgan "blind" Senate plan also has more districts that provide an effective opportunity for Black and Latino voters to elect their candidates of choice (20) than are present in the state's enacted plan (19).

2 Discussion of Wright Deposition

In her deposition of January 26, Gina Wright described her work as a mapper drawing the enacted plans for Congress, Senate, and House. She broadly acknowledged that multiple motives were in play, which notably included the pursuit of partisan advantage for the Republican party

Regarding Congressional District 6:

> Q: Do you know why Senator Kennedy's staff wanted to try adding Forsyth into CD 6?
>
> A: The desire for [CD 6] was to make it a more politically electable district.
>
> Q: Politically electable for whom?
>
> A: For the party of the people who were drawing the map. (p111, lines 16-23)

And again later:

> To my recollection, adding Dawson to CD 6 had to do with the political numbers of the district. That was the only thing. (p120, lines 1-3)

Regarding SD 17:

> I think the idea was to draw a district that would be a Republican district. (p178, lines 10-11)

Appeals to partisan advantage are found throughout the transcript, in reference to CD 14, SD 48, HD 104, and in numerous other instances, sometimes justifying the downgrading of other traditional districting principles.

Their statements are consistent with a stance that party, not race, is explanatory of the features found in the enacted plans. In other words, any structural disadvantage to voters of color might be argued to be a mere consequence of the pursuit of partisan advantage for Republicans. To illuminate this possible argument, I will use the same method referenced above in connection with the Morgan Report. I have run an algorithmic procedure that randomly alters districting plans, with a specification favoring plans with more Trump-favoring districts from his Presidential run in 2020.

[4] For instance, he writes of several districts that "The black percentage is lowered *only* by elongating the district to include lower concentrations of black population. This allows the black population to be redistributed and to create other majority black districts." (repeated verbatim four times ¶30, p23; ¶33, p29; ¶44, p41; and ¶45, p42; emphasis added).

2.1 Experiment: Pursuing partisan advantage

I ran a chain of districting plans for 100,000 steps statewide for Congress, Senate, and House using a specification that up-weights plans with more Trump districts according to 2020 voting patterns. From these outputs, I can ask whether plans selected for partisanship—but with no race data—tend to have the same hallmarks of racial sorting that I find in the enacted plans.

Figure 4 sets the table by illustrating that the algorithmic procedure succeeds in securing as much or more partisan advantage (measured by counting districts in which Trump received more votes than Biden in 2020) as the enacted plan, while remaining respectful of traditional districting principles. Compactness is illustrated here, but considerations for population balance and county preservation were also implemented in the runs, as described in Appendix A.

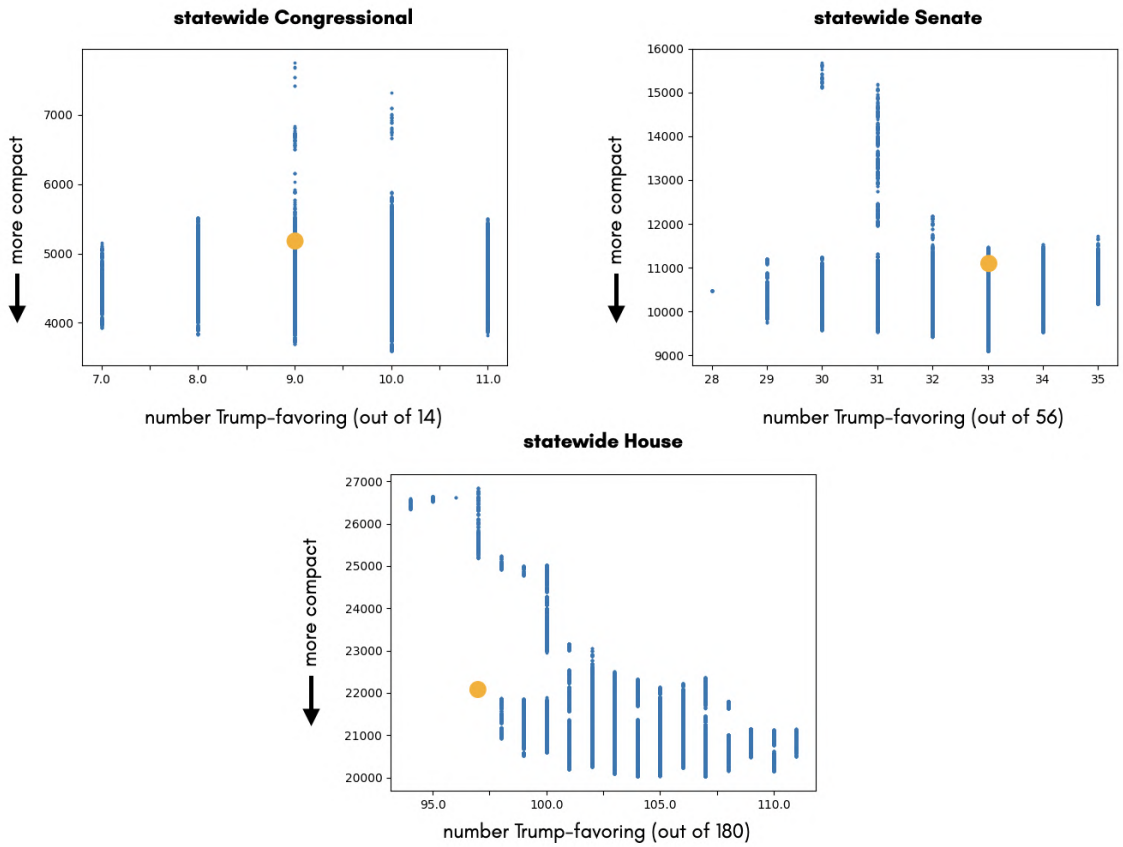


Figure 4: To examine the effects of partisanship, I generated 100,000 statewide plans at each level of redistricting with an exploratory algorithm seeking larger numbers of Trump-favoring districts from the 2020 Presidential election. The enacted plans, marked with large dots in the plots, have 9 Trump-favoring districts in Congress, 33 in the Senate, and 97 in the House. This figure is included to show that the algorithms meet and exceed the partisan performance of the enacted plan while respecting traditional districting principles. The following figures will illustrate the racial features that were used to achieve this on the part of the state.

Next, we examine whether the enacted plan is unusual in its racial balance *among highly partisan alternatives*. To do this, I will focus on the Black voting age population, since this was the principal racial category described by Director Wright as being considered in the mapping process.[5] If a plan were drawn by using minority racial population to secure partisan advantage in a state with roughly 50-50 partisan support, we would expect to see that the districts near the middle range would be "cracked"—the middle range because, all things being equal, these would be the most likely to be contested for political party control in an evenly split state. This would show up on a boxplot with dots below the boxes, perhaps even at or below the whiskers, in the middle columns. That is exactly what we see in Figure 5.

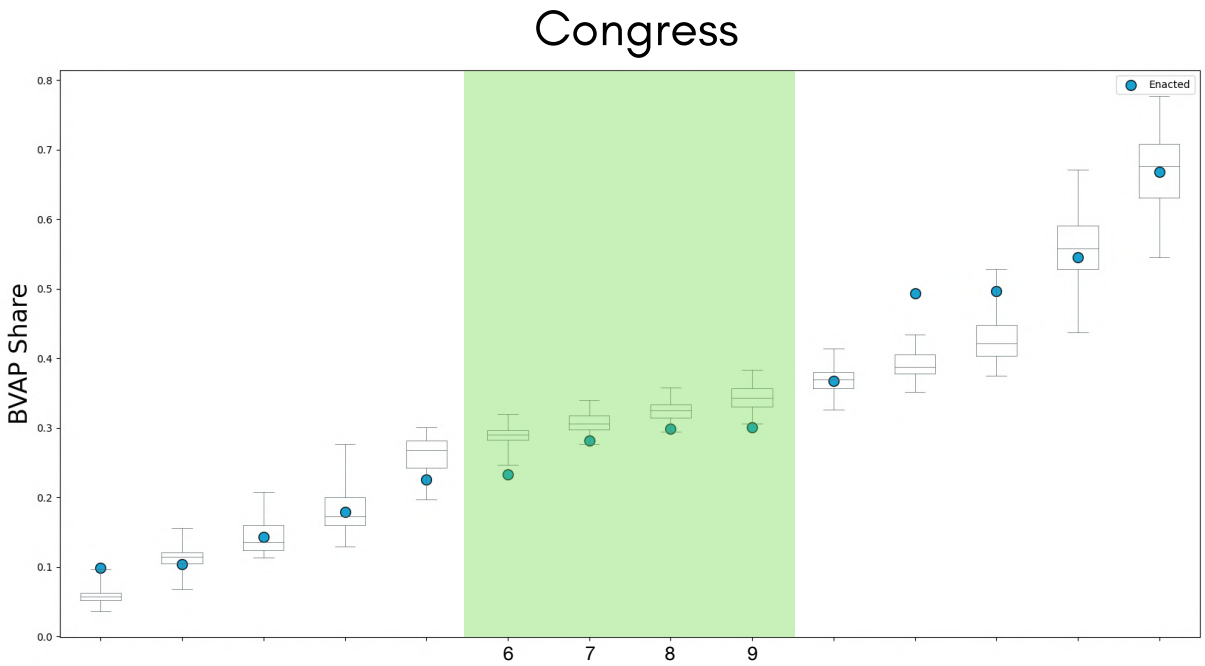


Figure 5: This box-and-whiskers plot organizes the districts of Congressional plans from the one with the lowest BVAP share to the one with the highest, regardless of geography. From 100,000 plans drawn with an emphasis on Republican partisan advantage, the box shows the 25th to 75th percentile, and the whiskers show the 1st to 99th percentile, of the Black voting age population share. The BVAP of districts in the enacted plan is shown with blue dots. Even compared to this collection of partisan plans, we can see that the middle range of districts show clear signs of "cracking," or reduced Black population relative to the comparison plans. This does not suggest a race-neutral pursuit of partisan advantage, but rather a highly race-conscious pursuit of partisan advantage.

[5] "I have not usually combined race categories together to consider it a packing or not packing. From my experience, it has typically been one single race category." (Wright transcript p171, lines 11-14)

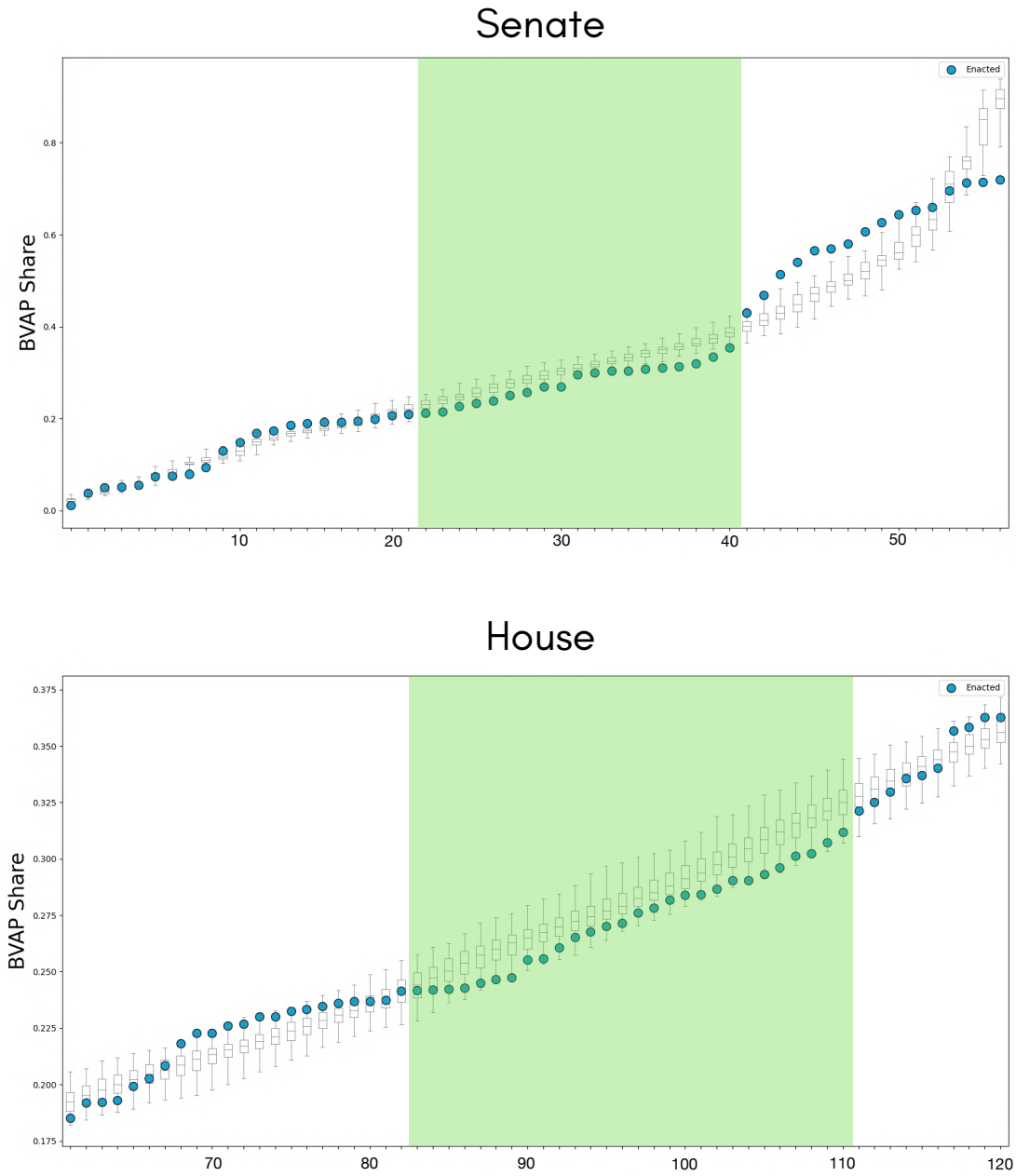


Figure 6: This figure shows boxplots for Senate (top) and state House (bottom; in each, the districts of the plan are arranged from the one with the lowest BVAP share to the one with the highest, regardless of geography. For state House, the middle range of districts is shown. The same signature of cracking is visible here as in the Congressional boxplot.

2.2 Summary discussion of race-versus-party experiments

Simple experiments show that the pursuit of partisan advantage may have been a motivation for map-drawers, but many thousands of examples with even more partisan tilt were found. These alternative examples do not show the marked signs of racial sorting that are found in the enacted plan. In a partisan-motivated plan for a 50-50 state, we would expect cracking in the middle range of districts, as discussed above; if that partisanship is pursued aggressively, we would expect it to extend somewhat above the middle range as the controlling party tries for more districts. This is what we see here.

In order to add a quantitative element to the illustrations provided in the figures above, I selected ten random plans from each Trump-favoring collection shown in the boxplots. For Congress, this makes eleven plans—ten randomized alternatives and the enacted plan. In districts indexed 6-9 (highlighted in Figure 5), the relative position of the enacted plan is 1-1-1-1. This means that in all four districts, all ten random plans had a higher BVAP. These order statistics are not probabilistically independent, because they display correlations that are hard to model precisely. However, if variables were drawn in an independently and identically distributed (i.i.d.) fashion, then the probability of being last of eleven values four times in a row would be less than .00007.

I repeated this demonstration in Senate and House, with ten random plans from the Trump-favoring collection, plus the Morgan alternative plan. With the enacted plan, that makes twelve. In the districts indexed 22-40, the relative position of the enacted plan is 1-1-1-1-1-1-1-1-1-1-3-2-2-1-1-1-1-1-1-1. The probability of being last of twelve options this often, if i.i.d., would be less than 0.0000000000000004. Similarly, in the House districts indexed 83-110, the relative position of the enacted plan is 3-1-1-1-1-1-3-2-3-3-4-4-3-3-3-6-2-1-1-1-1-1-1-1-1-1-1. The probability of being last of twelve options this often, if i.i.d., would be less than 0.00000000006.

In addition to these ensemble comparisons, we can find corroborating indications that race was operationalized by the mapmakers by considering other elements of the plan, such as the high numbers of split precincts. The enacted House plan splits 352 state precincts, while the random selection of alternatives split no more than 231. The enacted Senate plan splits 144 state precincts, while the alternatives split no more than 74.[6] High levels of precinct splitting is of particular note in a race-versus-party analysis, because vote history is not available at a sub-precinct level.

In summary, I find the enacted plan to have properties associated with the cracking of minority voters, suppressing their numbers in a range of districts in a manner that reduces or eliminates their opportunity to elect candidates of choice. This is consistent with a hypothesis that race was used to achieve partisan outcomes in the state's enacted plans.

[6] I am omitting the Congressional comparison, since I did not tune the alternative plans to two-person balance.

References

[1] MGGG Redistricting Lab, *GerryChain Python Library*. GitHub Repository. github.com/mggg/gerrychain

[2] Micah Altman and Michael McDonald, *A Half-Century of Virginia Redistricting Battles: Shifting from Rural Malapportionment to Voting Rights to Public Participation.* University of Richmond Law Review **47** (2013), 771–831.

[3] Daryl DeFord and Moon Duchin, *Redistricting Reform in Virginia: Districting Criteria in Context.* Virginia Policy Review, Vol. 12 No. 2 (2019), 120–146.

[4] Daryl DeFord, Moon Duchin, and Justin Solomon, *Recombination: A family of Markov chains for redistricting.* **Harvard Data Science Review**, Issue 3.1, Winter 2021.

A Description of methods

Randomized alternative districting plans were made with a Markov chain method called *recombination* has been implemented in a publicly available, open-source Python package called GerryChain since 2018 [1] and whose mathematical properties are surveyed in a peer-reviewed article that appeared in 2021 [4].

The basic step begins with a graph representing the geographical units of Georgia, then fuses two districts chosen at random. We draw a random tree (graph with no cycles) that spans the double-district; next, the tree is cut at an edge that creates two complementary balanced pieces, which become the new districts replacing the ones that were fused. The district generation process enforces that every district has population within a thresholded difference to ideal district size; if the tree has no cut edge leaving sufficiently balanced pieces, then a new tree is drawn. (Districts can have up to 1% deviation in Congressional runs and I studied variants with up to 2% deviation and up to 1.5% deviation in Senate and House runs.) Contiguity is also enforced throughout, as a consequence of the fact that deleting an edge from a tree always leaves two connected components, which ensures that new districts formed in the process are connected. Compactness is highly favored throughout this process, because compact districts have far more spanning trees [4]. All of these steps are performed with no attention to race or partisanship—these are only taken into account later in the procedure.

To choose the random tree, a method called *minimum spanning trees* is employed, using weights that encourage county integrity. Within-county edges are given a random weight in $[0, 1]$ while those between counties receive a weight with a +1 "surcharge." The random tree is chosen by drawing weights from these intervals and then finding the (generically unique) spanning tree of minimum weight. In addition, when that tree is cut to separate new districts, the algorithm first seeks for a between-county edge as the cut, if it is possible within balance constraints. This promotes the selection of spanning trees that restrict to counties in a single connected piece, which will tend to keep counties un-split in the districts. Census blocks were employed as the base unit, and a surcharge exactly like the one described above was used to promote the inclusion of whole precincts.

The method for favoring plans with higher numbers of majority-Black districts (or Trump-favoring districts, respectively) works without any change to the proposal of incremental changes. The only variation is that a weighted coin is then flipped to decide whether to accept a change. If the number of majority-Black or Trump-favoring districts is higher, the change is made with higher probability; if the number decreases, the change may still be accepted, but with lower probability. The parameter controlling this probability is called the *temperature*, and we experiment to find temperature settings that allow for reasonably low rates of rejected proposals. This kind of protocol is standard in MCMC, a leading method in applied statistics, and fits under the umbrella of what are called *heuristic optimization* or *local search* methods.

B Visual comparison

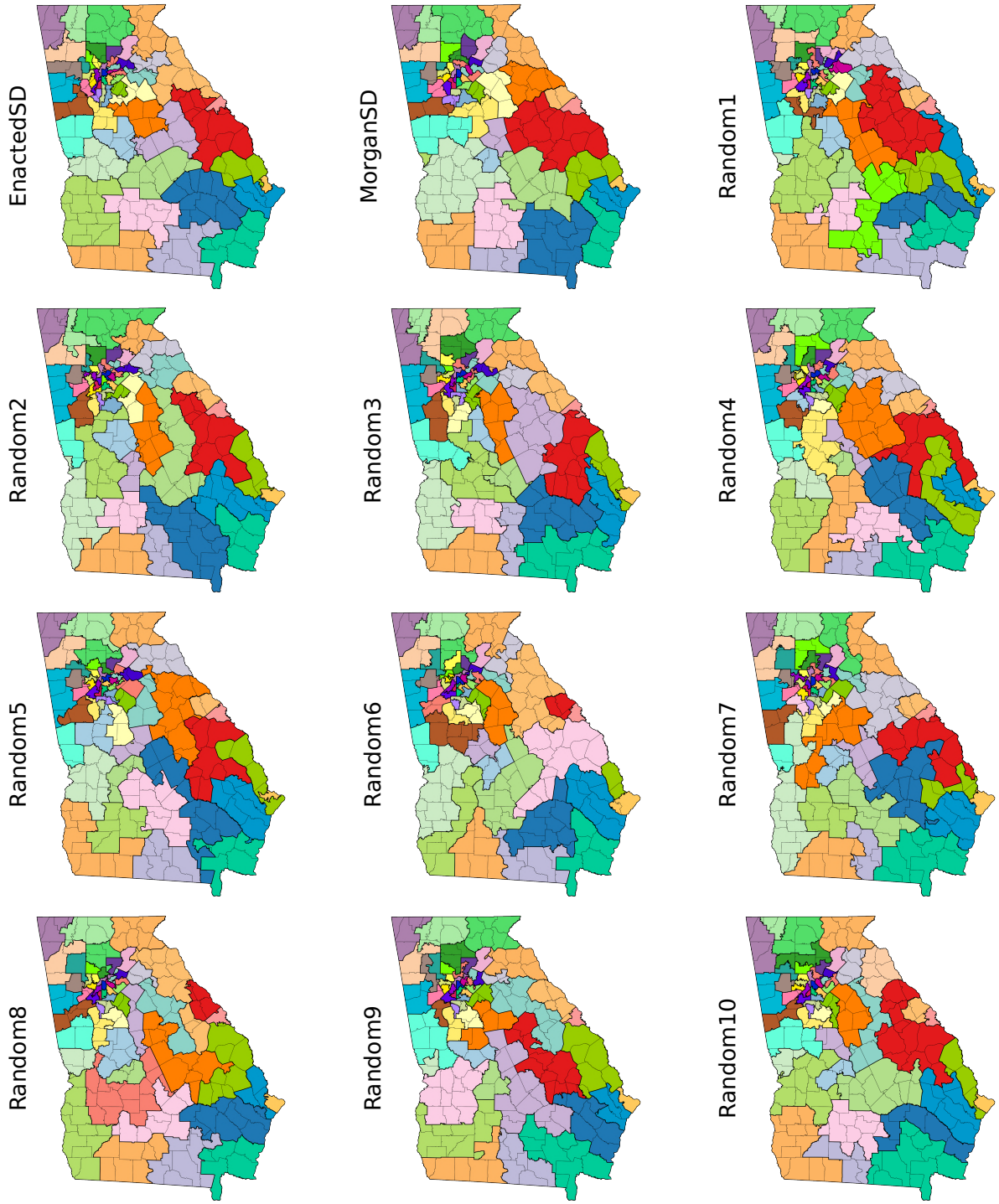


Figure 7: Subsampled Senate plans discussed in §2.2.

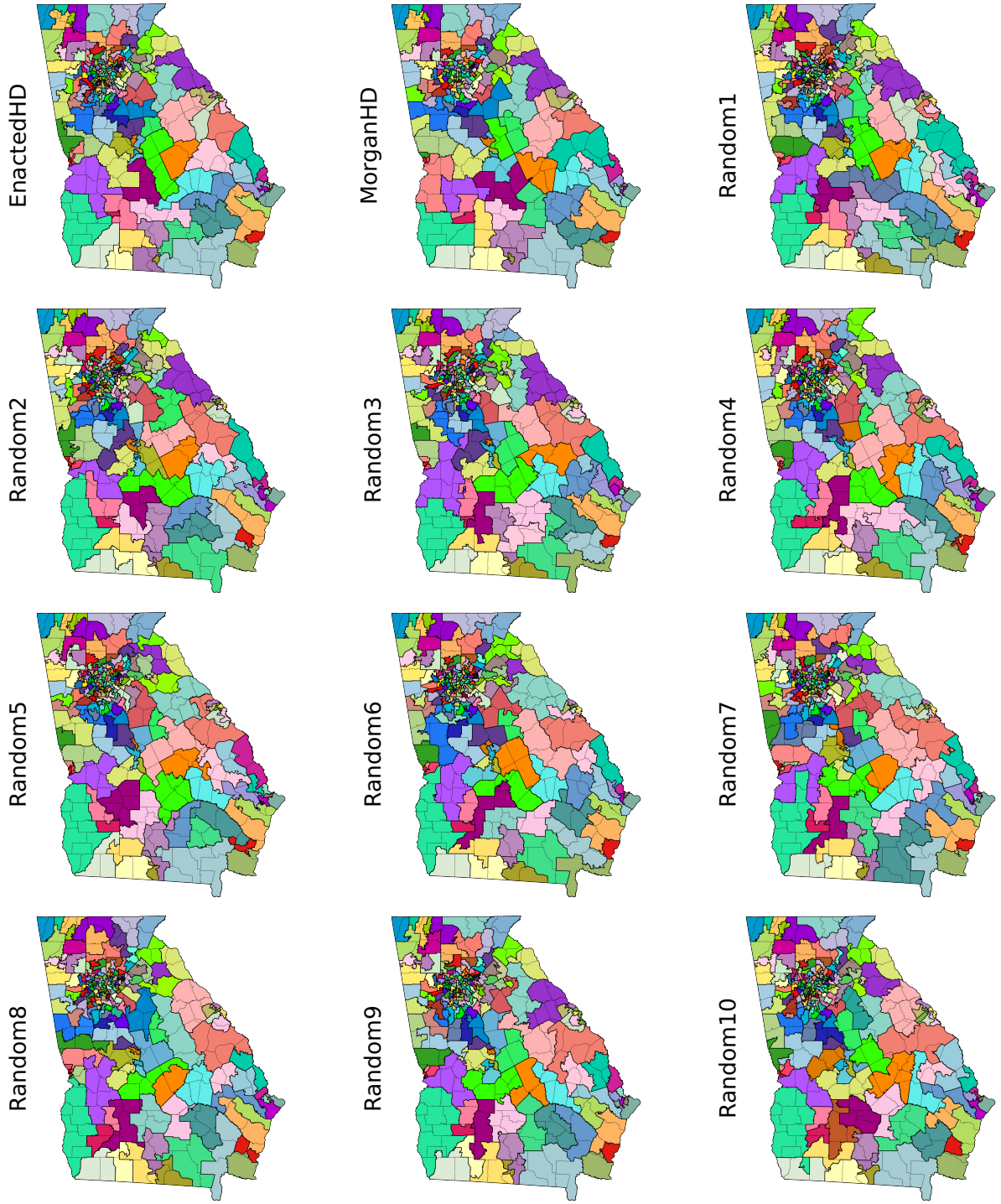


Figure 8: Subsampled House plans discussed in §2.2.

C Minor correction to January 13 Report

In my report filed January 13, 2023, Appendix A on page 81 gives a precise accounting of the construction of racial and ethnic categories throughout the report.

The bullets at the bottom of that page contain minor typographic errors, which are corrected here for clarity and completeness. The corrected version reads as follows:

- Black citizenship ratios are computed by dividing Black-alone CVAP from Table B05003B by Black-alone VAP from Table B01001B.
- Hispanic citizenship ratios are computed by dividing Hispanic CVAP from Table B05003I by Hispanic VAP from Table B03002.
- White citizenship ratios are computed by dividing non-Hispanic White-alone CVAP from Table B05003H by non-Hispanic White-alone VAP from Table B01001H.
- Citizenship ratios for the remaining ("Other") population are computed by dividing CVAP from Tables B05003C (American Indian and Alaska Native alone), B05003D (Asian alone), B05003E (Native Hawaiian and Other Pacific Islander alone), B05003F (some other race alone), and B05003G (two or more races) by VAP from Tables B01001C (American Indian and Alaska Native alone), B01001D (Asian alone), B01001E (Native Hawaiian and Other Pacific Islander alone), B01001F (some other race alone), and B01001G (two or more races).

I reserve the right to continue to supplement my report in light of additional facts, testimony and/or materials that may come to light. Pursuant to 28 U.S.C. 1746, I declare under penalty of perjury of the laws of the United States that the foregoing is true and correct according to the best of my knowledge, information, and belief.

Executed this 15th day of February, 2023.

Moon Duchin