STATE OF NEW MEXICO
COUNTY OF LEA
FIFTH JUDICIAL DISTRICT

REPUBLICAN PARTY OF NEW MEXICO, *et al.*,

Plaintiffs,

vs. **Case No. D-506-CV-2022-00041**

MAGGIE TOLOUSE OLIVER,
in her official capacity as New Mexico Secretary of State, *et al.*,

Defendants.

THE LEGISLATIVE DEFENDANTS' OPPOSED MOTION TO EXCLUDE THE UNRELIABLE SIMULATION-BASED EXPERT TESTIMONY OF SEAN P. TRENDE

The Court should exclude the "sophisticated social-science analysis" simulation-based testimony of Sean P. Trende as unreliable and as a remedy for his destruction of the 2,040,000 simulated maps he claims underly his opinions. Mr. Trende's expert opinions are putatively based upon him having generated maps, having analyzed those maps, and having compared those maps with New Mexico's current congressional districts. But Mr. Trende didn't save even one of the simulated maps so that they could be tested against his analysis and opinions. No one, including Defendants or the Court, can examine, test, or challenge the bases for his opinions. Regardless of the explanation for his inability to produce his maps, be it his lack of expertise with the simulation software he downloaded, simple negligence in drafting his computer scripts to use that simulation software, or something else, the effect is the same. There is no evidentiary foundation for Mr. Trende's opinions and there is no way to establish that his opinions are reliable. This motion does not seek to challenge Mr. Trende's status as a qualified expert—although his report, source code, and deposition testimony are replete with inconsistencies and misstatements—and instead focuses on the narrow and well-established law of New Mexico that expert testimony is inadmissible absent a showing of reliability. Mr. Trende destroyed the facts and data underlying his opinions. His opinions should be excluded.

1. STATEMENT OF RELEVANT FACTS

1.1. Mr. Trende's opinions are based upon his verified report that claims to be based upon 2,040,000 simulations and his analysis of those simulations.

1. On August 11, 2023, Plaintiffs filed the "Expert Report of Sean P. Trende" with the court. [Exh. A] Mr. Trende signed his report under penalty of perjury. [Exh. A, p. 78]

2. Plaintiffs' Annotated Findings of Fact and Conclusions of Law ("FFCLs") repeatedly describe Mr. Trende's opinions and analysis of his claimed 2,040,000 simulations as the sole basis for his alleged "sophisticated social-science analysis" that Plaintiffs claim reflects an "extreme partisan gerrymander." [Exh. B, FFCLs at p. 4 ¶ 5, p. 11 ¶ 20, p. 13 ¶ 23, p. 14 ¶ 24, pp. 15-16 ¶¶ 27-28, pp. 21-22 ¶ 36, p. 27 ¶ 44, pp. 29-30 ¶¶ 48-50, pp. 36-37 ¶¶ 60-62]

3. Sections 6.4.1 and 6.4.2 of Mr. Trende's report are titled "Baseline Simulations" and "Additional Simulations." In Section 6.4.1, [Exh. A, pp. 43-60], Mr. Trende claims two have performed two sets of 1,000,000 simulations. [*Id.* pp. 44, 54][1] In Section 6.4.2, [*id.* pp. 61-75], Mr. Trende claims to have performed four additional simulation scenarios of 10,000 simulations each. [*Id.* pp. 61, 64, 67, and 72]

4. Mr. Trende's purported analysis of those 2,040,000[2] simulations is reflected in Section 6.4.1's and 6.4.2's narrative and in the attendant Figures 19 through 42. The histograms, dot plots, and box plots in those figures refer to "Simulated Maps." [*Id.* pp. 43-75]

---

[1] Mr. Trende makes repeated references to "millions" of maps: "[o]nce the simulation creates our 1,000,000 maps, [Exh. A p. 44]; "[t]o calculate the index, we take each of the 1,000,000 simulated maps," [*id.*]; "all the districts in each of the 1,000,000 simulated maps," [*id.* p. 47]; discussing "3 million dots" representing the three congressional districts. [*Id.* p. 48]

[2] Mr. Trende's deposition testimony is that both of the alleged 1,000,000 simulation consisted of "half a million" duplicates. [Exh. C, Dep. ST 54:13-54:16]

1.2. Mr. Trende's report misstates the manner in which he performed his alleged simulations, is inconsistent regarding the number of simulations performed, and is contradicted by his computer scripts that could only produce 240,000 simulations.

5. In his verified report, Mr. Trende testified that he performed his simulations "at home on a Dell Alienware desktop with an i9 processor." [Exh. A, p. 20] At his second deposition, Mr. Trende contradicted his earlier sworn testimony stating that he performed his simulations on a 16-core AMD processor, not an Intel i9 processor. [Exh. C, Dep. ST 154:18-154:20] Mr. Trende explained that the inaccurate testimony was "probably a leftover from having done it on a laptop once and forgetting that I didn't get an Intel chip on this, I got an AMD chip." [*Id.* at 153:13-153:24]

6. Although Mr. Trende claims and his report sometimes reflects having performed "millions" of simulations, his report also states that he created "50,000 simulated maps." [Exh. A, p. 47] Mr. Trende responded to that contradiction stating "[t]hat should be a million. That is a typo, I think." [Exh. C, Dep. ST 72:12-73:3]

7. Prior to his deposition, Mr. Trende produced computer scripts that he claims to have copied and authored to perform the 2,040,000 simulations that form the basis of his analysis and his creation of histograms, dot plots, and box plots allegedly visualizing that analysis, including computer scripts titled "05-Part-6-4.R" and "06-Part-6-4b.R". [*Id.* at 28:19-29:16, 51:12-51:22, 35:18-36:14]

8. The computer script "05-Part-6-4.R" that Mr. Trende claims generated two sets of 1,000,000 simulations only performed two sets of 100,000 simulations. [*Id.* at 43:8-44:17, 49:11-49:16] Mr. Trende addressed the discrepancy between his report's claim of two sets of one million maps and his computer script's instructions to create two sets of 100,000 maps:

> it appears that I changed it from a million to 100,000 for some purpose and didn't change it back for you. It's obvious, from the histograms in the report, that it was a million maps.

[Exh. C, Dep. ST 44:13-44:17] After his first deposition Plaintiffs produced an altered version of Mr. Trende's computer scripts that set the number of simulations to 1 million rather than 100,000. [*Id.* at 144:15-145:2]

1.3. None of the histograms or figures in Section 6.4 of Mr. Trende's Expert Report were generated by the computer scripts produced by Mr. Trende.

9. Mr. Trende's "05-Part-6-4.R" and "06-Part-6-4b.R" scripts would have generated figures, including histograms, labeled "Simultated Maps" for Sections 6.4.1 and 6.4.2 of his report. [*Id.* at 35:18-35:23]

10. Mr. Trende's explanation for the discrepancy between his report's "Simulated Maps" and the "Simultated Maps" as would have been produced by his source code was that he made pre- and post-report changes to the scripts:

> And when I created these images myself, I hash tagged out the title line in the functions that made the map. I must have unhash-tagged them so that, when Dr. Chen or whomever ran the code, they would be able to match the output file with the document in the report.

[*Id.* at 36:10-36:14]

11. Mr. Trende went on to testify that the computer scripts produced by Plaintiffs were an earlier version of his scripts and not the version that he used to perform the alleged 2,040,000 simulations or to generate his report. [*Id.* at 38:1-38:9]

1.4. Mr. Trende's scripts were configured to destroy his alleged simulations and those simulations cannot be reproduced.

12. Mr. Trende did not produce any of the simulated maps that he claims to have created and analyzed. After admitting that he did not save any of those maps, [*id.* at 22:11-22:20], Mr. Trende testified that the 2,040,000 maps had not been destroyed "because the code is created with the seed set in it [and] should be replicable by plaintiffs' experts or defendants' experts." [*Id.*

at 23:1-23:3] Mr. Trende testified that he instructed the simulations to be reproducible because "presumably, your expert will want to see and reproduce the maps that were created...." [*Id.* at 47:24-48:10] Mr. Trende also testified that in past expert engagements he had received maps from the opposite parties. [*Id.* at 165:10-166:22]

13. When asked whether he had tested whether his source code generated accurate and reproducible results, Mr. Trende testified that "the fact there is a seed included should make it reproducible." [*Id.* at 39:19-39:23, 50:4-50:5]

14. After Mr. Trende's first deposition, Plaintiffs produced maps that they claimed were the 2,040,000 maps underlying his report. [*Id.* at 146:5-146:18] At his second deposition addressing those "re-generated" maps, Mr. Trende initially testified that they were the same as were used in his report. [*Id.* at 147:10-147:20]

15. When examined regarding that claim, Mr. Trende testified that he was unfamiliar with the version of the simulation software he allegedly used, did not know how to determine the version of the software and, beyond "how Sequential Monte Carlo algorithms worked," he was unaware of how the simulation software actually worked. [*Id.* at 157:9-157:21, 156:1-156:5]

16. Mr. Trende testified that he had referenced the manual for the free downloaded simulation software he used, had not "sat down and read it cover to cover," and did not know whether the revised manual applied to the unknown version of the free simulation software he had downloaded. [*Id.* at 156:6-156:9, 157:2-157:14] The manual provided that when the simulation software was used on hardware like Mr. Trende's it would not create reproducible simulations unless specifically instructed to do so. [*Id.* at 158:6-159:5]

17. However, based upon the source code for the simulation software having been published on January 31, 2021, before he said he installed the software, and based upon the source code's internal documentation providing that the simulations were not reproducible, Mr. Trende finally admitted that he could not reproduce the alleged 2,040,000 simulations underlying his opinions. [*Id.* at 161:12-163:3, 163:24-164:5]

2. ARGUMENT

2.1. Mr. Trende's simulation-based opinions should be excluded because the destruction of his alleged 2,040,000 simulations renders his opinions irrelevant, untestable, and unreliable.

The court should exclude Mr. Trende's simulation-based opinions—described by Plaintiffs as "sophisticated social-science analysis"—because they are definitionally unreliable. There are three prerequisites for the admission of expert testimony in New Mexico's courts: (1) the expert must be qualified; (2) the expert's testimony must assist the trier of fact; and (3) their testimony must be limited to the area of scientific, technical, or other specialized knowledge in which they are qualified. Rule 11-702 NMRA; *State v. Torres*, 1999-NMSC-010, ¶ 23, 127 N.M. 20; *State v. Alberico*, 1993-NMSC-047, ¶¶ 43-45, 116 N.M. 156. Although there is ample evidence that Mr. Trende is not qualified to render opinions regarding simulation analysis, such as his conflicting testimony regarding the computer on which he performed his simulations and the number of simulations he performed, 50,000, 240,000, or 2,040,000, and his admissions that he doesn't understand and misused the simulation software he downloaded, doesn't know what version of the software he used and doesn't know how to learn that information, and didn't bother to read the user manual as it relates to the simulations he claims he performed, this Motion addresses Plaintiffs' inability to establish the reliability of Mr. Trende's expert opinions because of his decision to destroy the facts and data underlying his opinions.

Both the second and third prerequisites for the admission of expert testimony require a showing of relevance and reliability. *State v. Downey*, 2008-NMSC-061, ¶ 30, 145 N.M. 232; *State v. Anderson*, 1994-NMSC-089, ¶ 14, 118 N.M. 284; *Alberico*, 1993-NMSC-047, ¶¶ 44-45; *United States v. Jakobetz*, 955 F.2d 786 (2d Cir. 1992); *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993). The trial court's first task is to determine whether the testimony is sufficiently reliable and relevant to help the fact finder in reaching accurate results. *Anderson*, 1994-NMSC-089, ¶ 16 (citations omitted). Critically, "[e]xpert testimony may be received if, and only if, the expert possesses such facts as would enable him to express a reasonably accurate conclusion as

distinguished from mere conjecture." *Downey*, 2008-NMSC-061, ¶ 32 (emphasis added). a proponent of expert testimony must show that the "theory or technique 'can be (and has been) tested'" *id.* ¶ 15, *citing Daubert*, 509 U.S. at 593, or that the "basic data may be verified by court and jury." *Jakobetz*, 955 F.2d at 797-98. Expert testimony is unreliable and inadmissible where its premises are unsupported by the evidence. *Id.* ¶ 34, *citing Hathaway v. Bazany*, 507 F.3d 312, 318-19 (5th Cir. 2007); see also Rule 11-705 NMRA (the expert may be required to disclose the facts or data underlying an opinion on cross-examination).

No one, including the Legislative Defendants or the Court, can test Mr. Trende's opinions against his underlying simulations because they do not exist and cannot be duplicated. [Fact Nos. 12, 17] The consequence of Mr. Trende's choices not to save those simulations and to use the simulation software in a way that prevents the simulations from being reproduced are plain. Plaintiffs cannot establish that Mr. Trende's theories and techniques were applied appropriately because no one can examine them in light of the simulations. Plaintiffs cannot establish that Mr. Trende's simulations were appropriate. If Plaintiffs seek to provide substitute data for that which Mr. Trende destroyed, there is no way to compare the substitute maps with the original maps that Mr. Trende claims formed the basis of his report and opinions. Plaintiffs cannot show that Mr. Trende's opinions relevant or reliable and they must be excluded.

2.2. Mr. Trende's simulation-based opinions should be excluded as a remedy for destroying the facts and data underlying his opinions.

Mr. Trende's "sophisticated social-science analysis" should also be excluded as a remedy for his destruction of his alleged simulations. In *State v. Gutierrez*, 2021-NMSC-008, 482 P.3d 700, the Court addressed the destruction of facts and data underlying an expert's opinion. During a murder investigation, the State performed a polygraph examination of an early suspect with a motive to commit the crime. *Id.* ¶ 65. Although he denied shooting and killing the victim, the polygrapher reported that the suspect's responses were deceptive or false. *Id.* Without a viable criminal suspect, the State lost the underlying charts and recordings of the examination. *Id.* ¶ 66. Years later the defendant was charged and, upon learning of the polygraph, sought to use it to exculpate himself. *Id.* ¶¶ 65-66. Because the State had lost the facts and data underlying the polygraph report, the State stipulated to the admission of the report but identified an expert witness to testify about the unreliability of the polygraph results. *Id.* ¶ 67. After the defendant was convicted and appealed the trial court having permitted the state to present expert testimony, the Supreme Court identified two alternative remedies for the destruction of the facts and data underlying an expert report. *Id.* ¶ 70. First, the trial court could exclude all evidence which the lost evidence might have impeached; second, it could allow admission of all of the evidence that the lost evidence would impeach with full disclosure of the loss and its relevance and import. *Id.*, *citing State v. Chouinard*, 1981-NMSC-096, ¶ 23, 96 N.M. 658. The trial court's "choice between these two alternatives depends on the court's 'assessment of materiality and prejudice. The fundamental interest at stake is assurance that justice is done, both to the defendant and to the public.'" *Id.* Because the circumstances of the State's destruction of the evidence was not deliberate or in bad faith, and because the criminal defendant wanted to introduce the State's polygraph results, the trial court had appropriately chosen the second option. *Id.* ¶¶ 69, 71.

Applying *State v. Gutierrez* to this case, Mr. Trende's simulation-based opinions should be excluded. The 2,040,000 alleged simulations underlying Mr. Trende's expert opinions are material—in fact, fundamental—to his opinions and his destruction of those simulations is

profoundly prejudicial to the Legislative Defendants. Mr. Trende's report is unambiguous that his opinions are based upon having performed "millions" of simulations and having analyzed those same simulations. [Fact No. 3.] But Mr. Trende did not save the 2,040,000 facts and data underlying his opinions so that they could be disclosed, reviewed, and tested. [Fact No. 12] Although he could have, Mr. Trende did not configure his simulation software so that the simulations could have been reproduced. [Fact Nos. 16-17] Mr. Trende admitted that the Legislative Defendants would be prejudiced by his inability to disclose the facts and data underlying his opinions and the corresponding impossibility of reproduction and testing. [Fact No. 12] Mr. Trende's simulation-based opinions should be excluded.

WHEREFORE the Legislative Defendants respectfully request that Mr. Trende's simulation opinions, Section 6.4 of his report, and all references to same in Plaintiffs' Annotated Findings of Fact and Conclusions of Law be excluded pursuant to Rule 11-702 NMRA because they are unreliable and because they lack an evidentiary foundation, and as a remedy for Mr. Trende's inability to produce the 2,040,000 simulations claims underly his expert opinions, and for such other and further relief as the Court deems just and proper.

Respectfully Submitted,

HINKLE SHANOR LLP

By: _____

Richard E. Olson
Lucas M. Williams
Ann C. Tripp
P.O. Box 10
Roswell, New Mexico 88202-0010
(575) 622-6510 telephone

PEIFER, HANSON, MULLINS & BAKER, P.A.

Sara N. Sanchez
20 First Plaza, Suite 725
Albuquerque, New Mexico 87102
(505) 247-4800

STELZNER, LLC

Luis G. Stelzner
3521 Campbell Ct. NW
Albuquerque, New Mexico 87104
(505) 263-2764

PROFESSOR MICHAEL B. BROWDE

751 Adobe Rd. NW
Albuquerque, New Mexico 87107
(505) 266-8042

Attorneys for the Legislative Defendants

CERTIFICATE OF SERVICE

Pursuant to Rule 1-005(E) NMRA, The Legislative Defendants' Opposed Motion to Exclude the Unreliable Simulation-Based Expert Testimony of Sean P. Trende was served on the following on September 20, 2023, by the method reflected:

Person Served	Method
All counsel of record	Via Efile/Eserve and Email

Respectfully Submitted,

HINKLE SHANOR LLP

By: _____

Lucas M. Williams
P.O. Box 10
Roswell, New Mexico
(575) 622-6510 telephone
(575) 623-9332 facsimile

Attorneys for the Legislative Defendants

STATE OF NEW MEXICO
COUNTY OF LEA
FIFTH JUDICIAL DISTRICT

REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA,

Plaintiffs,

v.

Cause No.
D-506-CV-2022-00041

MAGGIE TOLOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representatives,

Defendants.

EXPERT REPORT OF SEAN P. TRENDE

Expert Report of Sean P. Trende

in *Republican Party of New Mexico et al., v. Oliver, et al.*

August 11, 2023

Figure 2: Cluster of precincts with edge removed from spanning tree, creating two districts.

This, then, is a microcosm of the approach that the SMC algorithm takes. To simplify greatly, by sampling spanning trees of New Mexico's precincts and then removing two connections, the software produces three randomly drawn districts. While the math is quite complicated, this approach produces a random sample of maps that mirrors the overall distribution of possible maps, similar to the way a high-quality poll will produce a random sample of respondents that reflects the overall population. While the process is complicated, it can be run on a laptop computer. Indeed, these simulations were run at home on a Dell Alienware desktop computer with an i9 processor and 128M of RAM, using a free, widely employed, computer programming language (R version 4.1.2).

Importantly, these maps are drawn without providing the software with any political information. In other words, these maps help inform an analyst what maps would tend to look like in New Mexico if they were drawn without respect to politics.

Of course, other features, such as respect for county lines, compactness, or respect for geographic features could play a role in the drawing of district lines as well; these tra-

Democratic Statewide Wins in District, 2020 and 2022 Lines		
District	# D Wins, 20 lines	# D Wins, 22 lines
1	10	10
2	1	10
3	10	10

The Second District changes from one where Democrats won only 1 of the ten statewide races into one where it won ten of ten. At the same time, Democratic performances in the other 10 races are not appreciably weakened; Democrats won all 10 statewide races under both the previous and current lines.

The upshot of this was that the only Republican in the state's congressional delegation, Congresswoman Yvette Herrell, was defeated. She was one of only two Republican incumbents who lost in what was, generally speaking, a favorable environment for the Republicans. This gave Democrats complete control of the state's delegation for only the third time since it began electing members of Congress through congressional districts, and was just the first time this happened in a year that was not an exceptionally good environment for Democrats (the other two elections where this occurred were 2008 and 2018). And it occurred even as Republicans were winning 44.9% of the statewide vote for Congress. *See* "New Mexico Election Results," *New York Times*, *available at* `https://www.nytimes.com/interactive/2022/11/08/us/elections/results-new-mexico.html?action=click&pgtype=Article&state=default&module=election-results&context=election_recirc&region=StateNavMenu`

6.4 Simulations

6.4.1 Baseline Simulations

To conduct the simulations, I gathered and joined publicly available data with political and demographic data at the census block and precinct levels. After unifying

the data at the precinct level, I instructed the simulation to create 1,000,000 sets of three reasonably compact districts, which respect county subdivisions. I was then able to compare the partisanship of the enacted districts to the ensemble of maps.

We can think of this approach as answering the questions, "What would happen if we selected 1,000,000 individuals, gave them basic instructions to keep districts modestly compact and to keep populations equal, withheld political information from them, and then sent them out to draw maps? What sorts of maps would they produce?"

Once the simulation creates our 1,000,000 maps, it calculates the partisan lean of the districts. We can then compare the simulated districts to the enacted map to ensure that they perform comparably well on traditional redistricting criteria. That is to say, we ensure that the Legislature would not have to sacrifice traditional redistricting criteria in order to achieve more balanced maps.

To best illustrate the degree to which the 2022 Map reflects outliers when compared to maps drawn without partisan information, I employed the "gerrymandering index," proposed by Bangia *et al.* (2017) and endorsed by McCartan and Imai in their paper setting forth the algorithm used to generate the districts in this report. *See* Cory McCartan & Kosuke Imai, *Sequential Monte Carlo for Sampling Balanced and Compact Redistricting Plans*, *Annals of Applied Stat* (forthcoming) (manuscript at 24-25), *available at* `https://arxiv.org/pdf/2008.06131.pdf`.

It is conceptually similar to the idea of root mean squared error (used throughout statistics). To calculate the index, we take each of the 1,000,000 simulated maps and rank the districts from most heavily Democratic to least heavily Democratic. We then average Democratic vote shares across ranks. This tells us, generally speaking, what percentage Democratic vote share we would expect the most heavily Democratic district to have in a map drawn without respect to politics, what we would expect the second-most heavily District to have, and so forth.

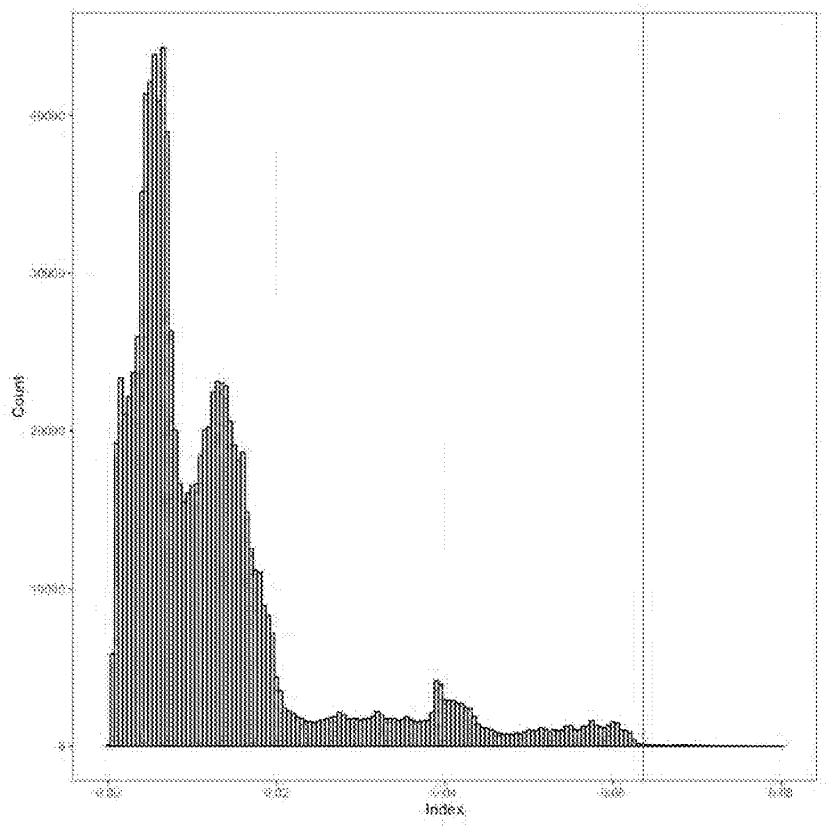
Of course, some areas might be conducive to a wide range of partisan outcomes depending how the map is drawn. To help account for this, we then calculate the de-

viations in each plan in the ensemble from the mean for each "bin." To make this less abstract: say that the most heavily Democratic district in the ensemble, on average, gives the Democrats 93.9% of the vote. A district in the ensemble whose most heavily Democratic district was 92% Democratic would have a deviation of 1.9% for that rank, while one whose most heavily Democratic district was 97% Democratic would have a deviation of 3.1%. Next, say that the second most heavily Democratic district in maps in the ensemble is, on average, 92.2% Democratic. A map whose second most heavily Democratic district has a Democratic vote share of 87% would have a deviation of 5.2%, and so forth. To emphasize large deviations (and to make them all positively signed) these values are then squared and added together to give us a sense of how far maps drawn without respect to political data will tend to naturally vary from expectations.

In simplified terms, this gives us the total deviation from the ensemble for all the districts in the plan, while giving more weight to particularly large misses; dividing by three gives us the average deviation. The square root is then taken, which effectively puts everything back on a percentage scale. We then engage in the same exercise for the 2022 Map and compare those scores to those in the ensemble.

The utility of this exercise is that it looks at maps as a whole, rather than in isolation. The results are displayed below:

Figure 19: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using 2020 POTUS as the Metric for Partisanship



The ensemble maps have, on average, a Gerrymandering Index of around 1.3%. The 2022 Map, on the other hand, is far on the tail of the distribution. It has a Gerrymandering Index of 6.4%, over four standard deviations from the mean. Of the maps in the ensemble, only 1,103 maps, or 0.11%, had larger gerrymandering indices. The probability that the 2022 Map would be drawn by map drawers who were avoiding political information is vanishingly small. In fact, there is a roughly a one-in-1,000 chance that this map would be produced by someone drawing under the same parameters as the computer. To put this in context, the typical standard in the political science discipline for rejecting the possibility that an outcome was merely a result of chance is 1-in-20, or 5%.

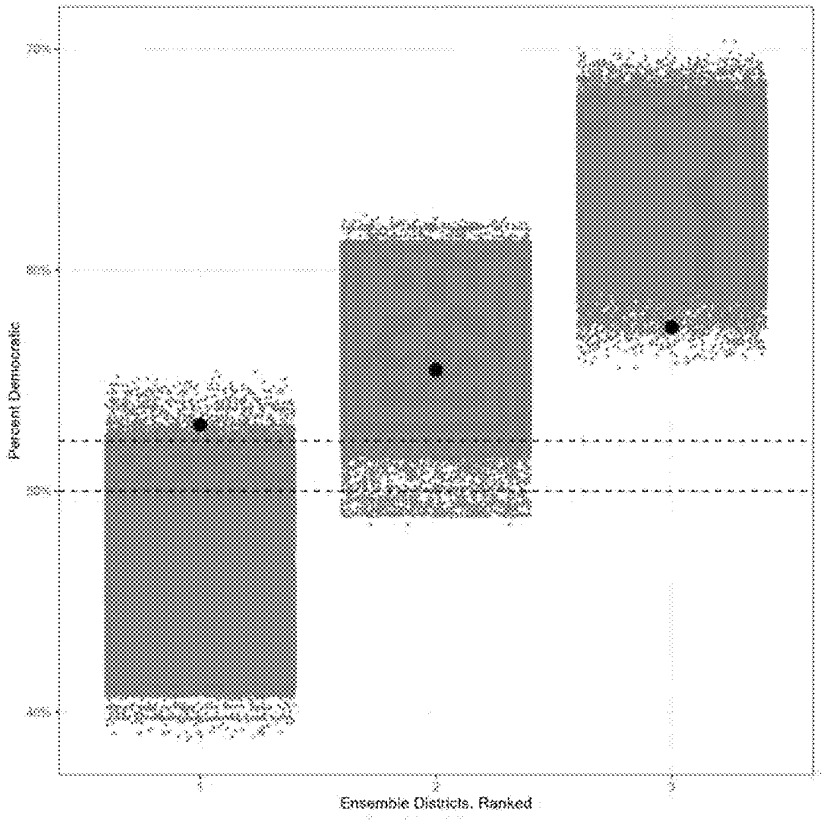
Put simply, it is implausible, if not impossible, that this map was drawn without a heavy reliance upon political data and was likely drawn to favor or disfavor a political party.

Interrogating the maps from a different angle makes clear that the party that the Legislature intended to favor was the Democratic Party, and the one that it intended to disfavor was the Republican Party. To see this, consider the following dotplot. In this plot, all the districts in each of the 1,000,000 simulated maps were sorted from most Democratic to least Democratic. Each of these districts then received a dot in the plot. At the far right, above the number 3, you will notice a large cluster of blue dots spread between 56% and 69%. That means in every plan, the most heavily Democratic district fell somewhere between 56% and 69% Democratic.

The next cluster to the left, hovering above the number 25, consists of blue dots ranging between 49% and 61%. This means that in all of the 50,000 simulated maps, the second-most Democratic district typically fell between 49% and 61% Democratic.

I have also added a dashed horizontal line at 52.27% Democratic. This represents Biden's two-party vote share from 2020. In other words, this marks the point where a PVI flips from favoring Republicans to favoring Democrats.

Figure 20: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 POTUS as the Metric for Partisanship. Black Dot = 2022 Map

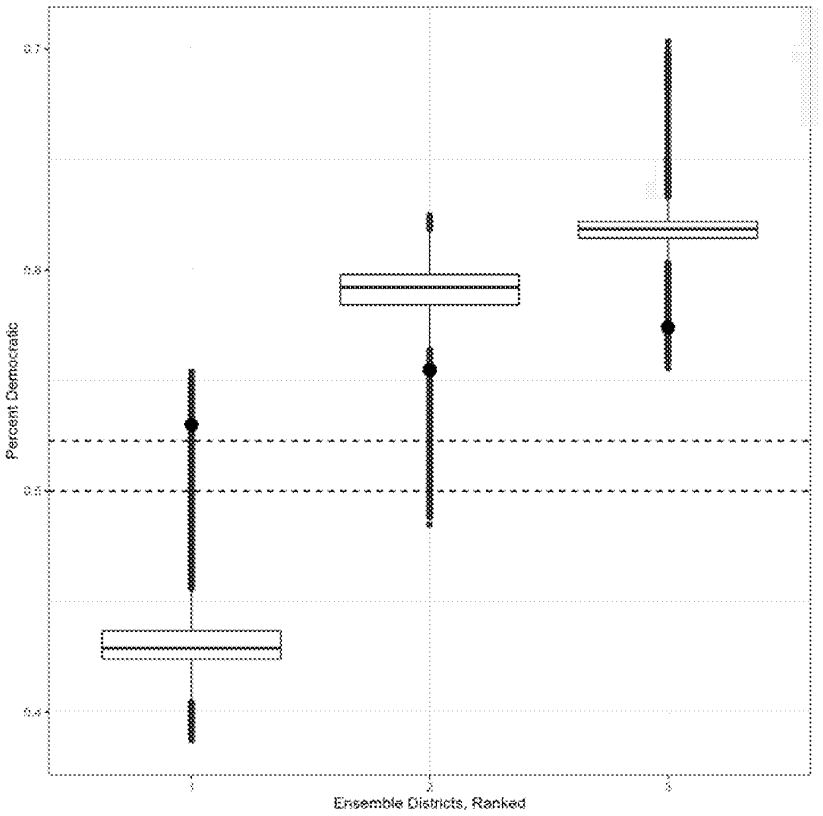


Here, we can see that the most Republican district is at the extreme of the dotplot. Only a handful of the randomly generated maps returned three districts at least as Democratic as the 2022 Map. We can also see how this was brought about: The most heavily Democratic district is made much more Republican than we would expect, but not so Republican that the incumbent would be seriously endangered.

One shortcoming of these dotplots with a large number of districts is that much of the detail is lost. In short, you cannot plot 3 million dots on a 8.5" x 11" page without a significant amount of overplotting. To address this, in the past I have utilized boxplots (as have other scholars, including McCartan and Imai). While these are less intuitive than the dotplots, they don't suffer from the "overplotting" issue.

The way to read a boxplot is as follows: The black horizontal lines represent the median of the distributions. The boxes enclose the middle half of the map values (this statistic is known as the "interquartile range" or "IQR"). The vertical lines coming off of the boxes, known as "whiskers" represent values that are within 1.5 times the values of the "box" in either direction. So, for example, here the boxes for the most Republican district range from 44.6% Democratic to 45.9% Democratic, a range of 1.37 percentage points. The top whisker then ranges from 45.9% to 48%, while the bottom whisker ranges from 44.6% Democratic to 42.5% Democratic. Beyond that, the black dots reflect outliers.

Figure 21: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 POTUS as the Metric for Partisanship. Black Dot = 2022 Map



As we can see, all of the districts in the Enacted Map would be classified as outliers. Moreover, they are outliers in a very particular manner. The districts that we would expect to be heavily Democratic are still Democratic, but much less so than we'd expect. On the other hand, the district we would expect to be a Republican district is made much more Republican than we would expect. Indeed, its base partisanship is flipped. This pattern reflects the cracking of Democrats in heavily Democratic districts, and their packing into areas where we would expect to see Republican districts, thereby diluting the Republican vote. We see this pattern repeatedly in states where courts have struck down maps; it is the very DNA of a gerrymander. *See also* Gregory Herschlag, *et al.*, *Quantifying Gerrymandering in North Carolina*, 7 *Stat. & Pub. Pol.* 30, 33, 34 (2020) (referring to this pattern as the "signature of gerrymandering").

If we conduct our analysis using the political index described above to measure district partisanship, the results are substantively the same.

Figure 22: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Political Index as the Metric for Partisanship

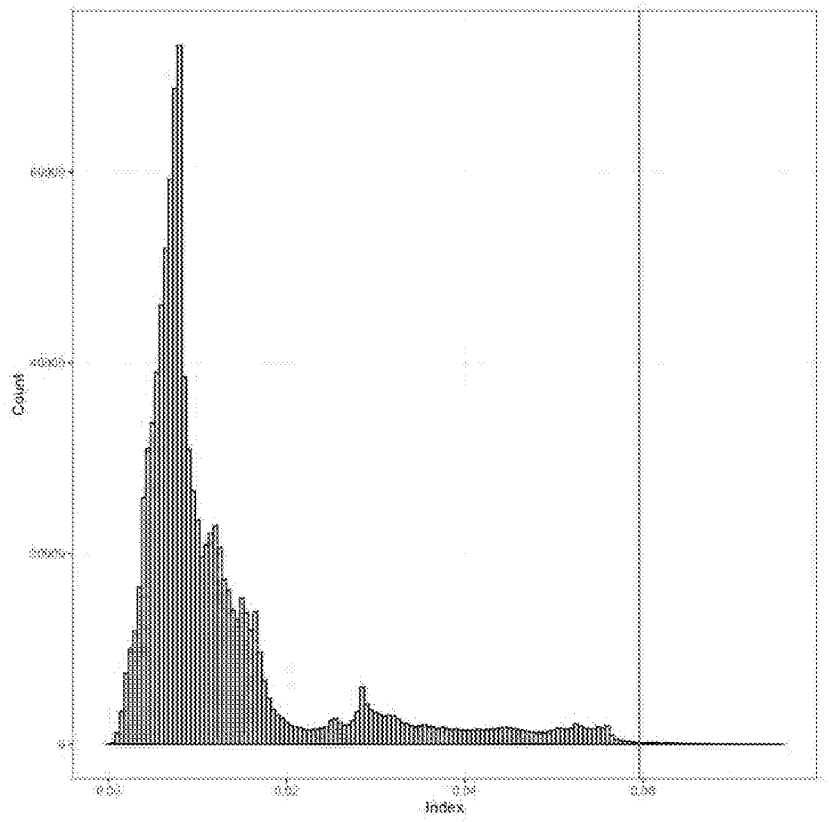


Figure 23: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship. Black Dot = 2022 Map

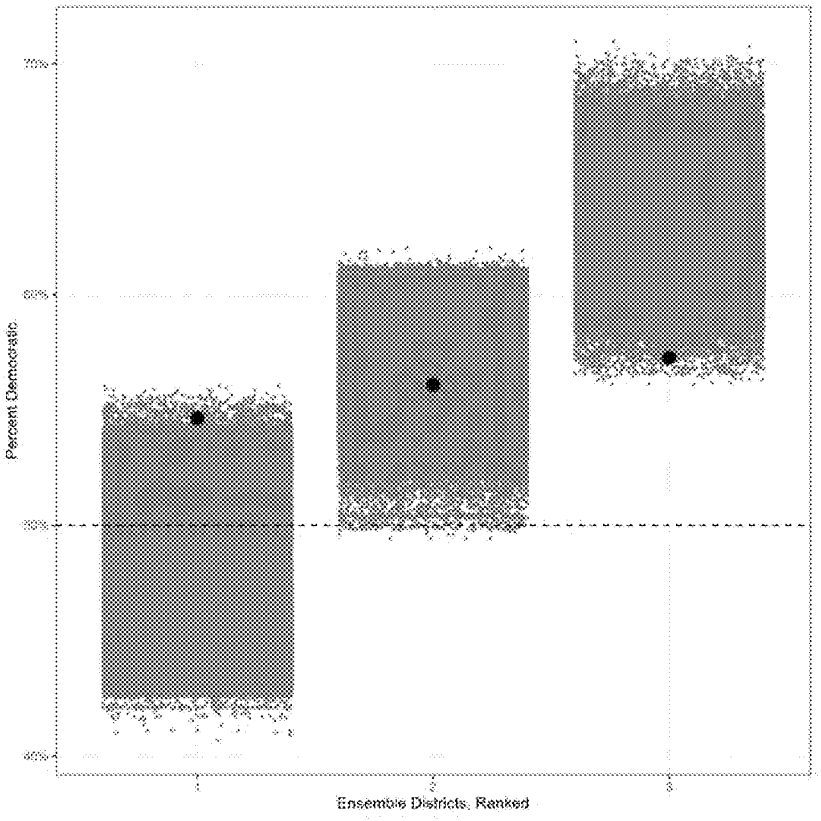
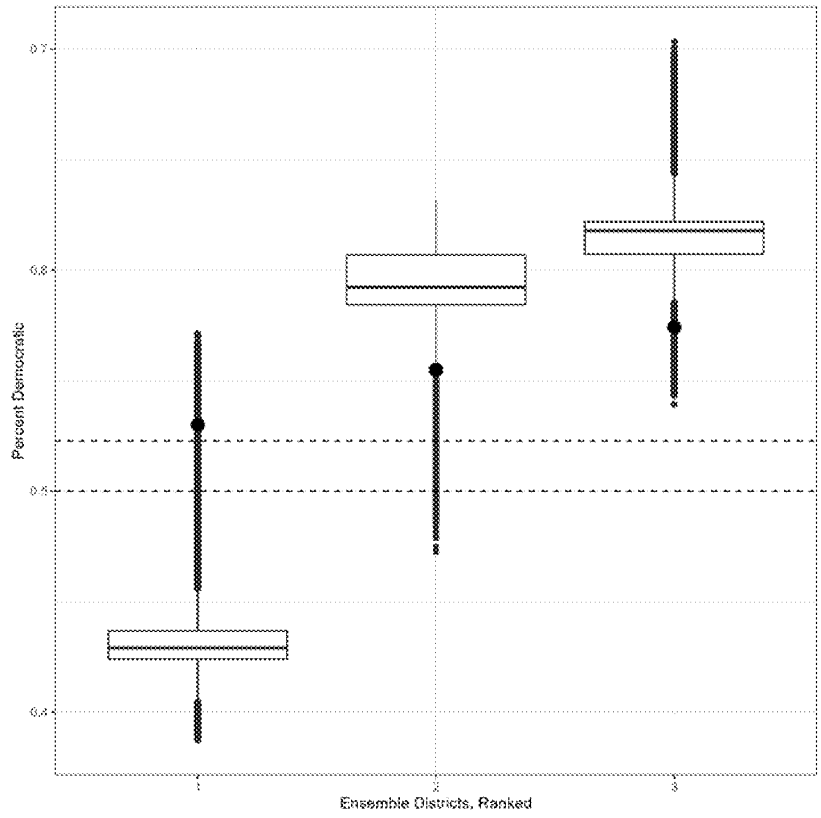


Figure 24: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship. Black Dot = 2022 Map



But these simulations assume that the entire map is redrawn. We know from the above, however, that the mapmakers didn't completely redraw the map. Instead, they drew from just two areas of the map. See also NMSA 1978, § 1-3A-7(A)(10) (empowering the citizen's redistricting committee to "to the extent feasible . . . preserve the core of existing districts.").

In situations like this, political scientists will often "freeze" precincts together. This is described in more detail in McCartan and Imai's 'vignette' explaining more complex redistricting environments. See https://alarm-redist.org/redist/articles/map-preproc.html. The most frequent reason for doing this is where the Voting Rights Act is involved. So, for example, in Maryland, I froze the two districts where African-Americans

comprised more than 50% of the voting age population (this also necessitated the freezing of a third district, due to geographic constraints). To be sure, there are multiple ways to draw VRA-compliant districts in Maryland, but because VRA analyses are so sensitive and fact-specific, I simply conceded, for sake of argument, that the legislature had drawn those districts in a considerate, fair manner. In New York, I engaged in a similar analysis, freezing the districts where Whites did not comprise a majority of the voting age population and running the simulations on the remaining precincts.

To account for the fact that New Mexico has a history of relatively small changes to its districts and anticipating that the state may offer a desire to at least somewhat continue that trend today, I performed a second set of analyses, which only allowed the precincts the mapmakers swapped between districts to move. That is to say, the precincts from District 1 under the previous lines that were still in District 1 under the new lines were locked together. Likewise, the precincts from District 2 under the previous lines that were still in District 2 under the new lines were locked together, as were the precincts that stayed in District 3.

In effect, this process concedes to the mapmaker that it was proper to keep the precincts in the same district that the mapmaker opted to keep in place; in effect 90% of the map is conceded to the mapmaker. We can therefore ask ourselves: Given the precincts that the mapmakers thought could be swapped between districts, how likely is it that they would have ended up with maps containing the partisan breakdown that the 2022 Maps produced?

Even under such extensive concessions the answer is: It would be astonishingly unlikely. *None* of the 1,000,000 additional maps in this ensemble has the gerrymandering index of the 2022 maps. The average index score is 0.62% for the ensembles. For the Enacted Plan? It is 2.95%, or over seven standard deviations from the mean. It is not on the tails, it is beyond them. It is virtually impossible to arrange the precincts that the mapmakers swapped between districts and come up with anything resembling what the legislature came up with, at least without heavy reliance on partisan data.

Figure 25: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting.

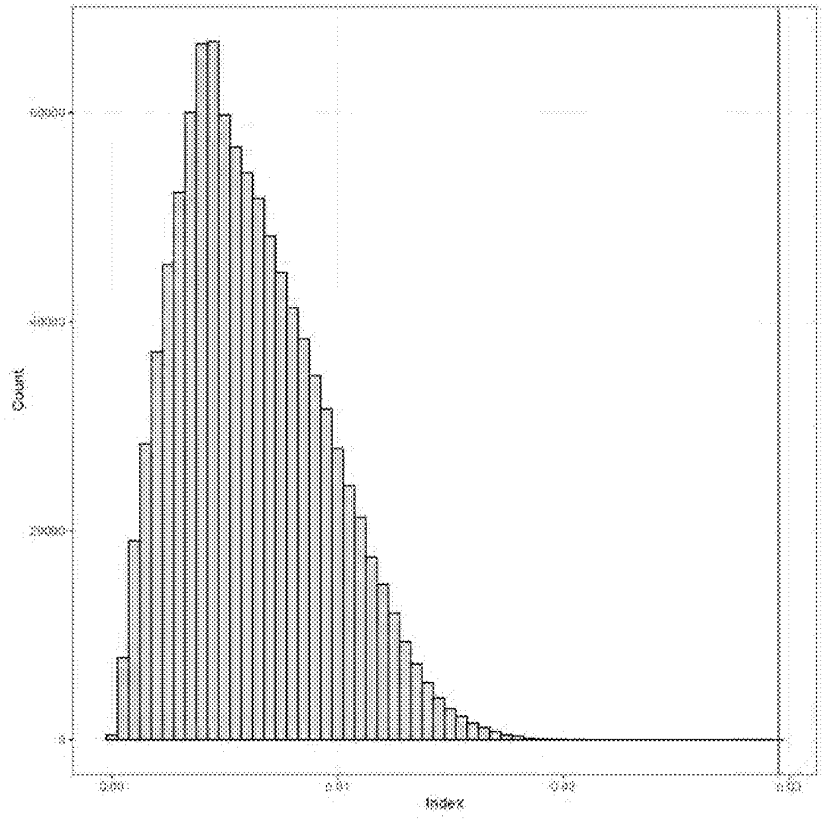


Figure 26: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map

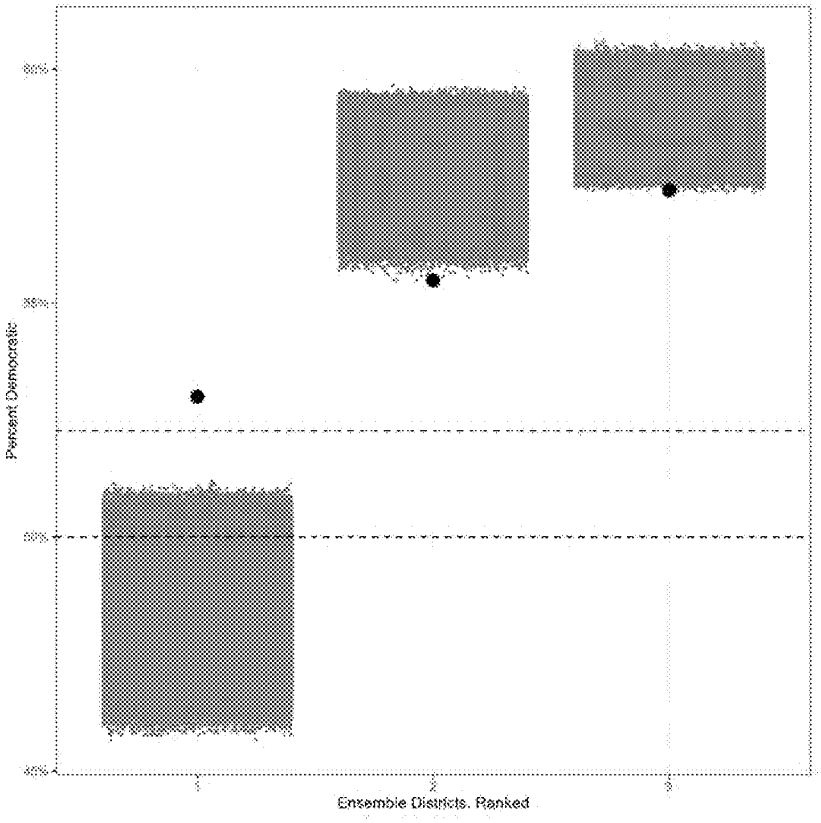
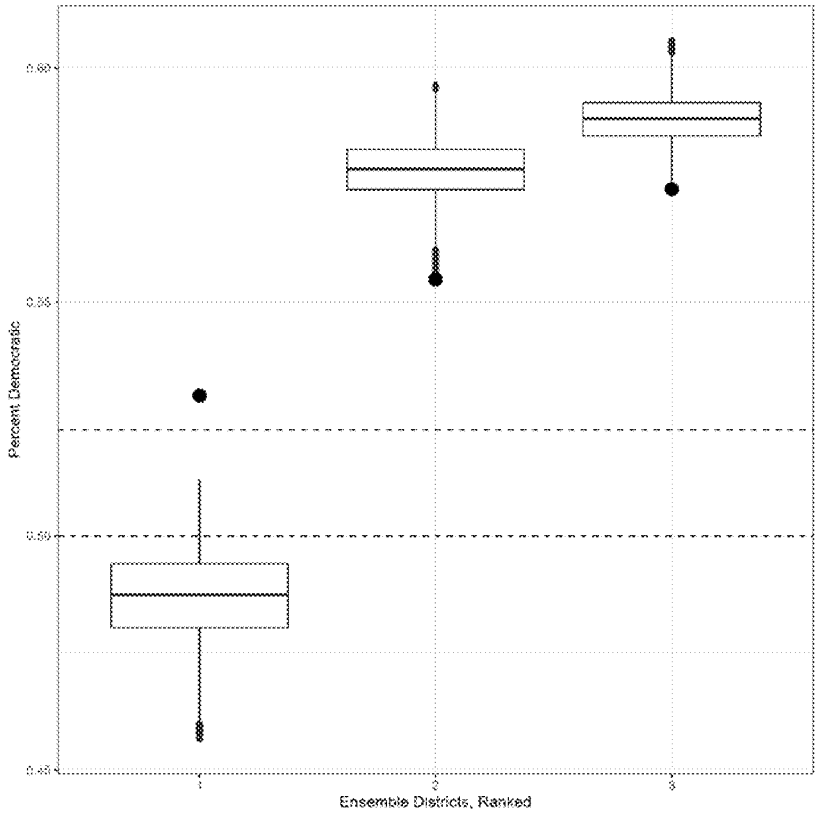


Figure 27: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using 2020 Presidential Election as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map



None of the simulated maps rearrange the precincts that the mapmakers rearranged and came up with a map where three districts leaned Democratic. Yet that is exactly what the mapmakers produced here. Again, it is virtually impossible to rearrange these precincts without heavily reliance on partisan data and produce the partisan configuration that the mapmakers produced.

Looking at the index produces the same results:

Figure 28: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting.

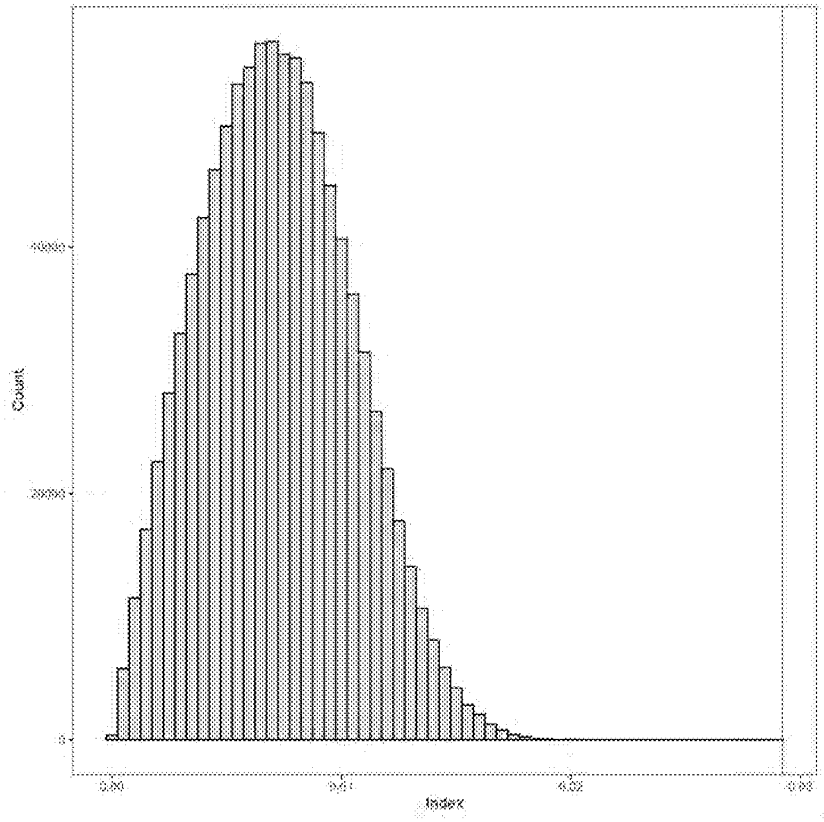


Figure 29: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map

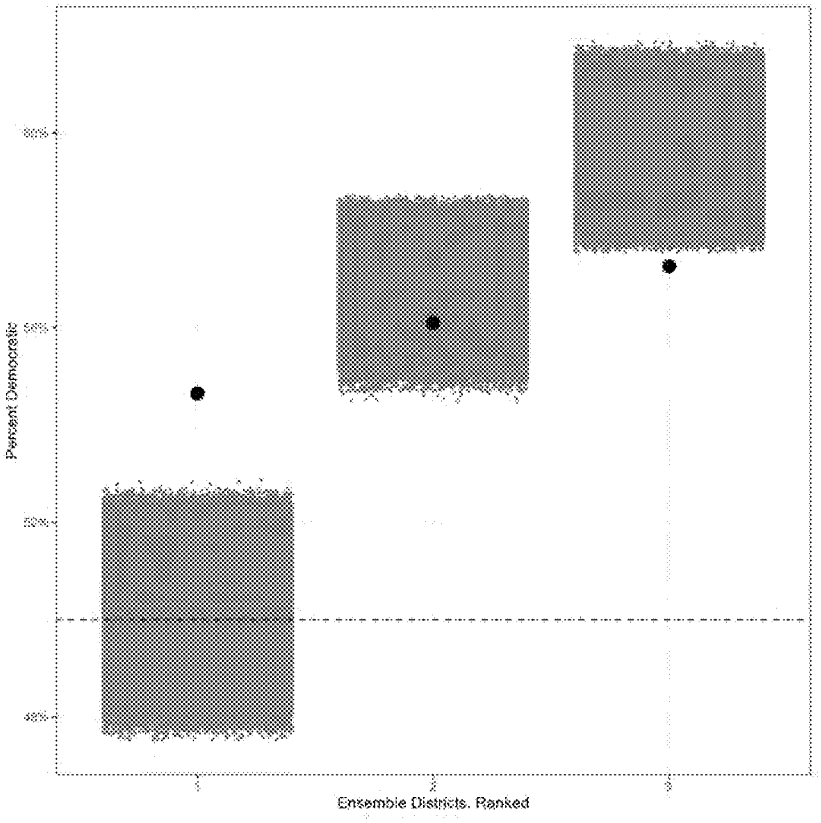
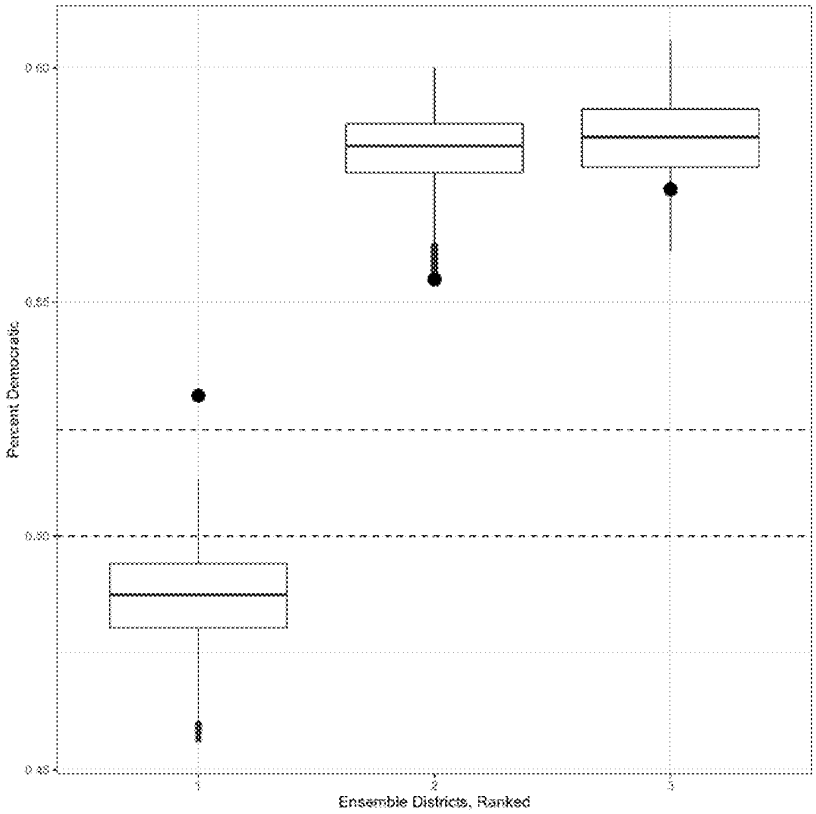


Figure 30: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Political Index as the Metric for Partisanship, Only Precincts that were Moved in 2021 Redistricting. Black Dot = 2022 Map



None of this should be surprising, given what the qualitative analysis revealed. In simple terms, the core of District 1 that was retained gave Joe Biden 61.1% of the vote; the core of District 2 that was retained gave Joe Biden 49.6% of the vote, and the core of District 3 that was retained gave the winner of the 2020 election 61.3% of the vote. The precincts that were moved gave Biden 46.6% of the two-party vote on average. To allocate those precincts in such as to raise Biden's vote share in a district takes work. That is precisely what the mapmakers plainly did here.

6.4.2 Additional Simulations

While the above should be sufficient to demonstrate conclusively that the Enacted Plan is an extreme partisan gerrymander, we may look at other scenarios. Since this is intended as a secondary analysis, I have limited the simulations run to 10,000 in each scenario, which is more than enough in an SMC simulation to pull a representative sample of maps.

The first set of simulations mimics the first inquiry above, except instead of using vote outcomes, it uses registration. This is a secondary analysis because (1) as explained above, registration does not necessarily correspond to voting in New Mexico (a registered Democrat in southwest New Mexico can be very different than a registered Democrat in Santa Fe; the same is true for Republicans); (2) the political science literature with which I am familiar has almost entirely utilized vote outcomes; the simulations provided in *Rucho* focused on election outcomes, not registration. Third, the available data don't match neatly with the shapefiles. The November 2020 data do match up mostly with the VEST precinct shapefile, but it does require merging a precinct in Taos County. This analysis is included only for the sake of completeness.

Regardless, using the Democratic share of two-party registration statistics brings about marginally better results for the state. But the map is still an extreme gerrymander. Just 1.92% of the ensemble's maps have larger gerrymandering indices, and the map is over 3 standard deviations from the mean (3.4 sd's).

Figure 31: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Registration as the Metric for Partisanship.

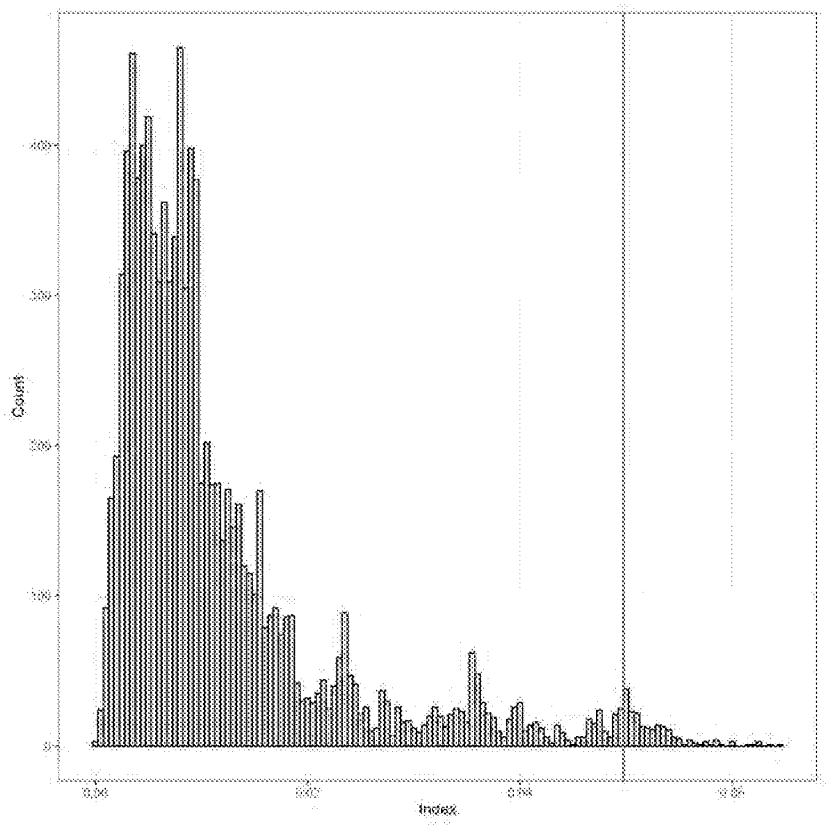


Figure 32: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps. Black Dot = 2022 Map

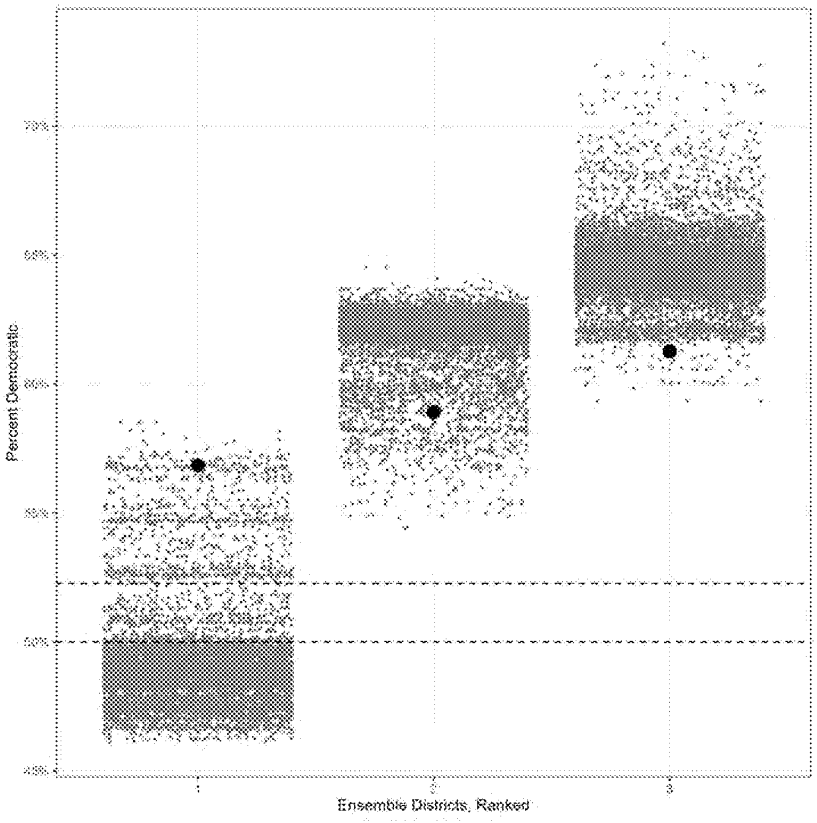
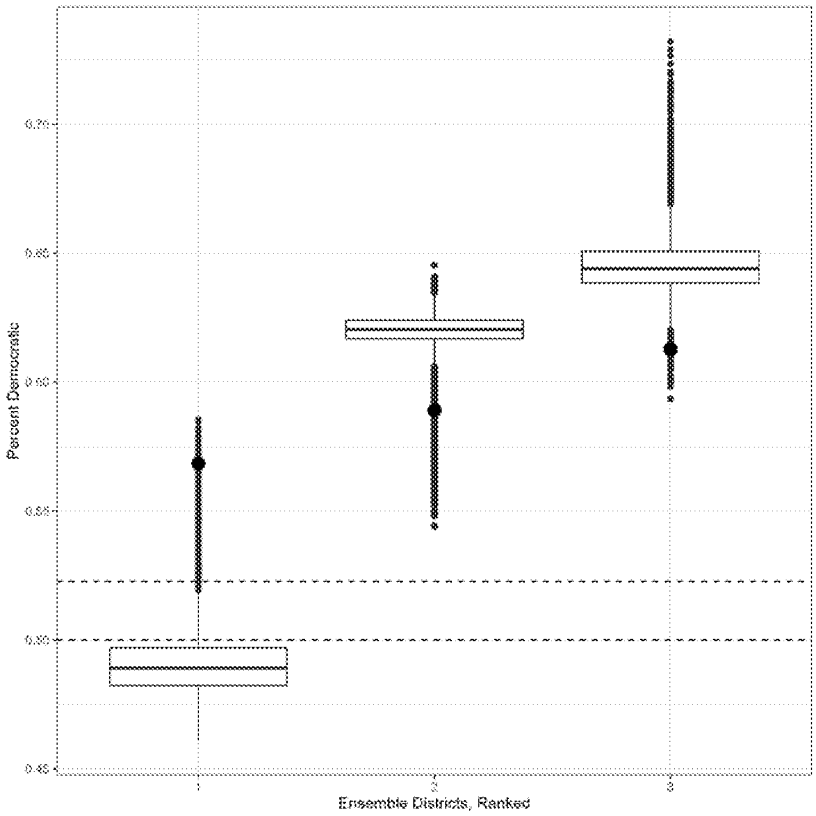


Figure 33: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps. Black Dot = 2022 Map



Likewise, running the simulations on the precincts that were swapped reveals similar outcomes, with only 1.2% of maps in the ensemble reporting more extreme registration advantages for Democrats, and an outcome over two standard deviations from the mean:

Figure 34: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Using Registration as the Metric for Partisanship, Swapped Precincts Only.

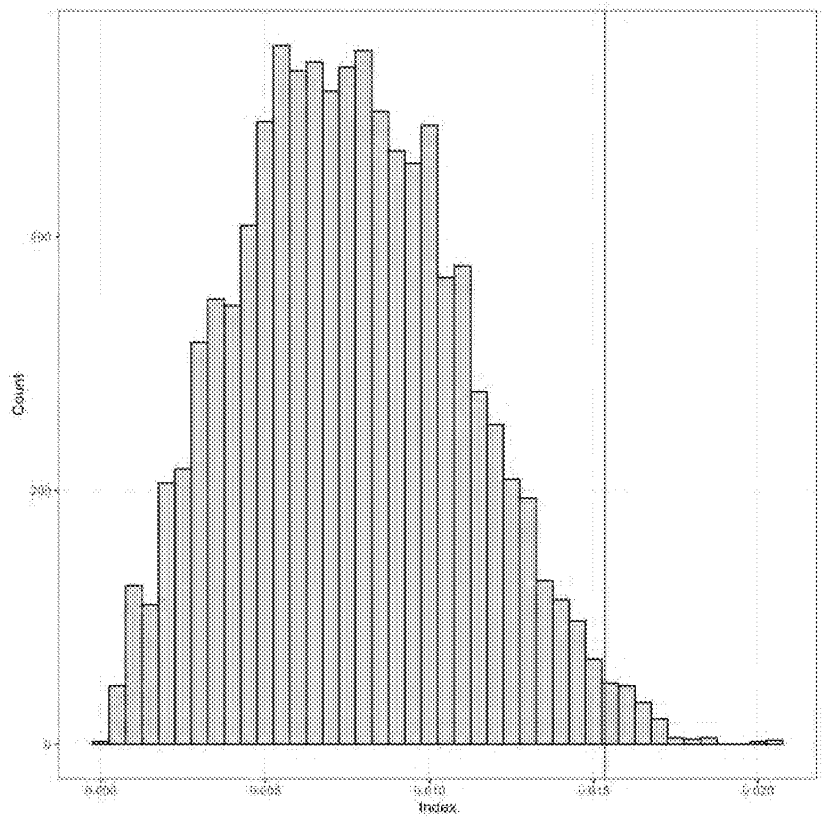


Figure 35: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts Only. Black Dot = 2022 Map

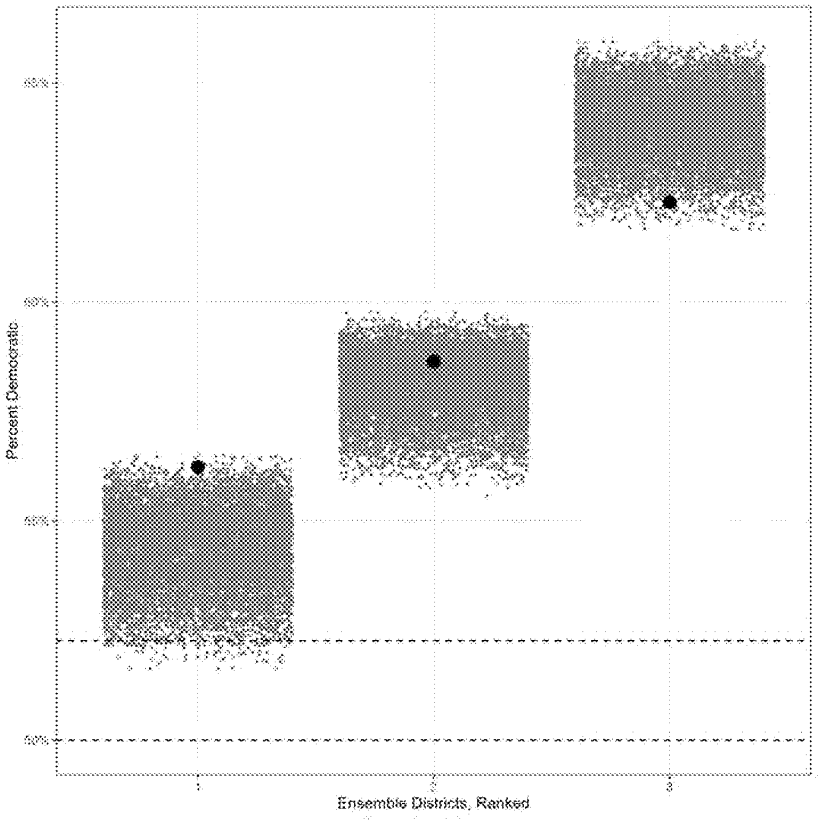
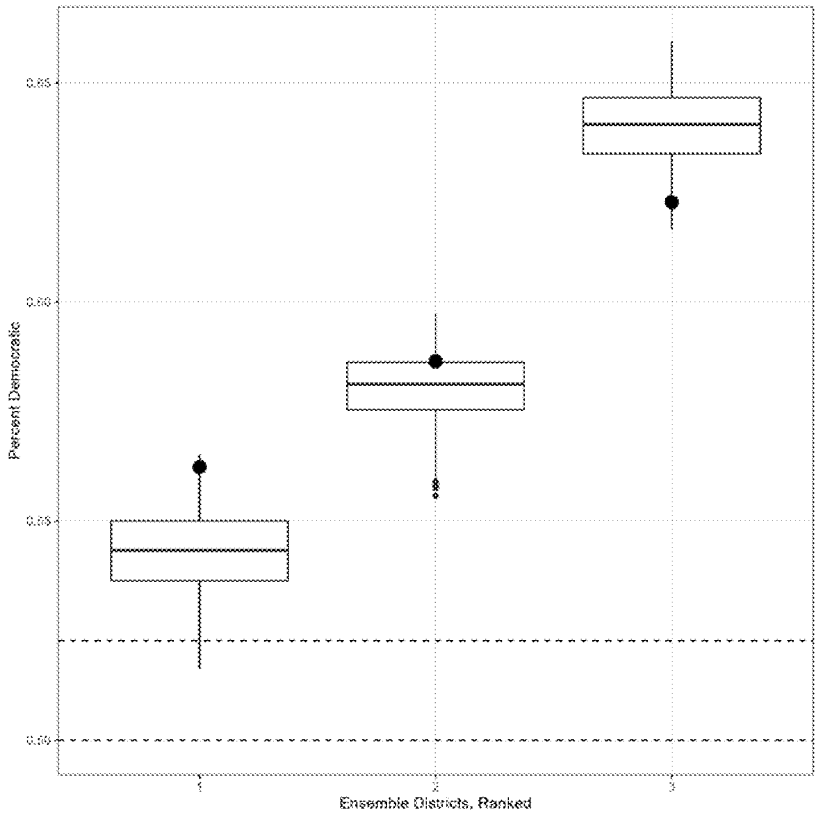


Figure 36: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts Only. Black Dot = 2022 Map



Second, we can compare the plan the legislature enacted to the Citizen Commission's Plan H, which is in many ways similar to the Enacted Plan. First, we should note that our expectation should likely be that this would present unfavorably for Defendants. An examination of the partisanship of the precincts that were retained from Plan H, and the precincts that were swapped from Plan H shows that the mapmakers took a map that was already favorably aligned toward Democrats, and made it even more so:

Partisanship of Precincts Moved From Plan H to Enacted Plans, By District

Citizens Commission H	Enacted Map	Biden votes	Trump votes	Biden Share
1	1	176,902	122,343	59.1%
1	2	15,415	12,550	55.1%
2	1	756	1,092	40.9%
2	2	121,335	109,951	52.5%
2	3	14,917	28,815	34.1%
3	1	10,796	11,418	48.6%
3	2	6,446	6,259	50.7%
3	3	153,047	109,466	58.6%

In particular, the commission retained precincts from Plan H that created three districts that voted for President Biden with at least 52.5% of the vote, roughly his national vote share. It then transferred a collection of precincts from Plan H's District 1 to District 2 that voted 55.1% for Biden. This was offset in part by moving a collection of precincts from District 2 to District 1 that gave President Trump almost 60% of the vote.

Likewise, the mapmaker shifted a net of over 14,000 Trump votes from District 2 in Plan H to District 3 in the Enacted Map. This group gave Biden just 34.1% of the vote. In exchange, it shifted a group of voters that gave Biden 50.7% of the vote from District 3 into District 2.

Party registration tells the same story:

Registration of Precincts Moved From Plan H to Enacted Plans, By District				
Citizens Commission H	Enacted Map	Registered Democrats	Registered Republicans	Democratic Share
1	1	188,030	134,807	58.2%
1	2	19,997	12,863	60.9%
2	1	1,008	1,048	49.0%
2	2	161,601	113,726	58.7%
2	3	20,167	31,869	38.9%
3	1	11,563	12,425	48.2%
3	2	6,486	6,799	48.8%
3	3	202,606	112,274	64.3%

Thus, it should be completely unsurprising that the resulting map represents an extreme gerrymander, with an ultimate gerrymandering index 6.67 standard deviations from the mean. Again, it is beyond the tails.

Figure 37: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Swapped Precincts from Plan H Only.

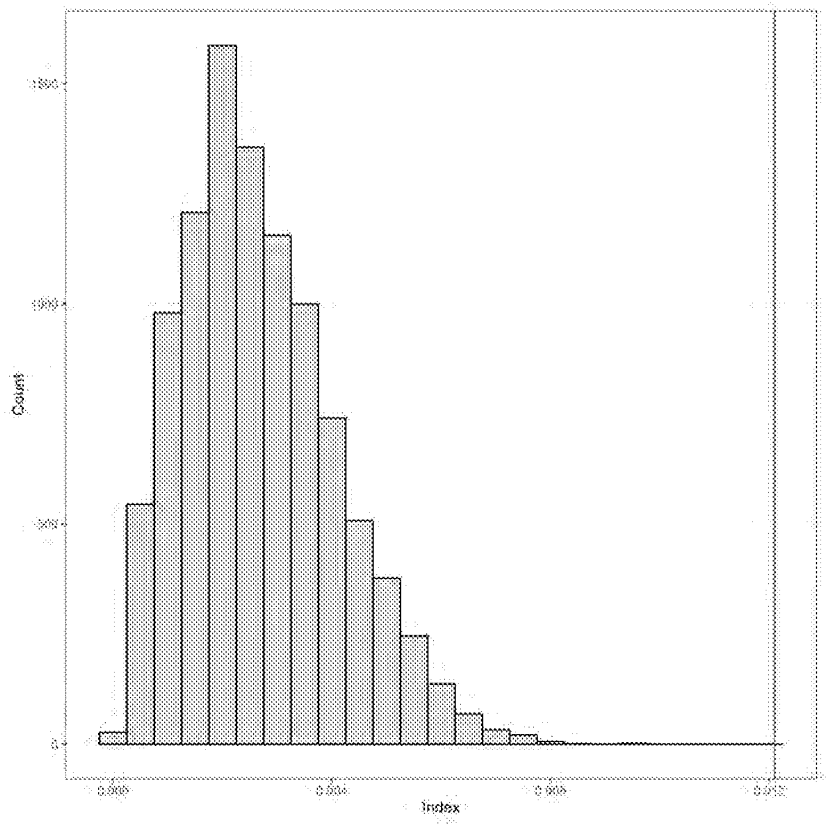


Figure 38: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts from Plan H Only.

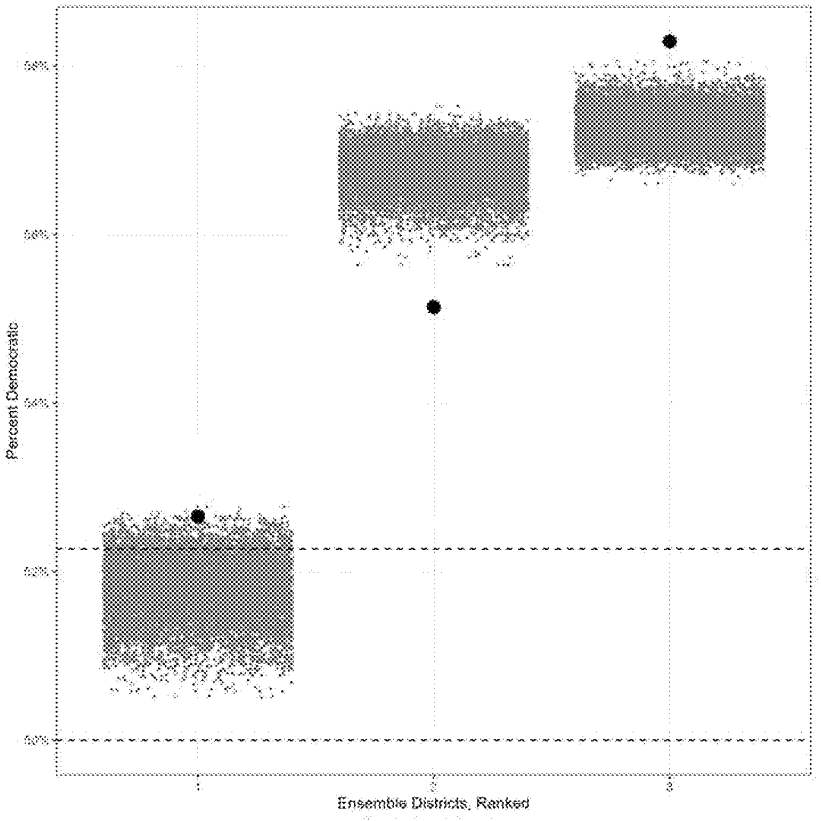
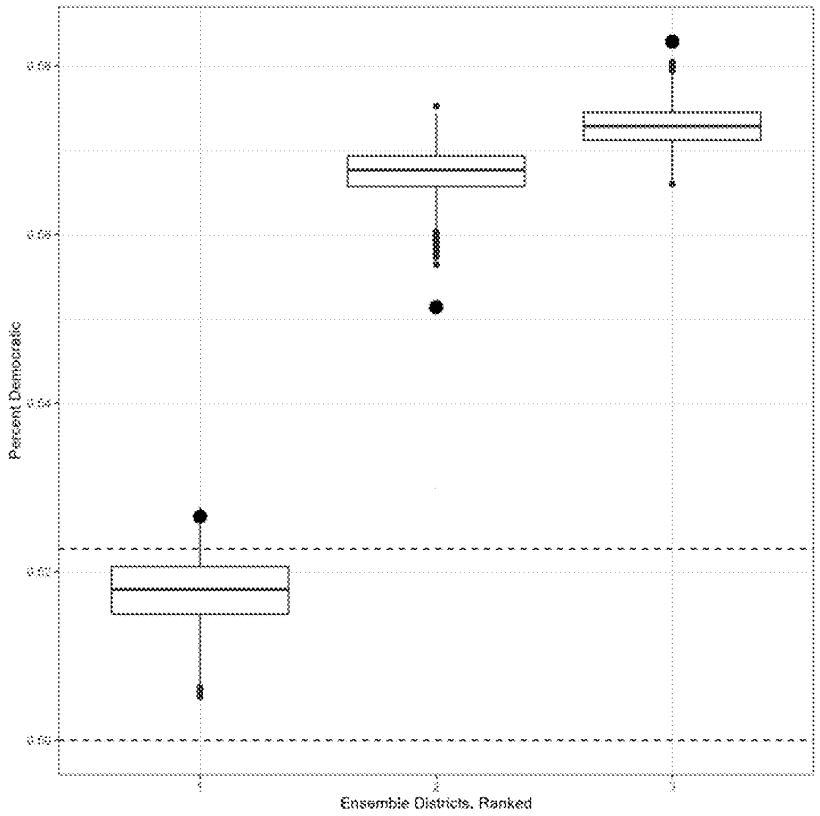


Figure 39: Democratic Registration %, Ranked by Registration Advantage, in Simulated Maps, Swapped Precincts from Plan H Only.



A final consideration may be a desire to keep Indian Reservations and other Indigenous homelands intact. To check this, I obtained a shapefile of Reservations from the Redistricting Data Hub. I matched census blocks to the Reservations, and then merged together precincts that overlapped those entities. Thus, every precinct that includes a Reservation is merged together, ensuring that the Reservations are not split.

The answer does not change. Even with these precincts frozen together, the Enacted Plan is an extreme outlier.

Figure 40: Values of Gerrymandering Index, Simulated Maps (Red Line = 2022 Map), Keeping Reservations Intact

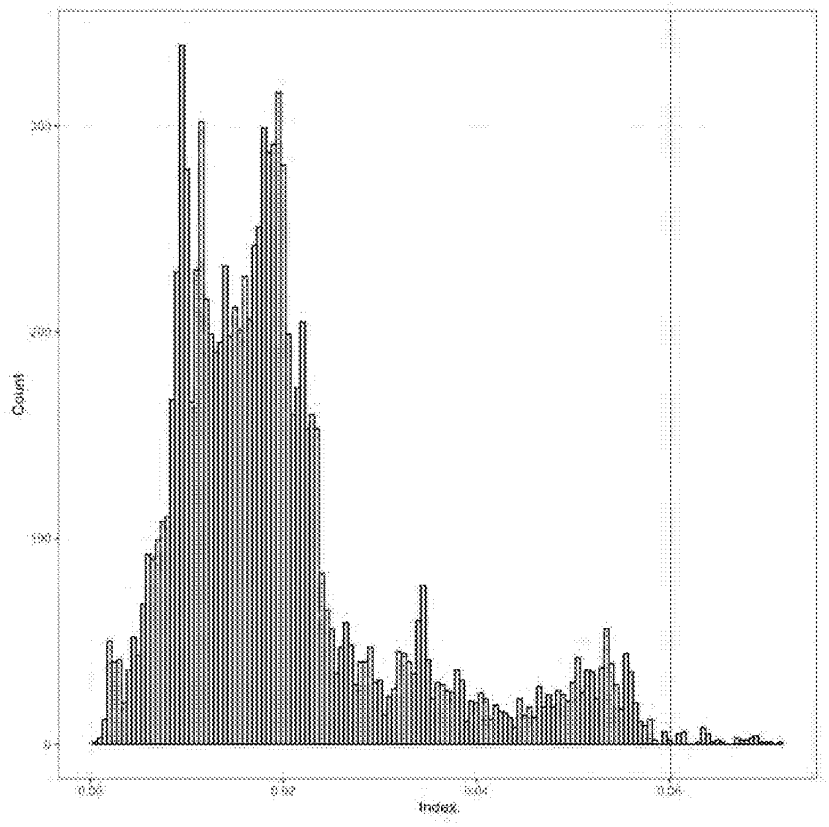


Figure 41: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Presidential Vote Share in 2020 as the Metric for Partisanship. Black Dot = 2022 Map. Reservations are frozen together.

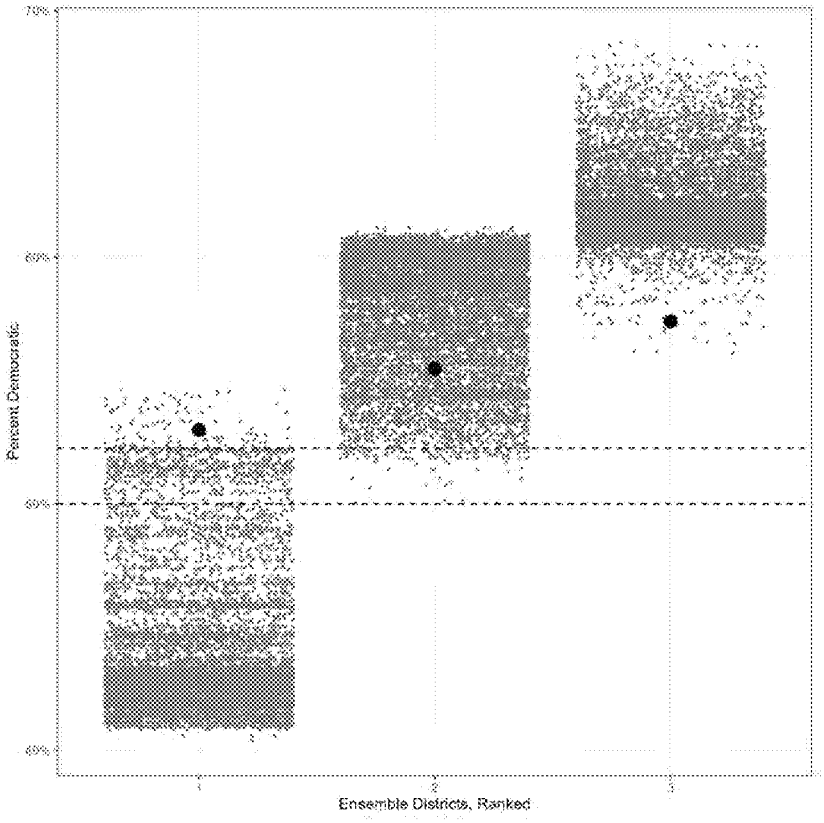
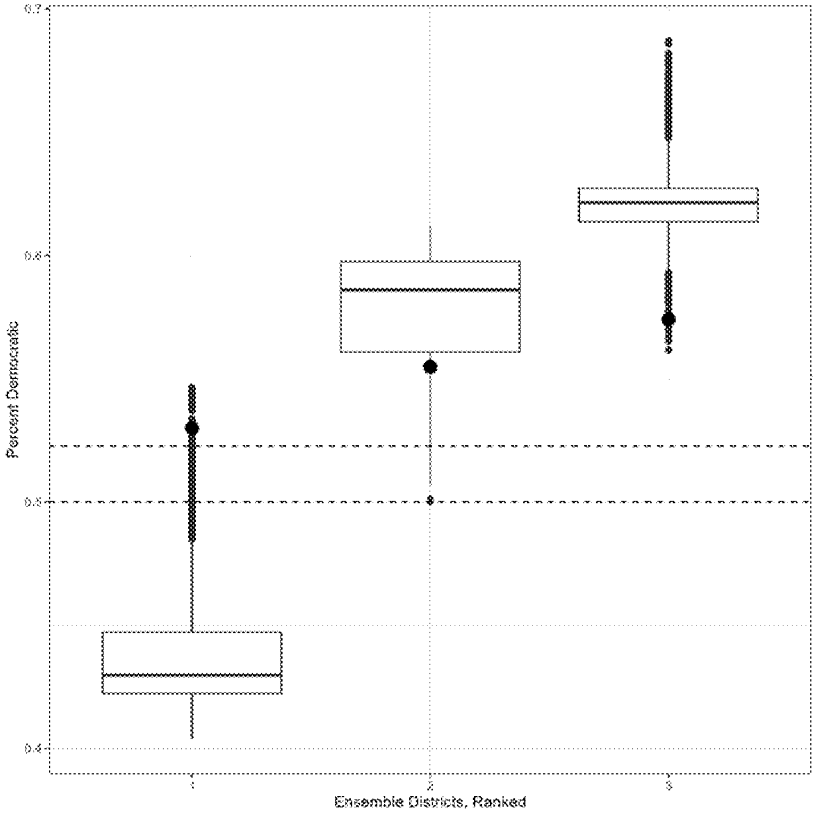


Figure 42: Democratic Vote Shares, Ranked by Partisanship, in Simulated Maps, Using Presidential Vote Share in 2020 as the Metric for Partisanship. Black Dot = 2022 Map. Reservations are frozen together.



7 Additional Considerations

Finally, there may be other legitimate considerations that motivate a legislature. Many of these are controlled for in the simulations above. However, it is worth comparing the performance of the Enacted Map against previous New Mexico maps. To begin with, we can examine the number of county splits.

Total Splits, New Mexico Congressional Maps	
Year	# Splits
1972	1
1982	3
1992	5
2002	5
2012	6
2022	9

While previous maps haven't had the minimum number of county splits possible, they have never had more than six splits. The Enacted Map, however, splits nine, the most in New Mexico's history.

We can also look to see how the compactness of the Enacted Map's districts compares to previous maps in New Mexico. To do this, I employ three commonly utilized metrics. The first two metrics are based on comparing the drawn district to a circle, which is the most compact shape. The Reock score looks at the ratio of the area of the district to the area of the smallest circle that would enclose the district (also known as a "minimum bounding circle"). Ernest Reock, *A Note: Measuring Compactness as a Requirement of Legislative Apportionment*, 1 *Midwest J. Pol. Sci.* 70, 71 (1961). This ratio will fall as districts become distorted lengthwise; it therefore punishes long, bacon-like districts. A "perfect" Reock score is 1, while a zero is a theoretical perfectly non-compact district.

The second measure is the Polsby-Popper score, which looks at the ratio of the area of a district to the area of a circle that has the same perimeter as the district. Daniel D. Polsby & Robert D. Popper, *The Third Criterion: Compactness as a Procedural Safeguard Against Partisan Gerrymandering*, 9 *Yale L. & Pol'y Rev.* 301 (1991). To understand the motivation behind Polsby-Popper, sketch out a circle. Then erase some of the edge of the circle, and have a narrow tendril snake into the district toward the center. The Reock score would not change much, since the size of the minimum bounding circle remains the

same and the area of the district does not change much, but the Polsby-Popper score would fall significantly, since the perimeter of the district would be greatly increased. A "perfect" Polsby-Popper score is 1, while a theoretical perfectly non-compact district would score a zero.

The final measure that I examine is the Convex Hull score. It is similar to the Reock score except that it uses the minimum bounding polygon instead of the minimum bounding circle. To understand this, consider that a perfect square – something that most people would consider a compact district – has a Reock score of 0.64. By allowing for shapes other than a circle to be the benchmark, the Convex Hull score recognizes that compactness can come in many forms. Like the other scores, a 1 is the most compact district and a zero is a theoretical non-compact district.

The following table provides the average scores for New Mexico's maps:

Average Compactness, New Mexico Congressional Maps

Year	Reock	Polsby-Popper	Convex Hull
1972	0.487	0.490	0.838
1982	0.324	0.345	0.746
1992	0.420	0.340	0.765
2002	0.408	0.361	0.784
2012	0.388	0.350	0.785
2022	0.368	0.289	0.730

By any metric, the districts produced in 2021 are some of the least compact districts in New Mexico history. Using Convex Hull and Polsby-Popper, they are the least compact Congressional Districts ever drawn. Using Reock scores, they are the second-least compact Congressional Districts. Under any of the three metrics, the 2021 lines are less compact than the preceding lines.

8 Conclusion

A careful qualitative analysis reveals that the 2021 redistricting shifted large numbers of Democrats from the 1st and 3rd Districts into the 2nd, while shifting large numbers of Republicans out of that district. The resulting map is one of the least compact maps in New Mexico's history, with a record number of split counties. It cracks the most Republican region of the state, splitting it among three districts, while carefully ensuring that the two Democratic districts – the 1st and the 3rd – don't become dangerously Republican.

A simulation analysis confirms these suspicions. Across millions of maps, under multiple assumptions and scenarios, the Enacted Map presents as an extreme outlier. Note that the ensembles still present a wide array of district configurations for a would-be mapmaker to choose from; the legislature's discretion is not entirely cabined in. What it cannot do is select *this* combination of precincts, which would almost certainly only arise in a scenario where political considerations predominate.

In short, no matter how one looks at it, this map is an extreme gerrymander under the test outlined by Justice Kagan and endorsed by the Supreme Court of New Mexico.

I declare under penalty of perjury under the laws of the State of New Mexico that the foregoing is true and correct. See N.M. R. Civ. P. Dist. Ct.1-011(B).

Dated: August 11, 2023

Sean P. Trende

SEAN P. TRENDE

FILED
5th JUDICIAL DISTRICT COURT
Lea County
9/15/2023 10:12 PM
NELDA CUELLAR
CLERK OF THE COURT
Cory Hagedoorn

STATE OF NEW MEXICO
COUNTY OF LEA
FIFTH JUDICIAL DISTRICT

REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY and DEE ANN KIMBRO, and PEARL GARCIA,

Plaintiffs,

v.

Cause No. D-506-CV-2022-00041

MAGGIE TOLOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representatives,

Defendants.

PLAINTIFFS' ANNOTATED FINDINGS OF FACT AND CONCLUSIONS OF LAW

TABLE OF CONTENTS

INTRODUCTION 1

FINDINGS OF FACT 5

A. New Mexico's Congressional Maps 5

B. The Committee Proposes Three Maps To The Legislature 8

C. The Legislature Creates SB1 By Taking The Committee's Most Favorable Map For Democrats—The Concept H Map—And Modifying It Into A Near-Perfect Partisan Gerrymander 11

D. Plaintiffs Challenge SB1 As An Unconstitutional Partisan Gerrymander, And The Supreme Court Holds That Plaintiffs' Claim Is Justiciable Under Justice Kagan's Test From Her Dissenting Opinion In *Rucho v. Common Cause* 18

CONCLUSIONS OF LAW 19

I. SB1 Is An Egregious Partisan Gerrymander, In Violation Of Article II, Section 18 of the New Mexico Constitution 19

A. The Legislature Passed SB1 With Egregious Partisan Intent 22

B. SB1 Has An Egregious Partisan Effect 29

C. Defendants Could Not Possibly Justify SB1 42

II. This Court Should Promptly Order Briefing On Appropriate Remedy 44

CONCLUSION 44

Ct. at 2491, it also involved a companion challenge in *Benisek v. Lamone*, 348 F. Supp. 3d 493, 497–507 (D. Md. 2018), *vacated and remanded sub nom. Rucho*, 139 S. Ct. 2484, to Maryland's Sixth District in its 2011 congressional redistricting map, *Rucho*, 139 S. Ct. at 2493. Both in *Benisek* and here, the challengers alleged that the mapdrawers targeted a single district to flip it from Republican control to Democratic control. *Id.* at 2510–11 (Kagan, J., dissenting). Both in *Benisek* and here, the challengers presented candid statements from mapdrawers, revealing why they drew the map the way they did (although, notably, Plaintiffs were effectively denied discovery by Defendants and non-party Legislators, whereas the plaintiffs in *Benisek* received robust discovery, including depositions of the gerrymanders). *Id.* Both in *Benisek* and here, the challengers showed how the mapdrawers made substantial, partisan cracking and packing of voters not necessary to reach population equality. *Id.* And both in *Benisek* and here, there was an election under the challenged map where the Republican challenger lost by a narrow margin in a favorable Republican year. *See* Pls.Ex.30. But the evidence in this case is even more powerful because the *Benisek* plaintiffs relied only upon this evidence, whereas Plaintiffs here *have also* presented a sophisticated social-science analysis, comparing SB1 to one million simulated maps—the same of type of simulation evidence, from the same expert, which carried the day in *Harkenrider v. Hochul*, 197 N.E.3d 437, 453 (N.Y. 2022). So, if Maryland's Sixth District is an unconstitutional partisan gerrymander, as Justice Kagan concluded was clear under her own test, the conclusion is even more obvious here as to SB1.

C. The Legislature Creates SB1 By Taking The Committee's Most Favorable Map For Democrats—The Concept H Map—And Modifying It Into A Near-Perfect Partisan Gerrymander

20. After the Citizen Redistricting Committee submitted its three maps to the Democratic-controlled Legislature, the Legislature did not adopt any of them. *Compare* Pls.Ex.1, *with* Comm. Rep.30–40. Instead, Democrat legislative leadership took the Concept H Map—the map most favorable to Democrats—and adjusted it to be a near-perfect partisan gerrymander for their party. *See* Pls.Ex.2, at 4. That is, "the mapmakers took a map that was already favorably aligned toward Democrats," the Concept H Map, "and made it even more so[.]" Trende Rep.67–68. Further, legislative leadership blocked Republican legislators from their map-drawing process in all material respects, perfunctorily meeting with Republicans about redistricting yet refusing to incorporate any Republican input into the map ultimately proposed. Pls.Ex.8, ¶¶ 7–11; Pls.Ex.32, ¶¶ 7–11. The Legislature ultimately introduced its gerrymandered map as SB1; the Legislature passed the map with only Democrats voting in support, while one Democratic Representative, an independent Senator, and all present and voting Republican legislators voted against the map, *id.* ¶ 9; and the Governor signed it into law, *see* Pls.Ex.13; *see generally* Pls.Ex.14.

21. In a text-message conversation between the Center for Civic Policy and Defendant Senator and President of the Senate Mimi Stewart—who, along with other members of legislative leadership, was responsible for the redistricting process—reveals the Legislature's precise strategy. Pls.Ex.2, at 4. In this conversation, held during the drafting of SB1, Senator Stewart brags to a representative for Center for Civic Policy that "[w]e improved [the Concept H Map] and now have CD 2 at 53% dpi

Representative Herrell, that, "We are sorry we've sent her to DC. Our Redistricting session is offering a way out of her chaotic and divisive politics." Pls.Ex.17, at 1.

23. Senator Stewart's text messages and these other revealing statements from key legislators are entirely consistent with objective analyses about SB1's lines. The Legislature partisan gerrymandered SB1 for the Democrats by cracking the State's Southeastern region among the State's three congressional districts. Trende Rep.17, 31–43, 67–68. SB1 pushes District 1 and District 3 further into Southeastern New Mexico, while shifting District 2 substantially into the Central region, which region is the most populous and strongly favors Democrats. *Id.* at 17, 32. That is, with SB1, the Legislature made politically targeted changes to the prior congressional map, concentrated in the Southeastern and Central regions, *id.* 34–35, to "transform[ ]" District 2 "from one where Republicans would generally be favored into one where Democrats tend to win"—*without* making District 1 and District 3 "so much less Democratic that they might seriously threaten their incumbent Democrats" in the process, *id.* at 42. Simple partisan-composition calculations for each of the State's three districts under the 2011 Map and SB1—calculations prepared by one of Legislative Defendants' own experts Kimball Brace, and which are generally consistent with the analysis of Plaintiffs' expert, Mr. Trende—demonstrate the Legislature's near-perfect gerrymander with SB1. As Mr. Brace calculates, under the *prior* map, District 1 was 57.70% Democratic; District 2 was 44.75% Democratic; and District 3 was 58.25% Democratic. Brace Rep.52 (pdf page number). Then, under *SB1*, District 1 is 53.57% Democratic (a decrease of 4.13%); District 2 is 52.73%

Democratic (an increase of 7.98%); and District 3 is 55.97% Democratic (a decrease of 2.28%). *Id.* at 73 (pdf page number); *see also* Trende Rep.42 (calculating similar pattern); *accord* Sanderoff Rep.6 (calculating District 2 under SB1 as 53% Democratic, 47% Republican).

24. Specific, discernible changes that SB1 made to the prior map also reveal the Legislature's near-perfect gerrymander. While the 2020 census required only minor population adjustments to reapportion New Mexico's districts, "mapmakers substantially altered the map for the first time in decades," diluting Republican votes through cracking and packing. Trende Rep.26, 32, 50, 78.

25. SB1 shifted "more than twenty times the number of residents that had to be shifted to meet equal population requirements," *id.* at 33, from about 23,000 to 505,952, *id.* at 33, 36. District 1 shifted 166,485 residents to District 2, although District 1 was underpopulated. *Id.* at 33. District 3 gave 21,292 residents to District 2 and 122,222 residents to District 1, although it only had to give up 3,082 residents. *Id.* And while District 2 was only overpopulated by 8,181 residents, it lost over 195,000 residents, giving 55,518 residents to District 1 and 140,435 residents to District 3—although, again, District 3 had to lose population. *Id.*; *see also id.* at 34 (summarizing these changes in chart form). Unsurprisingly, the shifting of these residents was "not politically neutral." *Id.* at 35. The Legislature focused its cracking and packing in the Southeastern and Central regions—given that the former is highly Republican while the latter is highly Democratic—to pack a net "approximately 40,000 Democratic votes" into District 2 and flip District 2's partisan makeup. *Id.* at

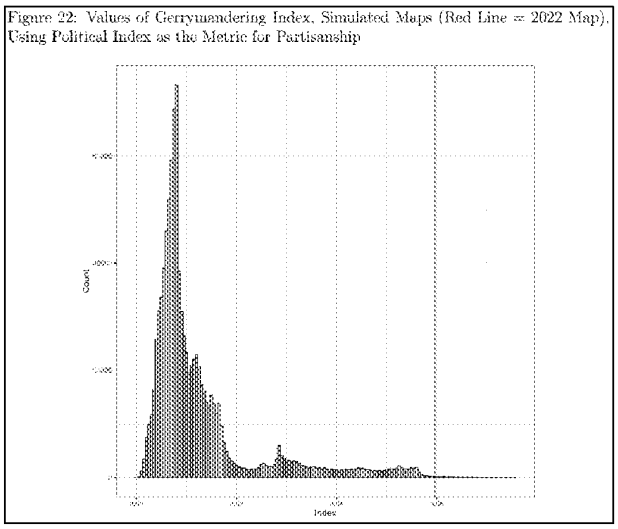
35–36 (relying on presidential-vote data); *see also id.* at 36–43 (reaching same conclusion after relying on an "index of [ten] elections," "party registration data," "actual vote results," and the "ten statewide races included in [the] index individually").

26. With respect to the Southeast region, SB1 deeply fractures it among the State's three districts, "for the first time in the state's history." *Id.* at 35. Thus, District 1 contains De Baca, Lincoln, and part of Otero and Chaves Counties; District 2 contains part of Otero, Chaves, Eddy, and Lea Counties; and District 3 contains Curry, Roosevelt, and part of Chaves, Eddy, and Lea counties. *Compare* Trende Rep.17 (listing counties in this region), *with* Pls.Ex.1.

27. SB1 splits a record number of counties and is not compact, given New Mexico's geography. Specifically, SB1 "splits nine" counties, which is "the most in New Mexico's history." Trende Rep.75–76. By "any metric" of compactness, "the districts produced [by SB1] are some of the least compact districts in New Mexico history." *Id.* at 76–77 (considering the Reock, Polsby-Popper, and Convex Hull metrics); *see also* Pls.Ex.18, at 2–3 (explaining how SB1 cracked the agricultural industry and the oil and gas Industry, which industries are longstanding communities of interest); Pls.Ex.7.

28. A sophisticated social-science analysis of SB1 performed by Plaintiffs' expert, Sean P. Trende, tells the same story. Mr. Trende randomly generated one million politically-neutral maps that adhere to New Mexico's redistricting criteria, but do not take partisanship into account. Trende Rep.43–44. Then, Mr. Trende

calculated the "gerrymandering index" for these one million maps, which index shows the expected percentage of Democratic vote shares across the maps from the most heavily Democratic district to the least. *Id.* at 44. The one-million map ensemble had an average gerrymandering index of around 1.3%, while SB1 had a gerrymandering index of 6.4%—meaning that it fell over four standard deviations away from the mean gerrymandering index of the million-map ensemble. *Id.* at 46. SB1 was more favorable for Democrats than 99.89% of the one-million ensemble maps (or 998,897 maps). *Id.* Given that extreme disparity between SB1 and the million-map ensemble, Mr. Trende concluded that "it is implausible, if not impossible, that [SB1] was drawn without a heavy reliance upon political data and was likely drawn to favor or disfavor a political party." *Id.* at 46–47.



Id. at 51 fig.19 (red line = SB1).

29. Mr. Trende's sophisticated social-science analysis is in accord with the independent analyses of SB1 conducted by various public-interest groups and news outlets. The Princeton Gerrymandering Project condemned SB1 as strongly favoring

splitting some counties for the first time in almost two centuries." *Id.* at 2519. As a result, the new Maryland Sixth District ended up "with 66,000 fewer Republican voters and 24,000 more Democratic ones," leaving Republicans "little or no chance to elect their preferred candidate" "[i]n what was once a party stronghold." *Id.* Further, despite this blatant gerrymander, there was one election under the new Sixth District map where the Republican challenger lost by a narrow margin in a favorable Republican year. *See* Pls.Ex.30 (49.7% to 48.2%, in the Democratic candidate's favor).

35. Justice Kagan concluded that Maryland's Sixth District map was an impermissible partisan gerrymander. As for the first element, Justice Kagan concluded that the Maryland mapmakers drew the Sixth District with the intent to entrench Democrats at the expense of Republicans. *Rucho,* 139 S. Ct. at 2517 (Kagan, J., dissenting); *see also id.* at 2510–11 (cataloging key statements from mapmakers). For the second element, Justice Kagan concluded that Sixth District had the intended entrenching effect, since the mapmakers "reconfigured the entire district" by cracking 66,000 Republicans out of the district and packing 24,000 Democrats into the district. *Id.* at 2518–19. Finally, for the third element, Justice Kagan "pass[ed] quickly over [it]" because Maryland did not "offer[ ] much of an alternative explanation for the evidence that the plaintiffs put forward." *Id.* at 2516 n.2.

36. Plaintiffs satisfy Justice Kagan's three-part test here. First, the Legislature drafted SB1 with the egregious partisan intent to entrench Democrats in District 2 at the expense of Republicans, just like mapdrawers in *Benisek*. *Infra* Part I.A. Second, SB1 has an egregious partisan effect, as it substantially dilutes

Republican votes in District 2 through packing and cracking, under both the qualitative- and sophisticated-social-science-analysis approaches described in Justice Kagan's *Rucho* dissent—making the case here stronger than that in *Benisek*, given that *Benisek* relied upon only qualitative data and was not a near-perfect gerrymander because that map still allowed Republicans to keep one congressional seat, although it would have been possible for Democrats to eliminate that seat as well. *Infra* Part I.B. Finally, Defendants cannot possibly carry their burden under the third element to justify their gerrymander, just like the defendants in *Benisek*. *Infra* Part I.C.

A. The Legislature Passed SB1 With Egregious Partisan Intent

37. Courts consider several factors when determining whether a mapdrawer has acted with impermissible intent to entrench their favored party in power, weighing both direct and circumstantial evidence of the mapdrawer's partisan intent for this element. *See Rucho*, 139 S. Ct. at 2520–21 (Kagan, J., dissenting); *see also, e.g.*, *Benisek v. Lamone,* 241 F. Supp. 3d 566, 575 (D. Md. 2017) ("[D]irect evidence, as well as circumstantial evidence, may be used to prove the element of intent."); *Harkenrider v. Hochul*, 197 N.E.3d 437, 452 (N.Y. 2022) ("Such invidious intent could be demonstrated directly or circumstantially[.]"). These factors include whether the "map-drawing process" itself was partisan, *see League of Women Voters of Ohio v. Ohio Redistricting Comm'n (LWV of Ohio)*, 192 N.E.3d 379, 410 (Ohio 2022), which may be demonstrated by, for example, "proof of a partisan process excluding participation by the minority party," *Harkenrider*, 197 N.E.3d at 452, "correspondence" and "contemporaneous statements" from mapdrawers, the "specific

Concept H Map had created. Trende Rep.67–69; *supra* pp.3, 11. The choices to retain or swap these precincts follow a partisan pattern: retaining a sufficient number of Democratic precincts from the Concept H Map districts in each SB1 district; swapping Democratic-leaning precincts from the Concept H Map's District 1 for Republican-leaning precincts in District 2, thus making the latter more Democratic; and swapping Democratic-leaning precincts from the Concept H Map's District 3 for Republican-leaning precincts in District 2, again making the latter more Democratic. Trende Rep.67–69.

44. *Second*, SB1's objective features further demonstrate that the Legislature acted with egregious partisan intent when enacting SB1. *E.g.*, *Rucho*, 139 S. Ct. at 2517–18 (Kagan, J., dissenting). The calculations from all three experts who did partisan-composition calculations in this case—experts from Plaintiffs and Legislative Defendants—demonstrate that SB1 is a near-perfect partisan gerrymander, given the partisan composition of each of the three districts that this map creates. *See supra* pp.13–14; *see also infra* Part I.B. Further, Mr. Trende conducted a statistical analysis of SB1 as compared to one million maps randomly generated by a computer without taking partisanship into account, and that analysis showed SB1 was more favorable for Democrats than 99.89% of the one-million ensemble maps (or 998,897 maps), meaning that "it is implausible, if not impossible, that [SB1] was drawn without a heavy reliance upon political data and was likely drawn to favor or disfavor a political party." Trende Rep.43–47; *supra* pp.15–16; *infra* Part I.B.

B. SB1 Has An Egregious Partisan Effect

47. The second prong of Justice Kagan's test considers the "effects" of the redistricting map alleged to be a partisan gerrymander, asking whether "the lines drawn in fact have the intended [partisan] effect by substantially diluting [the plaintiffs'] votes." *Rucho*, 139 S. Ct. at 2516 (Kagan, J., dissenting) (citation omitted). Two methods of proof may independently establish this effects element. *Id* at 2517–19.

48. First, plaintiffs can show that a map has impermissible partisan effects through just qualitative evidence, which evidence is "far simpler[,]but no less powerful" than the sophisticated social-science analysis. *Id.* at 2518–19; *infra* pp.29–30 (describing the sophisticated-social-science-analysis approach). Such qualitative evidence includes mapdrawers making "substantial" shifts in a district's "partisan composition" through cracking and packing that are unnecessary to reach population equality. *Rucho*, 139 S. Ct. at 2519, 2522 (Kagan, J., dissenting). And notably, the challengers to Maryland's Sixth District in *Benisek* only presented this kind of qualitative evidence to demonstrate that map's partisan effect, yet Justice Kagan still easily concluded that that map was an impermissible partisan gerrymander. *Id.* at 2518–19.

49. Second, plaintiffs can also establish a map's impermissible partisan effects with a sophisticated social-science analysis. *Id.* at 2517–18. Such evidence includes the "extreme outlier approach," which uses "advanced computing technology to randomly generate a large collection of districting plans that incorporate the State's physical and political geography and meet its declared districting criteria, *except for*

partisan gain." *Id.* at 2518 (considering this evidence as to the challenged North Carolina map). These simulated maps, "each with a partisan outcome attached to it," can then be "line[d] up . . . on a continuum—the most favorable to Republicans on one end, the most favorable to Democrats on the other," allowing the analyst to identify "the median outcome—that is, the outcome smack dab in the center—in a world with no partisan manipulation." *Id.* Next, the map is measured against this continuum, revealing "where the State's actual plan falls on the spectrum"—whether it is "at or near the median or way out on one of the tails." *Id.* This comparison establishes the partisan effects of a gerrymandered map, as "[t]he further out on the tail" that a map falls, "the more extreme the partisan distortion and the more significant the vote dilution." *Id.*; *see also Harkenrider*, 167 N.Y.S.3d at 664–67; *Adams v. DeWine*, 195 N.E.3d 74, 86–91 (Ohio 2022); *LVW of Pa.*, 178 A.3d at 770–75, 818–21.

50. SB1 has an egregious partisan effect since it substantially dilutes Republican votes in District 2 under both the qualitative- and sophisticated-social-science-analysis approaches described in Justice Kagan's *Rucho* dissent.

51. *a. Qualitative Evidence*. The qualitative data about SB1 alone suffices to establish that map's impermissible partisan effect, just as Justice Kagan concluded that this type of data was sufficient with respect to Maryland's Sixth District in *Benisek*. *Rucho*, 139 S. Ct. at 2518–19 (Kagan, J., dissenting).

52. *First*, the Legislature's balancing of the Democratic-party composition in each of the three districts created shows that it achieved a near-perfect gerrymander.

60. *b. Sophisticated Social-Science Analysis*. Sophisticated social-science analysis confirms that SB1 is an extreme partisan gerrymander, independently establishing SB1's impermissible partisan effects. *See* Trende Rep.43–75.

61. In his expert report, Mr. Trende used sophisticated social-science analyses to evaluate SB1. *Id.* at 17–22. This approach applies a state-of-the-art simulation methodology, which is both more current and more sophisticated than the earlier methodology that Justice Kagan had endorsed in her *Rucho* dissent. *See id.*; *Rucho*, 139 S. Ct. at 2517–18 (Kagan, J., dissenting). Mr. Trende randomly generated one million maps that "incorporate the State's physical and political geography and meet its declared districting criteria, except for partisan gain." *Rucho*, 139 S. Ct. at 2518 (Kagan, J., dissenting) (emphasis omitted); *see* Trende Rep.43–44. Mr. Trende then used the simulations to calculate the "gerrymandering index," showing the expected percentage of Democratic vote shares across the maps from the most heavily Democratic district to the least. Trende Rep.44. The ensemble of one million simulated maps has an average Gerrymandering Index of around 1.3%. *Id.* at 46. When Mr. Trende placed SB1 on this continuum, it fell on the far end of the distribution's tail, with a gerrymandering index of 6.4%—over four standard deviations from the mean. *Id.* Thus, it "was an out-out-out-outlier." *Rucho*, 139 S. Ct. at 2518 (Kagan, J., dissenting). SB1 is thus more favorable for Democrats than 99.89% of the one-million ensemble maps (or 998,897 maps). Trende Rep.46,

62. Further, because "New Mexico has a history of relatively small changes to its districts," Mr. Trende then performed "a second set of analyses," generating an

additional million simulated maps that only moved the precincts that the SB1 mapmakers also swapped between districts, while keeping the remaining precincts locked in place. *Id.* at 54–60. This, in essence, concedes "90% of the map . . . to the mapmaker." *Id.* at 54. This additional ensemble of simulations has an average Gerrymandering Index of 0.62%, while SB1 "is not on the tails, it is beyond them," with a Gerrymandering Index of at 2.95%—over seven standard deviations from the mean. *Id.* Mr. Trende's additional simulations only confirm that SB1 is "an extreme partisan gerrymander." *Id.* at 61–75.

63. None of Defendants' three experts offer any persuasive evidence to the contrary. *See* Brace Rep.; Sanderoff Rep.; Pls.Ex.6 (hereinafter "Chen Rep.").

64. Mr. Brace's report largely supports the qualitative analysis discussed above. As relevant here, Mr. Brace calculated a "State Composite Score" for each district under the prior map, the three maps proposed by the Citizen Redistricting Committee, and SB1, using data from statewide nonjudicial races. Brace Rep.6–9. Mr. Brace's statewide composite score for District 2 under the *prior* map is 44.75% Democratic versus 55.25% Republican. *Id.* at 51 (pdf page number). Then, his statewide composite score for District 2 under *SB1* is 52.73% Democratic versus 47.27% Republican. *Id.* at 73 (pdf page number). Although Mr. Brace concludes from this data that SB1's shift of composite scores in the Democrats' favor is "not overwhelming[ ]," such that SB1 is "not . . . an egregious gerrymander," *id.* at 6, he fails to grapple with just how different the shift from 44.75% Democratic (District 2 under the prior map) to 52.73% Democratic (District 2 under SB1) is in a State like

1

FIFTH JUDICIAL DISTRICT COURT
COUNTY OF LEA
STATE OF NEW MEXICO
NO. D-506-CV-2022-00041
REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA,
Plaintiffs,
vs.
MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of state, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representative,
Defendants.

DEPOSITION OF SEAN P. TRENDE
September 6, 2023
9:00 a.m.
VIA REMOTE VIDEOCONFERENCING

PURSUANT TO THE NEW MEXICO RULES OF CIVIL PROCEDURE this deposition was:
TAKEN BY: LUCAS M. WILLIAMS
ATTORNEY FOR THE DEFENDANTS

REPORTED BY: KAREN RODRIGUEZ, CCR #55
KMR Court Reporting, LLC
Post Office Box 11505
Albuquerque, New Mexico 87192

2

A P P E A R A N C E S

For the Plaintiffs:
MOLLY DiRAGO
Troutman Pepper
227 W Monroe Street
Suite 3900
Chicago, Illinois 60606
(312) 759-1926
molly.dirago@troutman.com
CARTER B. HARRISON
Harrison & Hart, LLC
924 Park Avenue, SW
Suite E
Albuquerque, New Mexico 87102
(505) 295-3261
carter@harrisonhartlaw.com
For the Defendants Michelle Lujan Grisham and Howie Morales:

HOLLY AGAJANIAN
KYLE DUFFY
The Governor's Office
490 Old Santa Fe Trail
Santa Fe, New Mexico 87501
(505) 476-2200
holly.agajanian@exec.nm.gov
kyle.duffy@exec.nm.gov
For the Defendants Mimi Stewart and Javier Martinez:
LUCAS M. WILLIAMS
ANN COX TRIPP
Hinkle, Hensley, Shanor & Martin, L.L.P.
400 Penn Plaza
Suite 700
Roswell, New Mexico 88202
(575) 622-6510
lwilliams@hinklelwfirm.com

3

SARA SANCHEZ
ABIGAIL PACE
Peifer, Hanson, Mullins & Baker PA
20 First Plaza, NW
Suite 725
Albuquerque, New Mexico 87102
(505) 247-4800
ssanchez@peiferlaw.com
apace@peiferlaw.com
Also Present:
JOWEI CHEN

I N D E X

PAGE
EXAMINATION OF SEAN P. TRENDE
By LUCAS M. WILLIAMS.....4
SIGNATURE/CORRECTION PAGE.....138
CERTIFICATE OF COMPLETION.....139

E X H I B I T S

FORMALLY MARKED/IDENTIFIED PAGE
1. Expert Report of Sean Trende.....18
2. July 5, 2023 Court Order of the NM Supreme Court.....20
3. August 25, 2023 Amended Court Order of the NM Supreme Court.....20
4. List of Work Product Produced by Plaintiffs' Counsel.....21
5. Two Files Produced by Plaintiffs' Counsel.....21
6. Code get_packages.R.....23
7. Code get_the_tiles.R.....23
8. Code 01 - get_data.R.....25
9. Code 02-methods.R.....25
10. Code 03-Part-6-1.R.....27
11. Code 04-Part-6-2.R.....28
12. Code 05-Part-6.4.R.....28
13. Code 06-Part-6-4b.R.....29
14. Code 07-Additional Figures.R.....29
15. Expert Report of Kimball Brace.....108
16. Expert Report of Brian Sanderoff.....77
17. Expert Report of Jowei Chen.....111
18. Federal Tax Lien.....128

4

SEAN P. TRENDE
after having been first duly sworn,
testified as follows:
EXAMINATION

BY MR. WILLIAMS:

Q. Good morning, Mr. Trende. My name is Lucas Williams. I'm an attorney with the Hinkle Law Firm. I represent the legislative defendants in this case. You and I have never met; is that correct?

A. That's right.

Q. All right. You've probably been deposed a few times. I've read a bunch of your depositions. How many times would you say you've been deposed, Mr. Trende?

A. Twenty.

Q. Twenty? So you know the ground rules. I'm going to ask you questions. I hope to get answers. I'm going to do my best to ask my question and then be quiet while you answer. I hope you will do me the same courtesy of not answering while I'm trying to ask you a question.

I ask remarkably poor questions. So when I do, feel free to stop me and let me know you don't understand, and I'll try to articulate something that is more clear.

If you answer my question, I'm going to assume you understood the question. If you need a break,

21

A. I'm not planning on it.
Q. Okay. All right. Mr. Trende, I want to go over with you briefly some of the materials that were provided by plaintiffs' counsel to us from you.
I am going to show on the screen what I am marking as Exhibit 4 to this deposition. Do you recognize that to be a tree structure containing the work product that was produced to us from plaintiffs' counsel?
MS. DIRAGO: Objection, form.
A. I would like to see the rest of it, but --
Q. (By Mr. Williams) All right. What do you mean, the rest of it?
A. Okay. So the second page was blank?
Q. Yeah. Well, it reflects that there were 10 directories with 72 files.
A. Yes. The tree structure doesn't extend to the second page. So yes, I do recognize that to be documents provided by counsel.
(Exhibit 4 identified.)
Q. (By Mr. Williams) All right. I'm going to show you what I'm marking as Exhibit 5 to the deposition, which is an additional two files that were produced to us on August 23rd.
(Exhibit 5 identified.)

22

Q. (By Mr. Williams) Do you recognize those two files?
A. Yes.
Q. All right. Are you aware, Mr. Trende, of a controversy that has arisen in this case regarding the defendants' request for the production of your maps that were utilized and referenced in your report and the plaintiffs not having produced them to us?
MS. DIRAGO: Objection, form.
A. No.
Q. (By Mr. Williams) Did you generate any maps as part of your expert report?
A. Yes.
Q. All right. Did you give those to plaintiffs' counsel?
A. I gave them as, I believe, I still have them, which is to say I don't.
Q. All right. So you generated maps, but you no longer have those maps?
A. I typically don't save the maps that I generate.
Q. When do you make the decision to destroy those maps?
A. Well, the maps aren't destroyed, and the shapefiles are never created. They are stored in an object in R. And when you turn off R, it goes away.

23

But because the code is created with the seed set in it, it should be replicable by plaintiffs' experts or defendants' experts. And since it would run in less than a day on my computer, it shouldn't be too burdensome to do so.
Q. Let's talk about the files that you sent to us. We'll work through that. I'm going to show you what I'm marking as Defendants' Exhibit 6. That is titled "get_packages.R."
(Exhibit 6 identified.)
Q. (By Mr. Williams) Do you see that?
A. Yes.
Q. And it appears that that code sets up the environment that you're going to be working in. Is that correct?
A. Yes.
Q. Does it do anything else?
A. No. There's a bunch of packages that I typically use or frequently use in R. So I just found it was simpler to create one script that I could reference on my E drive and always have most of what I wanted.
Q. I have put on the screen what I've marked as Exhibit 7, titled "get_the_tiles.R."
(Exhibit 7 identified.)
Q. (By Mr. Williams) Do you see that?

24

A. Yes.
Q. What is the purpose of this code, Mr. Trende?
A. So when I'm creating maps, I found that it is useful/looks nicer to have a background. And so this is a function that you can access in the R script that will obtain the tiles from OpenStreetMap at whatever level of zoom you want for the background of the maps.
Q. Did you write this code?
A. Parts of it.
Q. Okay. What parts of it didn't you write?
A. I've been using this script since working on the Virginia redistricting in 2021. So by this point, I don't know whose is whose. I know that the base approach for getting the tiles was taken from an internet site, and then I adapted it to make it more accessible and versatile.
Q. On line 65 of your code, you've chosen to use a user agent of Yutani's blog post. Do you see that?
A. I see that.
Q. Who is Yutani?
A. That would probably be the site that the code was taken from originally.
Q. So somewhere out there on the internet, there is a website written by somebody named Yutani, you think?
A. I don't know that, but I'm guessing that Yutani's

25

blog post is some type of an identifier for -- it's probably not a true name, for someone who wrote the code.

Q. So you copied this from somebody and just kept their name on it?

A. Well, I took the code from a website and certainly wouldn't claim it as my own, so yeah.

Q. All right. I'm going to show you what I've marked as Exhibit 8, which is named "01 -- get_data.R."

(Exhibit 8 identified.)

Q. (By Mr. Williams) Do you see this one?

A. Yes.

Q. All right. And the first line of that code contains the phrase or the command, set working director, "setwd." Do you see that?

A. Yes.

Q. And then it refers to a directory that is within your OneDrive account?

A. Yes.

Q. All right. So based on this document, all of your files related to the simulation would have been stored in your working directory; is that fair to say?

A. At least the documents that were produced from the "get_data" script.

Q. And would it be fair to characterize Exhibit 8 as

26

a collection of functions that assist you in making visualizations to use in your report?

A. No, not entirely.

Q. What else does it do?

A. Well, you've scrolled down to about line 114. So, actually, if you could, scroll up again, please, to page 2. Certainly page 1 makes visualizations.

That "make_dotplot_index" is a "ggplot." So yeah, I guess everything on page 2 that I can see makes plots. Lines 116 through 131 are functions for compactness metrics. And then it looks, from there, that it is data processing.

Q. Are you actually processing data there, or are you just aggregating data from files?

A. Well, we can use the more colloquial term of data munging. But yeah, it's putting the various data sources in a more usable format.

Q. All right. Let's look at what I'm marking as Exhibit 9. And what is the purpose of Exhibit 9, titled "02-methods.R"?

A. So it looks like the first chunk from roughly lines 4 to 54 generates a table entitled "toy_numbers," and it looks like the chunk from 59 to 70 generates a map of New Mexico's counties with the regions superimposed over it.

27

(Exhibit 9 identified.)

Q. (By Mr. Williams) And those are methods that you're using where?

A. So if I recall correctly, I tried to organize the code by following the Table of Contents in my report. So segment 5 in my report is called "Methods/Guiding Principles."

And so under that, if you go to page 15 of my report, you'll see a table, "Sample Redistricting in a Three-District State," which would be what is created in the first chunk. And if you go to -- oh, it looks like I didn't include that map, but it was for Section 5.4 where I talk about "Regions of New Mexico Utilized." That map was to be included there.

Q. All right.

A. Obviously, those regions get utilized throughout the report. So I still used the basic map from it.

Q. Let me look at what I've marked as Exhibit 10 to this, "03-Part-6-1.R."

(Exhibit 10 identified.)

Q. (By Mr. Williams) Do you see that?

A. Yes.

Q. What does this code do, Doctor? Or Mr. Trende? I assume you've not yet received your Ph.D. Is that correct?

28

A. That's right. My dissertation defense is September 25th. So we can bicker about whether I get called Dr. Trende at trial or not.

Q. Right.

A. But no, as of today, I have not defended my dissertation.

Q. And so, Mr. Trende, on Exhibit 10, what does this code do?

A. So this code would generate the illustrations used in part 6.1 of my report.

Q. All right. I'm putting up on the screen what I've marked as Exhibit 11, titled "04-Part-6-2.R."

(Exhibit 11 identified.)

Q. (By Mr. Williams) Do you see that?

A. I do.

Q. And what does this code do, Mr. Trende?

A. So this is meant to replicate the output for 6.2 of my report.

Q. All right. I'm going to show you what I've marked as Exhibit 12 to this deposition. It is titled "05-Part-6-4.R."

(Exhibit 12 identified.)

Q. (By Mr. Williams) Do you see that?

A. Yes.

Q. Now, this is the first place where you actually

29

begin to perform simulations; is that correct?
A. Correct.
Q. And these are the simulations that you reference in section -- or this is part of the simulations that you reflect in section 6.4 of your report; is that right?
A. Correct.
Q. I'm going to show you what I've marked as Exhibit 13 to this deposition, titled "06-Part-6-4b.R."
(Exhibit 13 marked.)
Q. (By Mr. Williams) Do you see this code?
A. Yes.
Q. And this is a continuing set of simulations that you have performed that are referenced underneath section 6.4; is that correct?
A. Correct.
Q. And finally, on Exhibit 14, which is titled "07-Additional Figures.R," what does this code do?
A. I believe this creates the output for part 7 of my report, "Additional Considerations."
(Exhibit 14 identified.)
Q. (By Mr. Williams) All right. I want to talk to you a little bit, Doctor, about how you wrote this report. While I'm doing that, let's pull your report up here. I am looking at Exhibit 1.3, which is lower case

30

Roman Numeral ii, your Table of Contents. Do you see that on the screen?
A. Yes.
Q. All right. How long did it take you to author this report?
A. 50 to 60 hours total. By "authoring the report," do you mean writing the actual report or doing the analysis and writing the report?
Q. Well, yes, let's start with the whole kit and caboodle. I want to understand it from the beginning to the end, Mr. Trende.
So did you start to write the report first, or did you perform your simulations first?
A. I'm sure I did at least some of the coding first.
Q. Okay. What portion of the coding do you believe you would have performed prior to authoring any of the text of your report?
A. I don't remember.
Q. Well, let's break this down. It looks to me like there are two different components to your work, Mr. Trende, and tell me if you agree with this. There is the simulation portion of your work and the non-simulation portion of your work. Would that be fair?
A. Yeah, we can break it down that way.

31

Q. Did you perform the simulation work before or after that portion of your code which precedes the 6.4 section?
A. I would have done the simulations, at least some version of the simulations, first.
Q. What do you mean by "some version of the simulations"?
A. Well, typically, when I do simulation code, I run it with a very low number of simulations so it will, you know, produce the output. You know, a thousand simulations produces the output in, like, five seconds. So that's how I make sure the code works and get a sense of whether I have something sensible, a basic report of where things will likely come down, because the simulations don't change all that much as you increase the number of maps that you draw. So I would have done that first.
But as to how far I went with it, I mean, I know that I did some simulations towards the end. You always get ideas as you go through. So it is kind of mixed up, but I definitely would have started writing the simulation code before I started the report.
Q. I'm going to show you, again, what I've marked as Exhibit 4.1. Let's look at these files that are listed. I'm going to highlight these starting at 01 through 07.

32

Do you see that?
A. Yes.
Q. All right. Would you have written -- I'm just going to refer to these by their number that you have put on their file names. So this would be file 01 through file 07. If I say that, do you understand what I'm talking about, Mr. Trende?
A. Yes.
Q. All right. Would you have written file 01 before 02, 03, 04, 05, 06 and 07?
A. No.
Q. All right. When would you have written file 01?
A. So file 01 and 02 were originally part of what probably would have been file 05 and were split off as the file became unwieldy.
Q. And when would that have occurred?
A. I don't know.
Q. Would it have happened as part of this project?
A. Oh, yeah.
Q. Okay. So at some point, you decide that 01 and 02, which formerly were part of 05, need to be broken out in to their own files?
A. That's right. You can hash tag a line in R, and it won't run. But then your code just looks really ugly, and if you want to produce it, you have to take

33

all the hash tags out.
You don't want to run it with no hash tags, because then every time you run the script, it's going to reproduce the data you've already created, which could take some time. So it's a useful way for me to do it, and it's certainly a kinder way to produce it to your experts.
Q. And to make sure that I understand -- I'm going to make this a little larger. The one that we have talked about previously contains some support functions for making graphics; is that correct?
A. Yes.
Q. And then it imported those two files that we talked about earlier; is that right?
A. That's right.
Q. And then it did, I think you described it as, data munging?
A. Yeah.
Q. All right. So you would not run this code repeatedly; is that right?
A. I would not want to, that's for sure. I'm not saying I didn't actually do it a few times before I realized, "Let's take this out." But yeah, that's why this file exists.
Q. Sure.

34

A. I started getting productions in litigation from Dr. Imai from Harvard, and he always did this, and I appreciated it. And so it just seemed a much more humane way to organize data and produce it.
Q. Okay. So then, to make sure that I understand, you would load file 01, and you would run that code; is that correct?
A. Correct. The files should be run sequentially.
Q. But as I appreciate it, you would run file 01 and 02 once, so that you would load the data once, and then you would iterate over it with different versions of your simulations. Is that correct?
A. Correct.
Q. All right. And let me get back to the most important ones. All right. So you would run 01 and 02. And then is any part of part 03 dependent upon parts 01 or 02?
A. It's been a while since I looked at the code, but I assume so. The idea is to run the chunks sequentially.
Q. Right. Is any part of part 05 dependent upon part 03?
A. I don't know. But I do know that the code should run if you run it sequentially.
Q. If I am understanding your earlier testimony,

35

Doctor, parts 03 and 04 were used to draw graphics for those relative sections of your report. Is that correct?
A. That's right.
Q. Is there anything that would be dependent upon your simulation code that is in parts 05 and 06 that would be dependent upon those graphics that you generated in 6.1 and 6.2?
A. I would have to look at the code to be sure, but I don't think so, because the regions, I think, are defined in the earlier shapefiles in 6.1. That's the only thing I can think of you might need to load for other parts of the report.
Q. Okay. I have put Exhibit 12 back up on the screen. Do you recognize that to be the part 6.4 that you provided to your counsel?
A. Yes.
Q. Okay. And I noticed there are some typos in here; for example, "Simultated Maps." Do you see that?
A. Yes.
Q. And I noticed that did not make it into your report with that typo. Is that correct?
A. Let me see. Oh, yeah, you're right, it does not.
Q. All right. So how did that get corrected between this source code, Mr. Trende, and your report?

36

A. Can you go back to part 01 of my code?
Q. Sure. Bear with me.
A. And then scroll up, please. Stop, please. Well, no, that is not it. Can you scroll up more, please.
Q. Sure.
A. Okay. Well, when I ran it the last -- the titles that are included in the report are not generated in R. They're generated as part of the LaTeX software. So those are generated independently.
And when I created these images myself, I hash tagged out the title line in the functions that made the map. I must have unhash-tagged them so that, when Dr. Chen or whomever ran the code, they would be able to match the output file with the document in the report.
Q. All right. So other than having -- you said "unhash-tagging." Another way of describing that would be "uncommenting." Would that be fair?
A. Sure. I mean, I turned the title command in the script into a comment so that it won't run.
Q. Correct. So other than having given us code that does not reflect having commented out this particular line, is there anything else that's been changed on the code that you've presented to us?
A. Not that I remember, but I wouldn't have remembered that title thing until we went over it.

37

Q. I'm going to show you what I've marked previously as Exhibit 13, which is the Part-6-4b. Do you see that?
A. Yes.
Q. I notice that at line 65 of that exhibit it also contains the word "Simultated." Is that another example of the code having been changed to generate your report as opposed to what was provided to us in plaintiffs' production?
A. That's an example of where the titles were generated in the LaTeX software, not in the actual report.
Q. So then would this line have been commented out in what you ran to generate your report?
A. No. I would have commented it in Figure 1. There is a line -- I don't know if I used "labs" or "ggtitle," but I would have commented that out so that whenever you accessed a figure, it would not have produced the title, since the title was being generated in LaTeX, Overleaf.
Q. You say LaTeX, not LaTeX?
A. Gosh, I've heard it pronounced both ways.
Q. GIF or GIF, which one is it?
A. It's GIF with a hard "G." It's like Elbridge Gerry pronounced his name Gerry, but I'm not going to call it a gerrymander.

38

Q. Gotcha. So the code that we have here is the code that you ran to generate your simulations; however, portions of this code would not have ultimately been expressed based on commenting that you performed on a slightly later version of this code; would that be fair?
A. It probably would have been an earlier version of the code. And then, when I produced it, I took the hash tags out so that it would create titles for you to reference the titles in the report.
Q. Okay.
A. Otherwise, you were just going to get a bunch of blank maps, which wouldn't be helpful.
Q. Sure. So other than commenting out these sorts of labels, is there anything different with the code that we were provided by plaintiffs' counsel than what generated the simulations for your report?
A. As I said before, I wouldn't have remembered this if we had not gone over it. So there might be other things, but not that I can think of as I sit here.
Q. You didn't make any conscious decisions to change anything; is that correct?
A. It's the same answer. I wouldn't have remembered this as a conscious decision until we went over it. So I don't think so.
Q. Let's look at your report, Doctor -- or

39

Mr. Trende. I'm going to promote you to a Ph.D. a little early.
Let me back up. Exhibit 12, this is the 6-4, the first simulation. Did you write all of the code that is within this file?
A. You know, that is always a tricky question, because code gets reused and you get ideas from the -- for example, I know that the basic idea of the simulation code is taken from a vignette that Dr. -- basically, it's the instruction manual that Drs. Imai and McCartan -- I think Cory is a Ph.D. now -- that they provide online, but it was certainly put together by me.
Q. Have you done any sort of testing of your code to verify that it produces accurate and reproducible results?
A. It should. It should run. I would have run it through to create the report. So I can't see how it wouldn't.
Q. All right. So this is my question, Mr. Trende, have you done any sort of testing of your code to verify that it produces accurate and reproducible results?
A. Well, for reproducible, the fact that there is a seed included should make it reproducible. For accurate, you know, it ran through without crashing for me. And I'm sure I did some defensibility checks as I

40

went through, looking at things. But I don't really know exactly what you're getting at, other than that, with this question.
Q. Do you understand what software testing is?
A. Making sure that it doesn't glitch, trying to break it by putting in absurd results, things of that nature. But I've used the core of this code so many times in so many different circumstances, that I have no reason to doubt that it works and produces accurate results.
Q. And to be fair, I don't think that is quite what you testified to. I believe you testified that you modified this code for the first time during this engagement by pairing out parts 01 and 02 from part 05. Is that correct?
A. Well, correct.
Q. So in at least that way, it's different than you've ever used it before; is that right?
A. Right. And that's why I say that I don't understand exactly what you're getting at, because I know that the code works and I've used parts of the code in various scenarios and environments. So I mean, it's been used again and again and again, parts of it. This particular application, it ran through and worked. So I don't see any reason why it wouldn't work this time.

41

Q. Okay. I want to point you to your expert report. I want to walk through portions of this. All right. On page 9 of your report, Exhibit 1.13, you discuss -- I believe this is section 5.1 where you're talking about Justice Kagan's opinion. Do you see that?
A. Yes.
Q. All right. I'm going to highlight the first full paragraph on page 9, Exhibit 1.13, that begins, "As discussed in more detail below..." Do you see that?
A. Yes.
Q. All right. You represent that in Rucho, there is a total of 24,518 total maps, while your report offers several million maps for analysis using more sophisticated techniques. Do you see that?
A. Yes.
Q. Is there something deficient in using the 24,518 maps as opposed to the several million maps for analysis that you reference here?
A. A bigger sample size is always useful for you, but I don't think there's necessarily anything wrong with 24,518.
Q. I'm looking at page 48 of your report, Exhibit 1.52. Do you see that?
A. Yes.
Q. You have a sentence that says "In short, you

42

cannot plot 3 million dots on a 8.5 by 11 inch page without a significant amount of overplotting." Do you see that?
A. Yes.
Q. Is that 3 million dots that is referenced there -- first, does that reflect maps that were generated by your software?
A. So each dot is a district from a map, is a representation of a district from a map.
Q. So when you say "3 million dots," that would be 1 million maps?
A. Correct.
Q. Okay. So at page 48, Exhibit 1.52, you're referencing again the 1 million maps that you say that you did in this project?
A. That's right.
Q. On page 1.82, your report page number 78, there is a sentence that reflects "Across millions of maps, under multiple assumptions and scenarios, the Enacted Map presents as an extreme outlier." Is that sentence part of your report?
A. Yes.
Q. And with this sentence, you're hoping to communicate to the Court that SB-1 is an extreme outlier as compared to the millions of maps you generated in

43

this simulation?
A. Yes.
Q. All right. Okay. Let's look at section 6.4.1, titled "Baseline Simulations." I'm going to go to your report page number 44, exhibit page 1.48. Is that correct? Do you see that?
A. Huh-huh.
Q. All right. I'm going to highlight the sentence that begins on the prior page, "After unifying the data at the precinct level, I instructed the simulation to create 1,000,000 sets of three reasonably compacted districts, which respect county subdivisions." Does that reflect the code that you produced to us?
A. It should, unless I changed the n_sims after I wrote the report, to check something, and never changed it back. But yeah, if you look at the histogram on page 46, that has the counts of maps. I mean, that is going to hit a million pretty quick when you're going over 40,000 in those bars every time. So yeah, it was a million maps.
Q. Let's look at your source code, Doctor. So I am looking at Exhibit 12, which is your part 05, which is the first simulation. Do you see that?
A. Huh-huh.
Q. Let's look at line 2. I've highlighted that.

44

What number do you see there being assigned to n_sims?
A. That's 100,000.
Q. Is 100,000 a million?
A. No.
Q. So the code that you sent us, does it generate a million maps?
A. If a competent computer programmer changes 100,000 to a million, it will, but not run in its raw form, no.
Q. Do you think a competent expert would produce monkey code?
MS. DIRAGO: Objection.
A. I don't know what monkey code is, but it appears that I changed it from a million to 100,000 for some purpose and didn't change it back for you. It's obvious, from the histograms in the report, that it was a million maps.
Q. (By Mr. Williams) Well, do you have those maps so that we can verify that?
A. No.
Q. Could you have saved those maps, Mr. Trende?
A. Not the maps themselves. You can save the block assignment files for them.
Q. Well, let's walk through your code and discuss the choices you made about this. I am looking at line 4

45

of Exhibit 12. Do you see that?
A. Yes.
Q. Can you describe to me what line 4 of your code does?
A. It creates the map file that is used to generate the simulation software.
Q. All right. What does line 5 of your code do?
A. That runs the simulation.
Q. So line 5 would output the results of the simulation into a variable called "results." Is that correct?
A. Correct.
Q. And it would be somewhat trivial, would it not, to convert that object "results" into a matrix or a table? Is that right?
A. Right. You can turn it into a matrix, although it would be a, depending which way you put it, 1 million by 2,200 matrix, but yeah.
Q. And in fact, you have code that, in part, does that at line 7; is that right?
A. That's correct.
Q. And you could take the matrix and save that to a CSV file; is that correct?
A. That's correct.
Q. And do you know how to do that?

46

A. I guess you would do "save_csv," whatever you want to call it and then "get_plans_matrix(results)."
Q. So between line 5, which when executed creates some number of maps, and when you turned off your computer or turned off your R environment, those maps existed; correct?
A. A file that contains the assignments for the maps existed, not the maps themselves.
Q. Well, the data that would be used to generate the maps; is that correct?
A. Correct.
Q. The output of your simulations; is that correct?
A. Correct.
Q. Which you refer to repeatedly in your expert report as "the maps." Is that correct?
A. Correct.
Q. All right. So that existed after the execution of line 5, and you chose not to save that output; is that correct?
A. That's correct. That's typically how this stuff has been produced in cases I've been involved in. And so I didn't save it. I just ran it this last time and reported the output.
Q. All right. Let's look at line 177 of that same source code. Do you see that there?

47

A. Yes.
Q. All right. That line of code says set.seed(8675309)." Did you choose that seed or did somebody else choose that seed for you?
A. I think one of my professors used that seed in code once, and I thought it was funny. So I will use that, or sometimes I'll do the date. It doesn't matter what seed you choose. That's a reference to a Tommy Tutone song.
Q. I am old enough to be familiar with it. All right. And the very next line, 178, again, sets up a simulation; is that correct?
A. Correct.
Q. And then line 179 runs that simulation; correct?
A. Correct.
Q. And in line 179, it uses the same variable, "n_sims." Do you see that?
A. Correct.
Q. Which, as we know, is 100,000. Is that right?
A. Unless your competent coding expert realizes it's producing 100,000 and changes it to a million, but yes, running the code straight through, it would be 100,000 maps.
Q. Mr. Trende, I am taken aback somewhat by your notion that someone else should fix the code that you

48

produced to us. Why should anybody other than you, Sean P. Trende, have to fix the code you produced?
MS. DIRAGO: Objection.
MR. WILLIAMS: You can answer the question, Mr. Trende.
A. Well, because, presumably, your expert will want to see and reproduce the maps that were created and, noticing that n_sims is 100,000, would realize that to replicate that would be set to a million and would do so, perhaps --
Q. Do you think it would be reasonable --
A. Can I finish my answer?
Q. Sure.
A. -- perhaps sending a clarification through counsel, "Hey, was this supposed to be a million?"
Q. Mr. Trende, you understood that, when you produced this, you were supposed to produce what you used to generate your report; is that right?
MS. DIRAGO: Objection.
Q. (By Mr. Williams) Is that right?
A. When I produced this, I produced the code from my report. There is, obviously, something that was changed at some point after the fact for some purpose that I didn't change back.
Q. And definitionally, this is not the code that you

49

used to generate your report; correct?
A. Definitionally, it has an easily correctable mistake in it.
Q. Are there any other mistakes in this code that you're aware of, Mr. Trende, that you changed after you generated your report?
A. Well, as I said before, I wouldn't have thought of this one until we went over it or the fact that the titles produce in this but not in my report. So I don't know, but I don't think so.
Q. So based upon the code that you produced to us or that you produced to your counsel and they produced to us, if I run this code, I will not get the results that you did in your report; is that correct?
A. If you run this code, you will get 100,000 maps, not the million from the report.
Q. Yeah, but we don't know that there was a million, because you didn't save them; is that correct?
A. Well, we know there's a million because you can look at the histograms and see it was a million, unless you're trying to suggest that I made up the histograms. But yeah, we know there's a million just as much as we would know there was 100,000 if we ran this through.
Q. I want to talk to you about line 177, Doctor, "set.seed(8675309)." Do you see that?

50

A. Yes.
Q. What is the purpose of setting the seed to 8675309 at line 177?
A. 8675309 would set it up so that it would make the same random choices every time you ran the code through.
Q. Do you know how a pseudorandom number generator works?
A. Oh, gosh, I used to before. I think it is set off of the time on your computer's clock and there's some algorithm it goes through for making the transformation necessary. I learned that one, like, six years ago and have since dumped it. I just know that if you put in "set.seed," it will produce the same random choices as you run the code every time.
Q. And I believe you testified earlier, Mr. Trende, that you were conversant with R, including its base packages. Is that correct?
A. That's correct.
Q. And is "set.seed" within the base packages of R?
A. I believe so.
Q. Okay. Is it your understanding that when you set the seed to any explicit value, you will then get a random distribution of numbers in a reproducible way? Is that fair?
A. Right. That's the point, is that now every time you run through your code, every random choice is going to produce the same value.
Q. What is your understanding of the scoping of the set.seed operator in R?
A. I don't understand your question.
Q. Well, I see that you set the seed at line 177. Do you see that?
A. Yes.
Q. Immediately before performing a simulation; is that correct?
A. That's right.
Q. Well, let's look up here at lines 1 through 5 of this same code where you purport to perform another 100,000 simulations. Do you see that?
A. It was a million simulations, but yes, the number there says "100,000."
Q. Do you see those lines?
A. I do see those lines.
Q. What was the seed for that simulation?
A. 8675309.
Q. How do you know that, Mr. Trende?
A. Because it was in part 2 of the code.
Q. Well, let's get back to my question about scoping, Mr. Trende. What is the scoping of the set.seed operator in R?

51

52

A. If you run the code through like I suggested, the first time you set the seed, it sets the seed and it will reproduce every time you run it through. So --
Q. And I believe you testified -- go ahead.
A. So the code is meant to be run in order.
Q. I believe you told me earlier in your deposition that you would run files 01 and 02; is that correct?
A. Yes.
Q. And then you would not want to run them again, and you would perform iterative simulations; is that correct?
A. Every time I was writing code and running it, I wouldn't want to reproduce the data every single time or produce maps. But when you're running it through for the final part, you definitely want to run them in order, in part, because the set.seed at the top of the script.
Q. And did you save your work history so that we could verify how you ran these, Mr. Trende?
A. Oh, no. You have my sworn testimony.
Q. Okay. So we don't know how you ran this. Did you run it using the interactive prompt on your RStudio?
A. I would have run it from the script window.
Q. All right. So you would have launched the first code and then run the second code and then the third,

53

all the way through the seventh; is that correct?
A. That's right, with the titles hash tagged out, because I produced these titleless documents when I put this in to LaTex.
Q. Was there any interaction on your part while that code was running?
A. Can you rephrase that question?
Q. Were you interacting with the scripting environment in any way while you were running that code?
A. I don't believe so.
Q. Is there any portion of the code that you produced to us that does nothing?
A. No, I don't know if anything is commented out. It wouldn't do anything.
Q. Well, let's look at line 7 of this code. Do you see line 7 on the screen there?
A. Yes.
Q. What does that code do, Mr. Trende?
A. It tells you how many of the plans are duplicated.
Q. All right. And in what way does it tell you how many of the plans are duplicated?
A. It goes through the block assignment files and looks for columns with identical output.
Q. Columns or rows?

54

A. Columns. That's why you have to do the transpose.
Q. Okay. And how would it report that information to you, Mr. Trende?
A. It would print it out.
Q. In the interactive console?
A. Yeah, that's where it would be printed.
Q. All right. Do you do anything with that information?
A. Not really. If it duplicated, like, 999,000 maps, you might have a problem. But I think the duplication rate here is way lower than that.
Q. How many were duplicated, Mr. Trende?
A. Fewer than half, I think.
Q. Fewer than half a million?
A. Fewer than half of the maps. So half a million.
Q. Okay. So when you were talking about millions of simulated maps, it's really more like about half a million?
A. No, because whenever you do these -- I mean, Dr. Chen's maps have duplicates, too. Whenever you do these, you're sampling with replacement. So just like if you were to sample heights of US males, you would get a bunch of numbers around 5-11, 6 foot, whatever, and then fewer and fewer out on the tails.

55

It's the same thing with these maps. When you add constraints to them, there are certain ways that the simulation enjoys drawing them, and so you'll get duplicates. That is part of the reason you wouldn't do an ensemble of, like, 500, the way you might do a traditional poll.
Q. In any of your other expert work using ensemble analysis, Mr. Trende, have you ever experienced duplicates in the amount of half of your dataset?
A. Oh, I don't know about that. Duplicates happen all the time.
Q. Have you ever experienced a 50 percent duplicate rate?
A. Like I said, I don't know. I do know that duplicates are common, both in mine and Dr. Chen's work. So it doesn't bother me, unless it gets extreme to where you end up having, like, 20 maps.
Q. What is a confidence interval in a statistical analysis?
A. A confidence interval is a measure of, if you repeated the experiment, what percentage of the time the true value would be contained within that interval. Or I guess I'm explaining more of what a p-value is.
You have a certain alpha that you set, which is your tolerance for false positives or for errors, and

56

it's a measurement -- assuming you choose 0.05 as your alpha, which is typically what is chosen, it means that, if you repeated the experiment a hundred times, 95 percent of the time your confident interval would contain the true value.
Q. What is the confidence interval using the simulation methods you have employed in this case for developing three congressional districts?
A. I don't know.
Q. Do you think it would require a sample size of less than a million maps?
A. Oh, I'm sure you could do it with fewer than a million maps. But you know, when you have a million draws and over a half million unique draws, you get a pretty good sense of what the sample is. I'm not sure of any statistical metric that suggests you need more than that.
Q. Are you aware of any statistical metric that suggests you need a million maps?
A. Oh, as I've said, I don't know if you need a million maps. But whenever you're increasing your N, it's good. You get a better sense of what the distribution really looks like.
Q. If you had selected a half million maps, Mr. Trende, would it have made any difference as opposed

69

Control and Beautification Act is?
A. I would assume it's to protect New Mexico's scenic areas from being overrun with trash and having billboards put up all over the place and things of that nature, but I don't know.
Q. Would it be fair to say that you have told the Court in this case that map drawers need to respect the trash routes that the Tourism Board is using under the Litter Control and Beautification Act? Is that right?
A. No.
Q. Okay.
A. I don't see anything there about trash routes. I see regions of the state that are tourism districts that the legislature has apparently used to divvy up the state. I didn't realize that there was statutory definition. So that is helpful. But I don't see anything in here about trash routes.
Q. Do you know when this statute was enacted?
A. It looks like it's part of the Annotated Code from 1978.
Q. Let me highlight this part for you. Do you see where it says "Effective 2017"?
A. Yes.
Q. All right. And we'll go down here. And prior to 2017, 2001 was the last iteration of that statute. Do

70

you see that?
A. I guess. I see 1985 is the first one, but I don't know how to -- I mean --
Q. 2017.
A. I see that.
Q. And then before that, we have laws, 2001, Chapter 140, Section 1, effective April 2nd, 2001. Do you see that?
A. I do see that.
Q. All right. Would it surprise you to know that in that compilation, the districts did not exist?
A. It would not, because I don't know one way or the other. The point is just to find an official grouping of counties in the state that presumably reflect some understanding of what regions in New Mexico are, so that we can have a common ground for discussion.
Q. When you were selecting those regions for respect in your report, did you study those regions, Mr. Trende?
A. I looked at them, for sure.
Q. As it relates to the northeast and southeast regions, why is Curry County separated from Quay County?
A. I don't know.
Q. As it relates to the central and southeast regions, why is Torrance County separated from Lincoln County?

71

A. I don't know.
Q. As it relates to the northeast region, what is the unifying principle behind placing Union County and San Miguel County in the same region?
A. I don't know.
Q. Do you know if Union County and San Miguel County have similar economies?
A. I don't.
Q. Do you know if they have similar populations?
A. No. And that's the whole point of finding a definition that has been used by a government agency which presumably knows the commonalities and structure of the state's economy and tourism and the like better than I do.
Q. And so it's your expert testimony today that it's more important for you to rely upon the Litter Control and Beautification Act to decide what the regions of New Mexico are than to actually do any sort of independent work to figure that out?
A. Well, it certainly seems more reasonable to rely on the legislature's definition of regional tourism districts than my own understanding of the state's geography.
Q. Do you know if those regional tourism districts have any relationship whatsoever with political or

72

physical geographies?
A. Certainly, physical geography, since they are roughly -- at least for three of the geographic quadrants of the state, and it looks like the northeastern one follows the mountain range in North Central New Mexico.
But other than that, the whole point is that presumably the legislature understands New Mexico's regions better than I do. And it seems like they do since those are the boundaries that are frequently respected by the map drawers.
Q. Let's look at page 47 of your expert report, Exhibit 1.51. Tell me when you get to that page, Mr. Trende.
A. I'm there.
Q. All right. The third full paragraph on the page, do you see that paragraph?
A. Yes.
Q. What are the 50,000 simulated maps referenced in your report right there?
A. That should be a million. That is a typo. I think. Let's see where we are in the overall report. Yeah, that should be a million.
Q. Not 100,000?
A. Definitely not 100,000.

73

Q. Now we've got two independent typographical errors that don't agree with the million?
A. Yeah. You can see a million, again, from the histogram.
Q. Let's look at page 14 of your report, Mr. Trende. That would be Exhibit 1.18. Are you on that page?
A. Yes.
Q. The paragraph beginning with "Thus, the best-case scenario for a gerrymanderer..." Do you see that?
A. Yes.
Q. "Thus, the best case scenario for a gerrymanderer would be drawing three districts that President Biden won by around 11 points." That is referring to the three congressional districts in New Mexico; is that right?
A. Yes.
Q. The next sentence -- or actually, the third sentence in that paragraph reads, "Democrats would be favored in such districts; Republicans currently occupy only five districts with a PVI of D+3 or more." Is that correct?
A. Correct.
Q. What are the districts you're referring to there in your expert report?
A. I think it's New York's Fourth District,

74

California's -- the district occupied by Valadao, the district occupied by Garcia, whoever won the Thirteenth District, and then there's one more I'm blanking on, which I think is in New York as well, because I think they're all in New York or California.
Q. So that sentence is not meant to reflect districts in New Mexico? Someone is supposed to intuit that that is about districts all over the nation?
A. I mean, yeah. There's only three districts in New Mexico.
Q. Well, I agree there's only three districts in New Mexico. When you generated your report, Mr. Trende, did you cut and paste portions of your report from prior reports that you had drafted?
A. Yes.
Q. All right. What portions of your report were cut and pasted from prior reports?
A. Well, I reused the background. There is no use charging a client again and again and again to give my resume.
I would have cut and pasted some of the explanation of the simulations and how they work. That's probably where the 50,000 number came from, as, you know, just framework of how to explain things. But I think that is it.

75

Q. Let's look at page 31 of your report, Exhibit 1.35. Tell me when you get there.
A. Okay.
Q. Below the figure, you write "In other words, New Mexico's lines have been more-or-less stable over the course of the past three redistricting cycles." Do you see that?
A. Yes.
Q. Who was drawing congressional maps in the past three redistricting cycles in New Mexico?
A. Well, in 2010, you would have had a Republican governor with a democratic legislature. So I believe that was done by a court.
In 2002, you would have had Governor Johnson, and I don't know if -- I am confident Republicans didn't control the entire legislature, but I don't know if they had one house or the other, probably not. So either that was a compromised map or a Court map.
And then, in 1992, I think you would have had King as the governor. So you would have had complete control by the Democrats. So I would imagine that was the Democrats. I'm not sure, though.
Q. Is there any difference between political redistricting by a legislature as opposed to a court?
A. No. Politicians are much more likely to

76

gerrymander in their favor than a court.
Q. Do you know how New Mexico's courts go about political redistricting?
A. It looks, from these maps, if I'm right about them being court drawn, that they drew these changes maps.
Q. Have you read the Maestas versus Hall case in New Mexico?
A. I have not.
Q. Okay. Do you know whether any of the judicially-drawn maps were done so to provide a regional basis for the state's districts?
A. Regardless of whether they were done for that purpose or not, they did.
Q. Do you know whether either of those judicially-created maps were drawn to provide a regional basis for the state's districts?
A. I don't know. But regardless of whether they were drawn for that purpose or not, they did.
Q. And the districts that you are using are the Litter Control and Beautification Act districts; is that right?
A. They're the regional tourism districts established by the legislature, apparently part of a statewide beautification act, yes.

141

FIFTH JUDICIAL DISTRICT COURT
COUNTY OF LEA
STATE OF NEW MEXICO
NO: D-506-CV-2022-00041

REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA,
Plaintiffs,
vs.
MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representatives,
Defendants.

VOLUME II
CONTINUATION OF THE REMOTE DEPOSITION OF
SEAN P. TRENDE
September 13, 2022
1:04 p.m. Mountain Time

PURSUANT TO THE NEW MEXICO RULES OF CIVIL PROCEDURE, this deposition was:

TAKEN BY: LUCAS M. WILLIAMS
ATTORNEY FOR DEFENDANTS MIMI STEWART and JAVIER MARTINEZ

142

REPORTED BY: SUSAN L. FINDLEY
New Mexico CCR #77
KMR Court Reporting, LLC
Post Office Box 11505
Albuquerque, New Mexico 87192

A P P E A R A N C E S

For the Plaintiffs:
MOLLY S. DiRAGO
TROUTMAN PEPPER
227 West Monroe Street, Suite 3900
Chicago, Illinois 60606
(312)759-1926
molly.dirago@troutman.com

For the Defendants Mimi Stewart and Javier Martinez:
LUCAS M. WILLIAMS
RICHARD E. OLSON
HINKLE SHANOR, LLP
400 Penn Plaza, Suite 700
Roswell, New Mexico 88202
(575)622-6510
lwilliams@hinklelawfirm.com
rolson@hinklelawfirm.com

SARA N. SANCHEZ
PEIFER, HANSON, MULLINS & BAKER, PA
20 First Plaza, Suite 725
Albuquerque, New Mexico 87102
(505)247-4800
ssanchez@peiferlaw.com

Also Present: Jowei Chen

143

INDEX OF WITNESS

EXAMINATION OF SEAN P. TRENDE
By Mr. Williams 144
By Ms. DiRago 164
CERTIFICATE OF COMPLETION OF DEPOSITION 168
WITNESS SIGNATURE/CORRECTION PAGE 170

EXHIBITS

19 Email dated 9/6/23 from Molly DiRago to Lucas Williams, et al. 144
20 Code 05-Part-6-4.R (9/6/2023) 145
21 Email dated 9/12/23 from Molly DiRago to Lucas Williams, et al. 146
22 Output of directory tree search 147
23 File titled File_save1.r 148
24 File titled 06-Part-6-4b.R 151
25 Package Redist 4/3/23 156
26 Source code to the Redist smc module that is part of Redist 161

144

SEAN P. TRENDE,
after having been first duly sworn under oath was questioned and testified as follows:

EXAMINATION

BY MR. WILLIAMS:

Q Good afternoon, Mr. Trende. I appreciate you making yourself available for this brief second deposition. I understand -- well, let me ask you this: I'm guessing that you provided a number of simulation files to Ms. DiRago last night?

A Yesterday morning, last night, yes. Oh, actually, no. It would have been provided to her all at once last evening.

(Exhibit 19 was marked.)

Q (By Mr. Williams) All right. Fair enough. I'm going to share with you what I've marked as Exhibit 19. Do you see that on your screen, Mr. Trende?

A Yes.

Q Okay. That was an email dated September 6th from Ms. DiRago to me that refsrences a copy of your code that sets the number of simulations to 1 million rather than 100,000; is that correct?

A Yes.

Q And are you familiar with the change in

145

code that Ms. DiRago references in that email?
A Yes.
(Exhibit 20 was marked.)
Q (By Mr. Williams) All right. I want to show you what I have marked as Exhibit 20. Do you see that code on the screen?
A Yes.
Q All right. I will represent to you that is the file that she produced to us. As I appreciate it, the only change you have made to that code is at Line 2 where it now reads 1 million; is that correct?
A I believe that's right.
Q All right. You say you believe that's right. Did you make any other modifications to 05-Part-6-4.R?
A I certainly don't remember doing so.
Q Okay. And the 1 million that you've set at Line 2, that populates the n sims variable, correct?
A Correct.
Q And the n sims variable is what makes 1 million now simulations be performed at Line 5; is that correct?
A Yes.
Q And similarly at Line 179, that same n sims variable is what causes the line of code at 179 and

146

180 to perform an additional 1 million simulations; is that correct?
A Correct.
(Exhibit 21 was marked.)
Q (By Mr. Williams) Fair enough. All right. I'm going to turn your attention to what I've marked as Exhibit 21. That is an email from Ms. DiRago to a whole bunch of people, including me, last night, indicating that she will be producing to us regenerated maps. Do you see that?
A Yes.
Q Have you seen this email before?
A I don't know.
Q Okay. Is it accurate to say that what you produced to Ms. DiRago was -- or were regenerated maps, as highlighted there in the first and second lines of that email?
A Yes.
Q All right. Do you see down here where Ms. DiRago says that she thinks I've engaged in unseemly gamesmanship?
A Yes.
Q All right. Is it your opinion, Mr. Trende, that if Dr. Chen had run the code, either the code that you produced prior to your deposition or the

147

modified code that you produced after your deposition, he could have regenerated the simulations that you used to formulate your expert report?
MS. DiRAGO: Object to the form. You can answer.
A Yes.
Q (By Mr. Williams) All right. I want to narrow this down so Ms. DiRago doesn't object to this.
Is it true that if Dr. Chen had used the source code that you produced prior to your deposition, substituting the module that you produced after your deposition, he would have regenerated the simulations that you used in your expert report?
A He should have.
Q Okay. And that is because, as I appreciate your testimony earlier, Mr. Trende, you used the set.seed (8675309) instruction in your code; is that correct?
A That's correct.
(Exhibit 22 was marked.)
Q (By Mr. Williams) All right. I want to show you what I've marked as Exhibit 22 to this deposition. I'll represent to you that this is the output of a directory tree search of the files that

148

were produced to us last night. Would you please verify that those are the regenerated map files that were produced -- that you generate -- you regenerated and that were produced to us last night?
A Can you scroll down?
Q Yes, sir.
A And keep going, please.
Q Yes, sir.
A It does appear that way.
Q All right. And your recollection is that you generated 204 files?
A Yes.
Q All right. And I realize that these are approximate file sizes that are to the left of the file names. I'm not trying to pin you down on that, but do they look approximately right?
A I couldn't tell you because I didn't check that.
(Exhibit 23 was marked.)
Q (By Mr. Williams) Fair enough. All right. I want to turn your attention to what I've marked as Exhibit 23. That is a file that Ms. DiRago produced to us today titled file_save1.r. Do you see that?
A Yes.
Q All right. What is that file, Mr. Trende?

153

the way you ran the Redist smc function when you regenerated the maps?
A I don't think so. I certainly don't remember doing anything.
Q Okay.
A I didn't remember changing the n sims to 100,000 from a million, though, so...
Q Certainly. Mr. Trende, I want to turn your attention back to Exhibit 1 of your deposition, and I'm going to show you Page 20 of Exhibit 1 of your deposition. Do you see that?
A Yes.
Q Highlighted on Page 20 is a sentence that reads, Indeed, these simulations were run at home on a Dell Alienware desktop computer with an i9 processor. Do you see that?
A Yeah. Actually, I think it's a AMD Ryzen processor. But yeah.
Q Why did you tell us that it was an Intel i9 processor?
A That is probably a leftover from having done it on a laptop once and forgetting that I didn't get an Intel chip on this, I got an AMD chip. But the AMD chip and the i9 are functionally equivalent.
Q Are you using that same computer right now?

154

A Yes.
Q Would you mind looking at the task manager for me, Mr. Trende, and telling me what processor you're actually using for these simulations?
MS. DiRAGO: So I'm going to object to the scope. But you can still call them, Sean.
MR. WILLIAMS: And, Molly, this is relevant narrow to the regenerated maps.
MS. DiRAGO: Okay.
A I don't know how to do that. I have task manager up.
Q (By Mr. Williams) Do you know how to get to the task manager?
A I have the task manager up, yes.
Q Do you know how to go to the processor section of your task manager?
A No.
Q Can you tell me how many cores are on your AMD processor?
A Sixteen.
Q Sixteen cores. All right. Have you disabled any of those cores?
A I wouldn't even know how to start with that.
Q All right. Is your AMD Ryzen 16-core

155

machine configured the same as it was when you initially ran the simulations as when you generated or regenerated the simulations?
A I don't know. I don't think I've done anything to change the chip.
Q Do you recall at your first deposition, Mr. Trende, that you testified you understood how Redist works under the hood?
MS. DiRAGO: Objection. I'm not sure that's what he testified to.
Q (By Mr. Williams) Well, we can pull the transcript up.
A I think that's a good idea.
Q Bear with me. Our document management system is sometimes slow.
All right. Do you see the deposition of Sean Trende, at least the first page of it?
A I do.
Q All right. Let me do a quick search for "under the hood." All right. At Line -- at Page 121, Line 14, I asked you, Are you familiar with how Redist works under the hood? And you said, Yes. Have you seen that?
A Yeah. Yeah. I see some of the clarifications afterwards. But yeah.

156

Q And when you say that, you do that without having reviewed the source code; is that correct?
A Yeah. When you asked me how it works under the hood, I thought you meant how the algorithm worked, how Sequential Monte Carlo algorithms worked.
Q Have you ever taken it upon yourself, Mr. Trende, to read the manual on how Redist works?
A I've certainly referenced it. I don't know that I've sat down and read it cover to cover.
(Exhibit 25 was marked.)
Q (By Mr. Williams) Okay. I'm going to show you what I've marked as Exhibit 25. Have you ever seen this document, Mr. Trende?
A Yes.
Q All right. And this is located at https://cran.r-project.org. Are you familiar with cran.org?
A Uh-huh.
Q Is that the package manager that you used to download Redist?
A Probably.
Q Are you aware that cran.org is the package manager that is within our studio?
A Yeah. Yeah. I know what cran is, and I probably download it that way, but it would have been

157

downloaded a very long time ago.
Q Okay. So looking at Exhibit 5 (sic), which is the API manual for Redist; is that right?
A Uh-huh. Yes.
Q You've looked at this document before?
A Yes.
Q All right. I want to turn -- I want to go --
A To -- I'm sorry. To clarify, this looks like the April 3rd, 2003 (sic) revision. I don't know if I've read it since April 3, 2003, and I don't know if the version of Redist I use is post April 3rd, 2023, but I have looked at the documentation.
Q Do you know what -- is there any way for you to tell me, Mr. Trende, what version of Redist that you use to generate your simulations?
A I don't think so.
Q Are you telling me you're not aware of how to do that?
A Yes.
Q All right. I want to go to Page 121. On Page 121 of Exhibit 5 (sic), do you see the beginning of the section documenting the function Redist_smc?
A Yes.

158

Q Have you read this documentation before, Mr. Trende?
A I'm sure I've read a version of it. I don't know if I've read off of this version of it. But yes.
Q Okay. I want to turn your attention to Page 122 of that documentation that describes the arguments for the Redist_smc function. Do you see that?
A Uh-huh. Yes.
Q Did you set the ncores argument when you ran Redist_smc?
A I did not.
Q Based on this documentation, does that suggest to you that Redist_smc would have used the default value of 0?
A I don't -- based on this, yes.
Q And using default 0 with a 16-core Ryzen chip, does it look like to you that set.seed did anything in your code?
A It depends when this was inserted.
Q I notice that it says, The sampler output will not be fully reproducible. Do you see that?
A Yes.
Q And then it goes on to say, If full

159

reproducibility is desired, set ncores equals 1. Do you see that?
A Yes.
Q Do you take issue with this documentation?
A No.
Q All right. You just don't know if this documentation applies to Redist as you're running it?
A Yes.
Q All right. When did you install Redist on your computer, Mr. Trende?
A I would have updated it a couple of weeks ago.
Q A couple of weeks ago? Would that have been after your initial simulations?
A Yes.
Q So your -- and then the Redist that you ran these new simulations on would be a newer version?
A No.
Q All right. So explain that to me, Mr. Trende. If you updated Redist after you performed your expert report, how is it the same version of Redist?
A Because I ran the second simulations on my laptop, which has an older version of Redist installed.

160

Q Okay. So now -- I believe I had asked you if you used the same computer, Mr. Trende, for both the original simulations and the regenerations, and you told me yes. Now you're saying you ran them on an AMD, and then you regenerated them on a laptop; is that correct?
A I don't think you asked me if I regenerated them on the same computer I used.
Q Mr. Trende, did you run your first set of simulations on a desktop?
A Yes.
Q And then the regenerations that you provided to Ms. DiRago were run on a laptop?
A Yes.
Q The first set of simulations that were run on your desktop were done with a newer version of Redist than was on the laptop that was used for your regeneration?
A No.
Q All right. So we know that -- or you're testifying today that the version of Redist on your laptop and on your desktop computer are identical?
A No.
Q All right. Well, explain this to me. I'm having a hard time reconciling your answers,

161

Mr. Trende.
A It's pretty straightforward. I updated Redist -- you asked me when I updated Redist on my desktop. I updated it after I submitted the expert report in this litigation.
Q And have you ever updated Redist on your laptop?
A No.
Q So it is running on the same earlier version of Redist that was on your desktop?
A Yes.
Q What version of Redist is that, Mr. Trende?
A I told you, I don't know.
Q How can you know that if you don't know what version is on either the laptop or the desktop?
A Because I got the laptop and the desktop at about the same time and installed Redist at the same time.
Q When was that, Mr. Trende?
A That would have been in April of 2022.
(Exhibit 26 was marked.)
Q (By Mr. Williams) All right, Mr. Trende. I want to turn your attention to what I am marking as Exhibit 26 to this deposition. This is the source code to the Redist smc module that is part of Redist.

162

Have you ever looked at this code?
A No.
Q All right. What is the date on that source code there, Mr. Trende?
A January 31st, 2021.
Q And is that before or after you installed Redist on your desktop computer and your laptop computer?
A Before.
Q All right. Let's go down on Exhibit 26 to the source code's documentation of cores. At Lines 62 -- oh, shoot. That's going to be tough. Let me see if I can do it this way.
At Lines 62 through 67 is the source codes documentation of the ncores argument. Do you see that there, Mr. Trende?
A Yes.
Q And that documentation is similar to the manual that we looked at at Exhibit 25; is it not?
A Yes.
Q It says, If more than one core is used, the sampler output will not be fully reproducible with set.seed. Do you see that?
A Yes.
Q And then it goes on to say, If full

163

reproducibility is desired, set ncores equals one; is that correct?
A Yes.
Q Mr. Trende, how can you testify today that the regenerated simulations that you produced to us yesterday are the same as those you claim to have used in your expert report?
MS. DiRAGO: Objection to form.
A I testified that way because I use the set.seed command, which is how you typically make sure that something is reproducible.
Q (By Mr. Williams) And would you agree with me that the documentation of the function that you use says that on a multi-core machine, without setting ncores equals 1, set.seed does not accomplish that goal?
A That's what it says.
Q Yep. Do you have any reason to disagree with the authors of Redist_smc?
A No.
Q So, Mr. Trende, as you're sitting here today, can you testify that the regenerated source code that was produced to us yesterday is -- or strike that.
Mr. Trende, as you're sitting here today,

164

can you testify that the regenerated maps that were produced to us last night are the same as the maps you generated to form your expert report?
A Not that they're completely identical, for certainty, no.
MR. WILLIAMS: Thank you, Mr. Trende. I will pass the witness.

EXAMINATION

BY MS. DiRAGO:
Q Mr. Trende, have you been engaged as an expert before this case?
A Yes.
Q Approximately how many times?
A Probably 20. It's listed in my report.
Q Did you provide expert reports for all of those cases?
A Yes.
Q Did you create simulation maps in all those cases?
A Not all of them.
Q About how many did you produce simulation maps?
A Probably about half of them. Oh, did I produce them? Never.
Q I'm sorry. I didn't mean produce to the

165

other side. I guess I mean how many times have you created simulation maps?

A Probably about half of them.

Q Okay. The question now is: How many times did you produce the simulation maps to the opposing counsel in that case -- in those cases?

A I don't think I've ever been asked to -- or at least -- I don't think we've ever produced maps in a case.

Q Have you ever received maps from the opposite party in a case?

A Three times.

Q Okay. What were the circumstances under which you received maps in those cases?

A In the Texas case, it was because of -- it was written in a programming language that I don't even execute in. The second case was something similar to the circumstance in this case. Dr. Imai was using an algorithm that ran so slowly that we wouldn't have had the output by the time the response was due. And then this case, where we seem to agree this algorithm runs slowly.

Q So is it typical to exchange maps in gerrymandering cases?

A No. Even in cases with Dr. Imai, it's just

166

been kind of understood you can reproduce the distribution by running the code on yourself. And when you have competent experts, they can be trusted to run the code.

Q So do you actually rely on individual maps or sets of maps?

A No. Because the whole point of using these maps is to explore probability distribution of drawing maps -- what the probability distribution looks like for maps drawn without respect to politics.

So, frankly, drawing different types of maps and getting the same basic output only reinforces the conclusions drawn the first time around because it's another -- it's like another poll validating what you're actually interested in, which is how likely it is that the inactive map would be drawn without heavy reliance on politics.

Q You testified that the maps that you create -- that you -- that we reproduced to opposing counsel in this case may not be exactly the same as the maps that you relied on for your expert work in this case. Can you explain that?

A Well, based on the documentation that he showed me, it would suggest that the set.seed command

167

at least isn't guaranteed to work fully if you don't set the number of cores to 1. So, you know, that wasn't done. But I don't think I've ever seen that done, including cases with Dr. Imai, so...

But I don't know. Without looking at the actual maps, I don't know whether what -- or looking at the actual output, whether what was produced is similar or even identical to what the first go-around was.

Q And do you think that this will prejudice defendants in this case to not have the exact maps, potentially, that you used?

A I can't see how it would because the actual output that we're interested in is the probability distribution, not the individual maps.

MS. DiRAGO: Okay. Thank you. I don't have any more questions.

MR. WILLIAMS: I have no further questions.

(The deposition concluded at 1:37 p.m. Mountain Time.)

168

FIFTH JUDICIAL DISTRICT COURT
COUNTY OF LEA
STATE OF NEW MEXICO
NO: D-506-CV-2022-00041

REPUBLICAN PARTY OF NEW MEXICO, DAVID GALLEGOS, TIMOTHY JENNINGS, DINAH VARGAS, MANUEL GONZALES, JR., BOBBY AND DEE ANN KIMBRO, and PEARL GARCIA,
Plaintiffs,
vs.
MAGGIE TOULOUSE OLIVER, in her official capacity as New Mexico Secretary of State, MICHELLE LUJAN GRISHAM, in her official capacity as Governor of New Mexico, HOWIE MORALES, in his official capacity as New Mexico Lieutenant Governor and President of the New Mexico Senate, MIMI STEWART, in her official capacity as President Pro Tempore of the New Mexico Senate, and JAVIER MARTINEZ, in his official capacity as Speaker of the New Mexico House of Representatives,
Defendants.

CERTIFICATE OF COMPLETION OF DEPOSITION

I, SUSAN L. FINDLEY, New Mexico CCR #77, DO HEREBY CERTIFY that on September 13, 2022, the deposition of SEAN P. TRENDE was taken before me at the request of, and sealed original thereof retained by:

Attorney for the Defendants Mimi Stewart and Javier Martinez
HINKLE SHANOR, LLP
400 Penn Plaza, Suite 700
Roswell, New Mexico 88202
LUCAS M. WILLIAMS