IN THE SUPREME COURT OF WISCONSIN

No. 2021AP001450 OA

BILLIE JOHNSON, ERIC O'KEEFE, ED PERKINS and RONALD ZAHN,

Petitioners,

BLACK LEADERS ORGANIZING FOR COMMUNITIES, VOCES DE LA FRONTERA, LEAGUE OF WOMEN VOTERS OF WISCONSIN, CINDY FALLONA, LAUREN STEPHENSON, REBECCA ALWIN, CONGRESSMAN GLENN GROTHMAN, CONGRESSMAN MIKE GALLAGHER, CONGRESSMAN BRYAN STEIL, CONGRESSMAN TOM TIFFANY, CONGRESSMAN SCOTT FITZGERALD, LISA HUNTER, JACOB ZABEL, JENNIFER OH, JOHN PERSA, GERALDINE SCHERTZ, KATHLEEN QUALHEIM, GARY KRENZ, SARAH J. HAMILTON, STEPHEN JOSEPH WRIGHT, JEAN-LUC THIFFEAULT, and SOMESH JHA,

Intervenors-Petitioners,

v.

WISCONSIN ELECTIONS COMMISSION, MARGE BOSTELMANN in her official capacity as a member of the Wisconsin Elections Commission, JULIE GLANCEY in her official capacity as a member of the Wisconsin Elections Commission, ANN JACOBS in her official capacity as a member of the Wisconsin Elections Commission, DEAN KNUDSON in his official capacity as a member of the Wisconsin Elections Commission, ROBERT SPINDELL, JR. in his official capacity as a member of the Wisconsin Elections Commission and MARK THOMSEN in his official capacity as a member of the Wisconsin Elections Commission,

Respondents,

THE WISCONSIN LEGISLATURE, GOVERNOR TONY EVERS, in his official capacity, and JANET BEWLEY SENATE DEMOCRATIC MINORITY LEADER, on behalf of the Senate Democratic Caucus,

Intervenors-Respondents.

BRIEF OF INTERVENORS-PETITIONERS CITIZEN MATHEMATICIANS AND SCIENTISTS

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Molly Beck, *Wisconsin Grows Modestly and More Diverse While Milwaukee Plummets to 1930s Levels, Census Data Show*, MILWAUKEE J. SENTINEL (Aug. 12, 2021), https://www.jsonline.com/story/news/politics/2021/08/12/census-wisconsin-grows-modestly-while-milwaukee-drops-1930-s-levels/8110913002/.....16

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Moon Duchin, *Geometry Versus Gerrymandering: Mathematicians Are Developing Statistical Forensics to Identify Districts that Disenfranchise Voters*, SCI. AM. (Nov. 2018).....3

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The Wisconsin Cartographer's Guild, *Wisconsin's Past and Present, a Historical Atlas* (1998)..... 20, 21

Wisconsin Legislative Reference Bureau, *Redistricting in Wisconsin 2020: The LRB Guidebook* (2020), https://docs.legis.wisconsin.gov/misc/lrb/wisconsin_elections_project/redistricting_wisconsin_2020_1_2.pdf 31

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Pursuant to the Court's November 30, 2021 Order (the "Order"), Intervenors-Petitioners Citizen Mathematicians and Scientists respectfully submit the following brief in support of their proposed congressional, senate, and assembly maps (together the "MathSci Proposed Maps").

INTRODUCTION

As this Court set forth in its Order, "all parties agree the existing maps, enacted into law in 2011, are now unconstitutional" due to malapportionment, and this Court must "provide a remedy." Order ¶ 2. In doing so, this Court will "ensure preservation of the[] justiciable and cognizable rights explicitly protected" under the United States Constitution, the Voting Rights Act ("VRA"), and Article IV, Sections 3, 4, and 5 of the Wisconsin Constitution. *Id.* ¶ 38.

To assist the Court in providing a remedy, the parties were "invited to submit congressional and state legislative maps that comply with all relevant legal requirements, and that endeavor to minimize deviation from existing law." *Id.* ¶ 87 (Hagedorn, J., concurring). The parties were also invited to discuss "other, traditional redistricting criteria," while recognizing that the Court's "primary concern is modifying only what [it] must to ensure the 2022 elections are conducted under districts that comply with all relevant state and federal laws." *Id*.

The Citizen Mathematicians and Scientists submit that their Proposed Maps are the proper remedies for the Court to adopt. The Citizen Mathematicians and Scientists started with the 2011 Maps and then used computational redistricting to bring the 2011 Maps into full compliance with not only the equal-population requirement given the

2020 Census Data, but also all other applicable state and federal legal requirements.

In Part I, the Citizen Mathematicians and Scientists briefly describe the new field of "computational redistricting." In Part II, the Citizen Mathematicians and Scientists discuss how their Proposed Maps accord with the principle of "least change" while applying 2020 Census Data to bring the 2011 Maps into full compliance with the mandates of the U.S. Constitution, the VRA, and the Wisconsin Constitution. Part III provides a detailed explanation of each legal requirement, the hierarchy of the legal requirements as they have been applied in Wisconsin, and how the Proposed Maps meet each legal requirement. In Part IV, the Citizen Mathematicians and Scientists explain how their Proposed Maps also address other traditional redistricting criteria in addition to all applicable legal requirements.[1]

ARGUMENT

I. COMPUTATIONAL REDISTRICTING CAN OPTIMIZE COMPLIANCE WITH LEGAL REQUIREMENTS.

Redistricting involves balancing a variety of legal requirements. Unfortunately, improving compliance with one requirement often creates "downstream consequences" for compliance with other requirements.[2] For example, "[d]eciding to keep a county whole instead of splitting it across two districts changes at least the boundaries of all neighboring districts, and could come at the cost of other

[1] The Citizen Mathematicians and Scientists attach to this brief their Proposed Congressional, Senate, and Assembly Maps. Specifically, the Citizen Mathematicians and Scientists attach a statewide congressional map along with eight district-specific maps, a statewide senate map and two insets, and a statewide assembly map with five insets. Citizen Mathematicians and Scientists also attach an expert report analyzing their proposed maps.

[2] Emily Rong Zhang, *Bolstering Faith with Facts: Supporting Independent Redistricting Commissions with Redistricting Algorithms*, 109 CAL. L. REV. 987, 1013 (2021).

redistricting criteria, such as making the map as a whole less compact."[3] Similarly, optimizing population balance sometimes comes at the price of diminished respect for political subdivisions. The traditional way to find the right balance has been through trial and error, with a mapmaker using commercial software to move existing district lines one at a time. But drawing maps by hand is both time-consuming and fundamentally limited. Indeed, "[a] single decision" in the map-drawing process can have "implications for the rest of the map that even seasoned line-drawers cannot always fully account for or predict."[4]

The field of computational redistricting that has developed over the past decade is a game-changer. The high-performance computing and optimization techniques involved in computational redistricting can apply the Census Bureau's latest data to existing maps and then sort through millions of alternatives to "zero in on the maps that best meet the redistricting criteria."[5] Computational redistricting is particularly effective at sifting through various geographic combinations to optimize compliance with legal requirements while constraining deviations from prior district boundaries.

Before explaining further, some terminology may be helpful. As used in this brief, a *legal requirement* is a criterion mandated under federal or state law, as articulated in the Court's November 30 Order:

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[3] *Id.*
[4] *Id.*
[5] *Id.*; *see also, e.g.*, Siobhan Roberts, *Mathematicians Are Deploying Algorithms to Stop Gerrymandering*, MIT TECH. REV. (Aug. 12, 2021), https://www.technologyreview.com/2021/08/12/1031567/ mathematicians-algorithms-stop-gerrymandering/; Moon Duchin, *Geometry Versus Gerrymandering: Mathematicians Are Developing Statistical Forensics to Identify Districts that Disenfranchise Voters*, SCI. AM. (Nov. 2018), https://www.scientificamerican.com/article/ geometry-versus-gerrymandering/; Amariah Becker, Moon Duchin, Dara Gold & Sam Hirsch, *Computational Redistricting and the Voting Rights Act*, 20 ELECTION L.J. (forthcoming 2022), https://www. liebertpub.com/doi/10.1089/elj.2020.0704.

population equality, minority electoral opportunity sufficient to comply with the VRA, respect for political subdivisions, contiguity, compactness, and nesting of assembly districts. Order ¶¶ 24–38; *id.* ¶ 82 n.4 (Hagedorn, J., concurring). A *traditional redistricting principle* is an additional consideration that, while not legally mandated, may assist a redistricter in selecting among "multiple proposed maps that comply with all relevant legal requirements, and that have equally compelling arguments for why the proposed map most aligns with current district boundaries." *Id.* ¶ 83 (Hagedorn, J., concurring). Traditional redistricting criteria for congressional districts in Wisconsin include compactness, respect for political subdivisions, and preserving communities of interest. For legislative districts, traditional redistricting criteria include preserving communities of interest and numbering senate districts to reduce the number of people who will have to wait an extra two years to vote for state senator. *See id.*

A *metric* is a precise, quantifiable measure of how well a district, or an entire map, satisfies a legal requirement or pursues the goal set forth in a traditional redistricting principle. For example, population equality is a legal requirement, and maximum population deviation (the difference between a plan's largest and smallest districts) is a metric. This population deviation metric can be expressed either as a number of persons (so a map in which all districts contain either 736,714 or 736,715 residents has a maximum population deviation of one person) or as a percentage of the population of an ideal district (for example, 1 person divided by 736,715 persons is 0.000136%). Most of the metrics described below, including the metric for the principle of population equality, are like golf scores: the lower, the better. A few, however,

like the metrics used to measure compactness, are like hockey scores: the higher, the better.

As demonstrated below, the Citizen Mathematicians and Scientists believe that the MathSci Proposed Maps approach the best metrics that can be attained on the full set of legal requirements and traditional districting criteria while still minimizing deviation from the 2011 Maps.

II. THE MATHSCI PROPOSED MAPS ACCORD WITH THE PRINCIPLE OF LEAST CHANGE.

The November 30 Order emphasized that the appropriate approach for courts to follow in the event of an impasse between the political branches in drawing a map is "to start with the laws currently on the books." Order ¶ 85 (Hagedorn, J., concurring). As the Court explained, "the maps drawn in 2011 were enacted by the legislature and signed into law by the governor." Order ¶ 4. However, those maps "no longer comply with the constitutional requirement of an equal number of citizens in each … district." *Id.*

In addition to new Census Data, there have also been other changes in the state. For example, in the years since 2011, Wisconsin cities and villages have continued to annex portions of surrounding towns, thus changing the borders of the towns and wards that the Constitution requires redistricting plans to respect, at least when drawing assembly (and by extension, senate) lines.[6] To illustrate the significance of these changes, note that when the 2011 Assembly Map

[6] According to the Wisconsin Department of Administration's Municipal Data System (MDS), Wisconsin cities and villages have filed more than 150 official border changes with the state since 2014. *See* Municipal Data System, Corporate Boundaries, available at https://mds.wi.gov/View/CorporateBoundries (last accessed Dec. 14, 2021).

was enacted, the districts split 79 *then-current* municipal lines.[7] Ten years later, shifts in the borders of municipalities caused the same 2011 Assembly Map to split 126 of the *present* municipal lines. Duchin Report § 8, Table 14. These changes to the circumstances facing the Court—like the shifts in population—mean that certain "lawful policy choices of the legislature" in 2011 may no longer accord with the dictates of federal law or the Wisconsin Constitution. Order ¶ 81 (Hagedorn, J., concurring).

Accordingly, the task taken up by the Citizen Mathematicians and Scientists was to make "necessary modifications to accord with legal requirements" given the changes in the state since 2011. *Id.* ¶ 85. Those legal requirements, which are discussed in the next section, are found in "United States Constitution, or Article IV, Sections 3, 4, or 5 of the Wisconsin Constitution." *Id.* ¶ 81. The MathSci Proposed Maps resist "[t]reading further than necessary to remedy [the existing maps'] current legal deficiencies" and instead "'reflect the least change' necessary for the maps to comport with the relevant legal requirements." Order ¶¶ 64, 72 (quoting *Wright v. City of Albany*, 306 F. Supp. 2d 1228, 1237 (M.D. Ga. 2003)).

The maps that the Citizen Mathematicians and Scientists propose were generated by essentially "[u]sing the existing maps 'as a template.'" *Id.* ¶ 72 (quoting *Baumgart v. Wendelberger*, No. 01-C-0121, 2002 WL 34127471, at *7 (E.D. Wis. May 30, 2002) (three-judge court), *amended*, No. 01-C-0121, 2002 WL 34127473 (E.D. Wis. July 11, 2002)). With the power of computational redistricting, Citizen Mathematicians and Scientists' experts were able to generate maps that

[7] *See* https://legis.wisconsin.gov/ltsb/gisdocs/Data2010/act43_act44_w_bvb_by_ward.pdf. For a longer discussion of split municipalities, see section III.B.1 below.

remedied the malapportionment present in the 2011 Maps while also optimizing compliance with all relevant legal requirements. Among the set of maps that complied with all legal requirements, the Citizen Mathematicians and Scientists then identified maps that also best served traditional redistricting criteria, including preserving communities of interest and minimizing the number of people who would have to wait six years to vote for their senator. *Id.* ¶ 47; *see also id.* ¶ 83 (Hagedorn, J., concurring). Although the approach is rigorous, the outcome is minimalist inasmuch as it "alter[s] current district boundaries only as needed to comply with legal requirements." *Id.* ¶ 82.

Several metrics illustrate the degree to which the MathSci Proposed Maps exhibit a "least-change" approach with respect to the existing maps.

First, the MathSci Proposed Maps perform well on the metric of population displacement, which measures the number (or share) of people who are reassigned to a new district. *See* Duchin Report § 5.3. This is measured by totaling the 2020 population in census blocks that are in a different district in the proposed map relative to the 2011 enacted map. *Id.* A version of this metric, sometimes described as "core retention," has been used previously in Wisconsin and elsewhere. *See Baumgart*, 2002 WL 34127471, at *7 (average level of core retention in 2002 court-adopted plan was 76.7%); *see also Martin v. August-Richmond Cnty., Ga., Comm'n*, No. CV 112-058, 2012 WL 2339499, at *3 (S.D. Ga. June 19, 2012) (court "preserved the core constituency of each district" by retaining at least 74.19% of the "benchmark district[s]" in the prior maps). Here, the MathSci Proposed Congressional Map has a core retention rate of 91.5%; the Proposed

Senate Map has a core retention rate of 74.3%; and the Proposed Assembly Map has a core retention rate of 61.0%.

Second, the MathSci Proposed Maps minimize the extent to which the new map "alters district boundaries." Order ¶ 82 (Hagedorn, J., concurring); *see also Stenger v. Kellett*, No. 4:11-cv-2230, 2012 WL 601017, at *3 (E.D. Mo. Feb. 23, 2012) (noting that a "frequently used model" is "to begin with the current boundaries and change them as little as possible"); *Bodker v. Taylor*, No. 1:02-cv-999, 2002 WL 32587312, at *5 (N.D. Ga. June 5, 2002) (referencing "small, though constitutionally necessary, change in the district lines in accordance with the minimum change doctrine").

There are multiple ways to measure this. One metric, known as area displacement, is calculated by measuring the share of the state's land area that is reassigned to a new district. Duchin Report § 5.3. Here, the MathSci Proposed Congressional Map displaced less than 3% of Wisconsin's land area.

Another metric focuses on the district lines or boundaries themselves. This metric, which can be called the "buffer distance," asks how much the boundaries of a given district in the enacted map would have to be pushed outward, or "buffered," in a new map to contain all of the same district. Duchin Report § 5.3 & Fig. 5. For example, as explained in the supporting expert report, if the maximum distance between the old map and the new map at any given point is 8.8 miles, then the "buffer" would be the outline that lies 8.8 miles beyond the old map at every point. *Id.*

Yet another metric is to look at units of "overlap" between the districts, as Justice Hagedorn suggested in his concurrence. Order ¶ 85 n.13. Justice Hagedorn used the unit of counties in evaluating the map drawn by this Court in *Zimmerman*, asking how many of the new

districts consist of some or all of the same counties as the parallel predecessor districts. Order ¶ 85 n.13 (*comparing State ex rel. Reynolds v. Zimmerman*, 23 Wis. 2d 606, 617–18, 128 N.W.2d 16 (1964) ("*Zimmerman I*"), *with* Wis. Stat. § 4.02 (1963-64)). (As described *infra*, counties are a natural unit to consider given their stable boundaries and their historic importance in Wisconsin.) A more demanding metric of overlap would measure how many districts in the Proposed Maps share at least some population with their parallel predecessor districts. Duchin Report § 5.3. As shown below, both of these metrics demonstrate the "striking" similarities between the MathSci Proposed Maps and the 2011 Maps. *See id*. For example, while Justice Hagedorn applauded the 1964 Court-ordered map for overlapping with the pre-existing statutory map in 31 of 33 senate districts, *see id.*, the MathSci Proposed Senate Map overlaps perfectly, in 33 of 33 districts.

TABLE 1: Least Change[8]

	MathSci Proposed Maps					
	Population Displacement	**Core Retention**	**Area Displacement**	**Average Buffer Distance**	**Overlap**	**County Overlap**
Assembly	2,299,625 (39.0%)	61.0%	1947.9 mi^2	13.0 miles	85/99	87/99
Senate	1,513,824 (25.7%)	74.3%	1470.6 mi^2	17.0 miles	33/33	33/33
Congressional	500,785 (8.5%)	91.5%	150.4 mi^2	5.1 miles	8/8	8/8

[8] Duchin Report, Tables 5, 10, 16.

III. THE MATHSCI PROPOSED MAPS BRING THE 2011 MAPS INTO FULL COMPLIANCE WITH ALL FEDERAL AND STATE LEGAL REQUIREMENTS.

As described above, the Citizen Mathematicians and Scientists hewed closely to the 2011 Maps. However, deviations from the 2011 Maps were necessary to comply with all applicable legal requirements. Those requirements and the metrics measuring how well the MathSci Proposed Maps achieve those requirements are set forth below. In each case, the Citizen Mathematicians and Scientists were able to improve on the 2011 Maps' compliance with the applicable legal requirements.

A. Vote-Dilution Requirements

The foremost legal requirements in redistricting concern two forms of vote dilution. Quantitative vote dilution—the harm inflicted on persons residing in overpopulated districts—is prohibited by both the United States and Wisconsin Constitutions. Qualitative vote dilution—the harm inflicted on persons, such as members of racial or ethnic minority groups, whose voting strength is weakened even in equally populated districts—is prohibited primarily by the Federal Constitution and the Voting Rights Act.

1. Equal Population

Chief among the legal requirements for redistricting is the principle of one person, one vote. *See Abrams v. Johnson*, 521 U.S. 74, 98 (1997); *Wesberry v. Sanders*, 376 U.S. 1 7–8 (1964); Order ¶ 24. Indeed, that is the entire reason redistricting is necessary. The command under the Federal Constitution's Article I, Section 2, "that Representatives be chosen 'by the People of the several States,'" *Wesberry v. Sanders*, 376 U.S. at 7, has been interpreted as requiring "absolute population equality" in congressional districts, *Karcher v. Daggett*, 462 U.S. 725, 732 (1983). Thus, in 2011, the Wisconsin plan

enacted by the legislature and signed by the Governor limited the deviation among congressional districts to a single person. *See* National Conference of State Legislatures, *Redistricting Law 2010, Table 3: Population Equality of 2000s Districts* (Nov. 2009).[9] To do the same in 2021, the number of people of in any congressional district should not deviate by more than one person from the ideal congressional district of 736,714.75 people. Order ¶ 15.

The federal requirement of "equal protection" that the Fourteenth Amendment imposes upon state legislative districts is more flexible and has been interpreted to allow population deviations up to ten percent. Order ¶ 26; *Brown v. Thomson,* 462 U.S. 835, 842 (1983). The Wisconsin Constitution, however, is far more demanding and "places ... heavy emphasis on the requirement that the legislative districts be apportioned" as equally as possible. *State ex rel. Reynolds v. Zimmerman*, 22 Wis. 2d 544, 556, 126 N.W.2d 551 (1964) ("*Zimmerman II*"). The plain text of the Constitution requires that the legislature "apportion and district anew the members of the senate and assembly, *according to the number of inhabitants*." Wis. Const. art. IV, § 3 (emphasis added); *see also* Order ¶ 19; *Zimmerman II*, 22 Wis. 2d at 565 ("The 'rationality' of apportioning representatives in direct ratio to the population was affirmed when the constitution, embodying the … specific standard of sec. 3, art. IV, was ratified.").

As this Court recognized in its November 30 Order, the Wisconsin Constitution demands, with respect to legislative district populations, that "there should be *as close an approximation to exactness as possible*, and this is the utmost limit on the exercise of

[9] Available at https://www.ncsl.org/Portals/1/Documents/Redistricting/Redistricting_2010.pdf#page=59.

legislative discretion." Order ¶ 33 (emphasis added) (quoting *State ex rel. Att'y Gen. v. Cunningham*, 81 Wis. 440, 484, 51 N.W. 724 (1892)). The significance of this provision cannot be overstated: As this Court put it, "[o]ur system of representative democracy would be a sham if our representatives in the legislature did not in fact represent the people 'according to the number of inhabitants.'" *Forseth v. Sweet*, 38 Wis. 2d 676, 688, 158 N.W.2d 370, 376 (1968).

Since the Governor vetoed the first apportionment bill in 1851 for failing to achieve an appropriate level of population equality, Order ¶ 33,[10] the extent to which "an approximation of exactness" is indeed possible has grown dramatically due to advances in technology. In the last three redistricting cycles, the maximum population deviation among Wisconsin senate and assembly districts was about 1.6%. Duchin Report § 5.1. While the other legal requirements in the Wisconsin Constitution make it difficult to achieve in state legislative districting the one-person deviations that have become standard in the congressional context, this recent track record shows that population deviation can and should be minimized.

Taken together, these precedents make clear that (A) congressional-district populations must be exactly equal (*i.e.*, at most, only one person apart); and (B) legislative districts should contain only the amount of deviation necessary to achieve other legal requirements set forth in the Court's Order. Given that in the last three redistricting cycles, the maximum population deviation among legislative districts

[10] The very first apportionment act passed under the Wisconsin Constitution in 1851 was vetoed because the "disproportion in the number of inhabitants in senate and assembly districts" was "unconstitutional as not being according to the number of inhabitants." *Cunningham*, 81 Wis. at 512 (Pinney, J., concurring).

was about 1.6%, any plan that exceeds a 2% deviation is presumptively unconstitutional.

* * *

The MathSci Proposed Maps properly prioritize population equality as the most important objective. Each congressional district contains either 736,714 or 736,715 people and thus does not deviate from the ideal by more than a single person. *See* Order ¶ 15. The maximum population deviation is 0.74% for assembly districts and 0.50% for senate districts. Duchin Report §§ 7, 8. Each of these figures is substantially lower than 1.6%, *i.e.*, the maximum population deviation for any legislative district in the last three redistricting cycles, and is lower than the maximum population deviation reflected in the 2011 Maps. And Citizen Mathematicians and Scientists would have pushed those percentages even lower, were it not for the need to adhere to county lines wherever possible and to ward lines invariably. *See infra* Part III.B.1 (discussing Wis. Const. art. IV, § 3). By keeping population deviation to a minimum, the Citizen Mathematicians and Scientists have ensured that their Proposed Maps serve the most fundamental redistricting requirement under both the United States and Wisconsin Constitutions.

TABLE 2: Population Equality		
	2011 Maps Maximum Population Deviation[11]	**MathSci Proposed Maps Maximum Population Deviation[12]**
Assembly	0.76%	0.74%
Senate	0.62%	0.50%
Congressional	0.0001%	0.0001%

2. Minority Voting Rights

Any maps adopted by the Court must comply with the Fourteenth Amendment to the Federal Constitution, which bars the excessive and unjustified use of race and racial data and the intentional dilution of minority voting strength. *See Shaw v. Reno*, 509 U.S. 630, 639–57 (1993); *Rogers v. Lodge*, 458 U.S. 613, 616–28 (1982). Further, the maps must comply with Section 2 of the Voting Rights Act ("VRA"), which "prohibits the denial or abridgment of the right to vote on account of race, color, or membership in a language minority group." Order ¶ 27; *see* 52 U.S.C. § 10301.

The VRA prohibits both intentional and unintentional vote dilution. *Thornburg v. Gingles*, 478 U.S. 30, 43–44 (1986); Order ¶ 27. It provides that, irrespective of discriminatory intent, members of a racial or language-minority group must not "have less opportunity than other members of the electorate" to "nominat[e]" and "elect representatives of their choice," based on "the totality of circumstances." 52 U.S.C. § 10301(b).

[11] Exhibit A to Joint Pretrial Report at 11-12, *Baldus v. Gov't Accountability Bd.*, No. 11-cv-562 (E.D. Wis. Feb. 14, 2012), ECF No. 158-1; Joint Pretrial Report at 51, *Baldus v. Gov't Accountability Bd.*, No. 11-cv-562 (E.D. Wis. Feb. 14, 2012), ECF No. 158.
[12] Duchin Report, Tables 1, 6, 12.

In practice, where voting is racially polarized—more specifically, when a bloc-voting majority usually will defeat "candidates supported by a politically cohesive, geographically insular minority group," *Gingles*, 478 U.S. at 49—Section 2 of the VRA may require replacing one or more districts that elect candidates preferred by the majority group with districts that would nominate and elect candidates preferred by minority voters. *See Johnson v. De Grandy*, 512 U.S. 997, 1008 (1994). To guard against potential violations of Section 2 of the VRA, a redistricting plan should provide effective opportunities for minority group members to nominate and elect their preferred candidates in a number of districts that is "roughly proportional" to the minority group's share of the state's citizen voting-age population, or "CVAP." *League of United Latin Am. Citizens v. Perry (LULAC)*, 548 U.S. 399, 436–38 (2006); *see De Grandy*, 512 U.S. at 1000.

To that end, a district in which a minority group constitutes less than 50% of the voting-age population but can still nominate and elect minority-preferred candidates "can … [and] should" count as a minority-effective district when assessing compliance with the Voting Rights Act. *Bartlett v. Strickland*, 556 U.S. 1, 24 (2009) (plurality opinion); *see also Cooper v. Harris*, 137 S. Ct. 1455, 1469–72 (2017) (holding that the VRA did not require the state to "ramp up" the Black percentage in an effective "crossover" district, where Black voters had scored consistent victories despite lacking an arithmetic majority of the voting-age population). In other words, whether a proposed plan complies with the VRA depends on the actual electoral opportunity for minority voters, not on "particular numerical minority percentage[s]." *Ala. Legis. Black Caucus v. Alabama*, 575 U.S. 254, 275 (2015); *see also Cooper*, 137 S. Ct. at 1469; *Bethune-Hill v. Va. State Bd. of*

Elections, 137 S. Ct. 788, 799, 801–02 (2017); *Bush v. Vera*, 517 U.S. 952, 969–72 (1996).

* * *

The 2011 legislative maps, as modified by a 2012 federal-court order in *Baldus v. Members of Wisconsin Government Accountability Board*, 849 F. Supp. 2d 840 (E.D. Wis. 2012) (three-judge court), contained two senate districts and six assembly districts in which Black voters had a realistic opportunity to elect their candidates of choice and 1 assembly district in which Latino voters had such an opportunity.

The MathSci Proposed Maps reflect changes to the demographics of Wisconsin in the intervening years. Since 2011, population increases have brought with them demographic shifts that must be taken into account under the VRA. As has been widely reported, the state's population growth over the past ten years was primarily among people of color. The state's white population dropped by 3.4%, while the Latino population grew by 33.1% and the Black population grew by 4.8%.[13] The state also saw a large increase in the number of people who identify as two or more races. That number grew by 244% to 359,534, up from 104,317 a decade ago.[14]

Accordingly, the MathSci Proposed Maps reflect these demographic shifts and contain *seven* assembly districts in which Black voters have an opportunity to elect their candidates of choice and *two* assembly districts in which Latino voters have an opportunity to elect their candidates of choice. These nine assembly districts are nested into

[13] Molly Beck, *Wisconsin Grows Modestly and More Diverse While Milwaukee Plummets to 1930s Levels, Census Data Show*, MILWAUKEE J. SENTINEL (Aug. 12, 2021), https://www.jsonline.com/story/ news/politics/2021/08/12/census-wisconsin-grows-modestly-while-milwaukee-drops-1930-s-levels/8110913002/.
[14] *Id*.

three senate districts that are effective for minority voters to elect their candidates of choice.

Specifically, proposed Senate Districts 3, 4, and 6 are all majority-minority districts, with voting-age populations that are 41% Latino, 52% Black, and 51% Black, respectively. By contrast, the adult population in each of these three districts is only about one-third white. And in the Proposed Assembly Map, Assembly Districts 8 and 9 have voting-age populations that are at least 58% Latino, and the other seven districts (Assembly Districts 7, 10, 11, 12, 16, 17, and 18) are each solidly effective for Black voters, who constitute anywhere from 35% to 84% of the districts' voting-age populations.

With these districts, the Citizen Mathematicians and Scientists can "ensure any remedy [the Court] impose[s] satisfies the requirements of the VRA." Order ¶ 27.

B. Additional Wisconsin Constitutional Requirements

The Wisconsin Constitution contains several other legal requirements in addition to population equality. Order ¶ 34. This Court and others have sometimes described these requirements as being of "secondary importance." *Id.* (quoting *Wis. State AFL-CIO v. Elections Bd.*, 543 F. Supp. 630, 635 (E.D. Wis. 1982) (three-judge court)). However, they are secondary in importance only to the preeminent legal requirement of redistricting "according to the number of inhabitants." Order ¶ 34; *see also AFL-CIO*, 543 F. Supp. at 634–35 (rejecting argument that population inequality should be excused due to respect for political subdivisions). The emphasis in certain decisions on the primacy of population equality (and relative subordination of other factors) reflects that, for much of its history, Wisconsin prioritized respect for counties over population equality. *See AFL-CIO*, 543 F. Supp. at 635. The discussion of certain Wisconsin constitutional

requirements as being of "secondary importance" must be evaluated in the context of this history.

As noted at the outset, redistricting involves balancing multiple factors. Prior judicial discussions of the relative weights of these factors were heavily influenced by the assumption that it was perhaps impossible to achieve population equality while complying with the other factors. *See AFL-CIO*, 543 F. Supp. at 635 (assuming that "maintaining the integrity of county lines" is "generally incompatib[le] with population equality"). With their Proposed Maps, however, the Citizen Mathematicians and Scientists have proved that population equality, respect for political subdivisions, and compactness can largely be reconciled.

1. Respect for Political Subdivisions

Wisconsin has always placed a high priority on respect for political subdivisions, and in particular on maintaining the integrity of counties, towns, and wards. As this Court recognized in its Order, under Article IV, Section 4 of the Wisconsin Constitution, assembly districts must "be bounded by county, precinct, town or ward lines." Wis. Const. art. IV, § 4; Order ¶ 35.[15] Because assembly districts nest in senate districts, this bounding requirement necessarily controls senate districts as well. Although respect for political subdivisions is not a legal requirement for congressional districts, it has always been

[15] "[T]he precinct of the constitution disappeared when the uniform system of town and county government prescribed by the constitution . . . became fully operative. We have now no civil subdivision, other than towns and wards, which are the equivalent of the precinct of territorial times." *Cunningham*, 81 Wis. at 520 (Lyon, C.J., concurring).

considered a traditional neutral redistricting principle for Wisconsin's congressional-district boundaries.

Under Wisconsin law, all political subdivisions are not created equal. Indeed, the text and the history of Article IV, Section 4 leave no doubt that the foremost consideration when drawing legislative districts must always be the integrity of counties and county lines.

Counties

The history and context of Article IV, Section 4 is set forth in this Court's 1892 decision in *State ex rel. Attorney General v. Cunningham*, 81 Wis. 440, 51 N.W. 724 (1892) ("*Cunningham*"), which this Court recognized as "seminal." Order ¶ 28. As the decision explains, "[u]p to the time of the constitutional convention representation had been by counties." 81 Wis. at 512 (Pinney, J., concurring). Even as that system was replaced with a district system, many of the delegates shared the view that "each county was regarded in the nature of a small republic, or in the light of a family, and each organized county had a separate interest." *Id.* at 513 (internal quotation marks omitted). Given the primacy of counties, the delegates added the above language as an amendment to the original language of the Constitution to avoid "dismemberment of counties in the formation of assembly districts." *Cunningham*, 81 Wis. at 526 (Lyon, C.J., concurring). At the time the amendment was adopted, it meant that "each county having sufficient population should have its own representative in the legislature, chosen by its own electors and them only, and owing no divided, perhaps conflicting, allegiance to any other constituency." *Id.*

This principle—that the county should be the primary unit for creating a legislative map—reflected a deeply held view of the

importance of counties to representative government. As the Court observed in *Cunningham*:

> The county is the chief civil subdivision of the state. It, or its equivalent, has existed from the first in all the states and territories of the Union. It has always been the medium through which the state performs some of its most important functions, particularly that of raising revenue…. The people of a county have common interests and objects, peculiar to themselves, and intimate public relations with each other. The electors thereof vote for the same public officers; are subject to the same jurisdiction of and attend the same courts; some of them sit upon the same juries and in the same board of supervisors; and all have a common interest in all county affairs.

Id. at 525–26.[16]

The primacy of counties in Wisconsin state government continues to the present day. Counties have been treated as the primary geographic unit in Wisconsin outside the electoral context and are given broad authority to "act and decision-make on local affairs." *Jackson Cnty. v. State, Dep't of Nat. Res.*, 2006 WI 96, ¶ 31, 293 Wis. 2d 497, 519, 717 N.W.2d 713, 724; *see Cunningham*, 81 Wis. at 525 (county's "governing body has always been clothed with important legislative powers, of a local character, directly affecting the welfare of all the people within its borders").

In addition, unlike municipalities and wards that change over time, counties are a constant fixture in the geography of Wisconsin's government. Of Wisconsin's current 72 counties, 58 had been founded by 1861. The Wisconsin Cartographer's Guild, *Wisconsin's Past and*

[16] *See also Cunningham*, 81 Wis. at 485 (Orton, J., concurring) ("The people have a commendable pride in their own counties, and have more or less a common feeling and interests, and participate together in all their county affairs. They have a right to be represented by their own members of the legislature, and the members themselves can better represent them, and promote and protect their interests. . . . That most dangerous doctrine, that these and other restrictions upon the power of the legislature are merely declaratory, and not mandatory, should not be encouraged even to the extent of discussing the question. The convention, in making a constitution, had a higher duty to perform than to give the legislature advice.").

Present, a Historical Atlas 70–71 (1998). The most recent county change occurred in 1961, when the county of Menominee was formed out of reservation lands in two other counties, and the next most recent change occurred in 1901. *Id.* By contrast, the borders of municipalities are often in flux, as city and village governments annex nearby properties to expand their tax base. *See* Eric Mueller, Wisconsin Legislative Reference Bureau, 4 LRB Reports 12, *The Municipal Annexation Process in Wisconsin* 1 (July 2020).[17]

Reflecting the primacy of counties in the state's system of government, from the enactment of the Wisconsin Constitution until the U.S. Supreme Court's decision in *Reynolds v. Sims*, 377 U.S. 533 (1964). Wisconsin's redistricting plans generally (a) divided only those counties that were larger than the ideal district based on population and (b) joined only whole counties in districts. *See AFL-CIO*, 543 F. Supp. at 635 (noting that "[c]ounty lines were considered to be 'inviolable' in Wisconsin" and that "Assembly districts which divided counties were held unconstitutional except where a county was entitled to more than one state Representative"); *see also* The Wisconsin Cartographer's Guild, *Wisconsin's Past and Present, a Historical Atlas* 84 (1998) (showing a map of 1892 legislative districts compared to county boundaries). But the U.S. Supreme Court's decision in *Reynolds* rendered it impossible to keep counties perfectly intact when redistricting. *See AFL-CIO*, 543 F. Supp. at 635 (noting that an "intact-

[17] Available at https://docs.legis.wisconsin.gov/misc/lrb/lrb_reports/municipal_annexation_process_4_12.pdf

county plan" ... "established population deviation ranges" that would be impermissible under *Reynolds v. Sims*).

While this change in the law meant that the integrity of counties could no longer be prioritized over population equality, it did nothing to undermine the enduring significance of counties. Preservation of counties remains a constitutional requirement that should be respected "insofar as it does not compel disregard" for population equality. 60 Op. Att'y Gen. 101, 106–09 (Wis. Att'y Gen. 1971) (internal quotation marks omitted).

* * *

The MathSci Proposed Maps reflect the Wisconsin Constitution's historical recognition of the primacy of counties and the importance of keeping them whole. The degree of county integrity achieved by the Citizen Mathematicians and Scientists can be seen by comparing the number of counties split by the MathSci Proposed Maps to the number split by the 2011 Maps. The number of splits is calculated by counting the number of counties that appear in more than one district. The number of parts is calculated by counting how many different districts the counties are split into.

TABLE 3: County Integrity		
	2011 Maps[18]	**MathSci Proposed Maps[19]**
Assembly	58 splits (229 parts)[20]	40 splits (175 parts)
Senate	46 splits (130 parts)	28 splits (86 parts)
Congressional	12 splits (27 parts)	7 splits (15 parts)

[18] *See* https://legis.wisconsin.gov/ltsb/gisdocs/Data2010/act43_act44_by_mcd.pdf.
[19] Duchin Report, Tables 3, 8, 14.
[20] As used in Table 2, the number of county "splits" represents the number of counties that are divided among more than one district. The number of "parts" represents the number of discrete pieces into which the counties are divided. "Parts" are equivalent to "pieces," as that term is used in the Duchin Report.

Wards and Towns

In addition to county lines, Article IV, Section 4 requires consideration of ward lines. As the opinions in *Cunningham* explain, the necessity to draw some districts on town and ward lines that are not county lines "only arises because the constitution provides for choosing members of assembly by single member districts, and some counties have a sufficient number of inhabitants to entitle each of them to more than one member of assembly." 81 Wis. at 522 (Lyon, C.J., concurring). Thus, "the assembly districts should be bounded by county lines until the necessity arises for bounding them by town or ward lines which are not county lines also." *Id.* In other words, while the size of counties may require them to be split more often than smaller units of government, those splits are permissible only to the extent that they are dictated by the need to equalize population.

Like counties, towns and wards are constitutionally required to be respected. Wis. Const. art. IV, § 4; Order ¶ 35. Wards are the smallest political subdivisions in Wisconsin, and counties are made up of perfectly nested wards. *Prosser v. Elections Bd.*, 793 F. Supp. 859, 862 (W.D. Wis. 1992); *Baldus*, 849 F. Supp. 2d at 845. Where possible and practicable, each ward is to consist of whole census blocks; be kept compact; observe the community of interest of existing neighborhoods and other settlements; be confined to a single municipality; and be only in one county supervisory board district. *See* Wis. Stat. § 5.15. Wards are "the basic unit of Wisconsin state government for voting purposes." *Prosser*, 793 F. Supp. at 866; *see also Baldus*, 849 F. Supp. 2d at 845 ("redistricting has always proceeded on a 'bottom up' basis: ward lines would be redrawn based on the new census figures, villages and towns would recompute their populations, and the counties would build on

those figures"); *Town of Blooming Grove v. City of Madison*, 275 Wis. 342, 347, 81 N.W.2d 721, 723 (1957) ("Since the earliest days ... apportionment acts of the legislature have listed ... wards ... when dividing counties into assembly districts."); *City of Janesville v. Rock Cnty.*, 107 Wis. 2d 187, 190, 319 N.W.2d 891, 893 (Ct. App. 1982) (wards are the "basic building blocks to be used by the legislature, county boards and municipal governing bodies in redistricting their respective election districts"). As one court put it: "You vote by ward." *Prosser*, 793 F. Supp. at 866.

* * *

The MathSci Proposed Assembly and Senate Maps use wards as the building blocks for their districts and thus do not divide even a single ward. *See* Wis. Const. art. IV, § 4; Order ¶ 35.[21] The MathSci Congressional Map splits wards only enough to achieve absolute population equality.

TABLE 4: Ward Integrity[22]	
	MathSci Proposed Maps[23]
Assembly	0
Senate	0
Congressional	8

Incorporated municipalities (cities and villages)

Cities and villages—unlike counties, towns, and wards—are not required to be preserved in legislative redistricting, according to the

[21] As noted in the parties' joint stipulation, the Wisconsin Legislative Technology Services Bureau publishes 2020 U.S. Census Data by Ward information in CSV, KML, Shapefile, and GeoJSON formats, which are available at https://data-ltsb.opendata.arcgis.com/datasets/LTSB::2020-us-census-data-by-ward/about. Joint Stipulation of Facts and Law ¶ 19 (Nov. 14, 2021).

[22] Duchin Report, Tables 3, 8, 14.

[23] In 2011, rather than draw the district maps to fit the wards, the ward lines were drawn after the district maps were adopted. *See* 2011 Wisconsin Act 39.

plain text of the Wisconsin Constitution. *State ex rel. Lamb v. Cunningham*, 83 Wis. 90, 148, 53 N.W. 35 (1892) (Cassoday, J., concurring) (constitution "speaks of 'ward lines,' but contains no other reference to cities"). That is because, "when the Constitution was adopted, there existed in the territory villages with town lines passing through and dividing them into two parts. In such cases the dismemberment of the villages could not be prevented without dismembering towns." *Cunningham*, 81 Wis. at 742. "The inference is irresistible that such lines are so specified to prevent the dismemberment of counties, as well as towns and wards, while the lines of cities and villages are not specified as such boundaries, because it would be necessary to disregard them, and dismember such municipalities, in order to prevent the dismemberment of counties and towns." *Id.*; *see also AFL-CIO*, 543 F. Supp. at 635–36 (discussing caselaw regarding status of city and village borders). Accordingly, there is no constitutional requirement to keep cities or villages intact.

Nonetheless, there is a long history of evaluating redistricting plans in part based on the number of cities and villages, as well as towns, that are split, at least to the extent they are not split along county lines. *See AFL-CIO*, 543 F. Supp. at 636 (noting intent to use municipal splits "sparingly"). Consistent with this guidance, federal courts in Wisconsin have sought to avoid dividing cities and villages, even though their integrity is not enshrined in the Wisconsin Constitution. *Baldus*, 849 F. Supp. 2d at 850 (emphasizing significance of avoiding breaking up villages, among other subdivisions); *Baumgart*, 2002 WL 34127471, at *3, *7 (observing that "municipalities [should] be kept whole where possible" and that the court was guided by the "neutral principle[] of maintaining municipal boundaries," including those of cities and villages).

* * *

Although they prioritize county and ward integrity as required by the constitutional text, the MathSci Proposed Maps nonetheless also perform well with regard to municipality splits. The below table reports the number of municipalities that are split by the MathSci Proposed Maps, with a municipality being defined as the portion of a city, village, or town that falls within a single county. (In other words, if a city or village spans two counties, it would count as two municipalities for the purposes of this table.)

TABLE 5: Municipal Integrity[24]	
	MathSci Proposed Maps[25]
Assembly	70 splits (176 parts)
Senate	31 splits (69 parts)
Congressional	13 splits (27 parts)

These numbers compare favorably to the number of municipalities that the 2011 Maps split when enacted. Though calculated slightly differently, the 2011 Assembly Map split 79 municipalities, the 2011 Senate Map split 48 municipalities, and the 2011 Congressional Map split 34 municipalities.[26]

[24] As used in Table 4, the number of municipal "splits" represents the number of municipalities that are divided among more than one district (excluding splits that align with county boundaries). The number of "parts" represents the number of discrete pieces into which the municipalities are divided. "Parts" are equivalent to "pieces," as that term is used in the Duchin Report.

[25] Duchin Report, Tables 3, 8, 14.

[26] *See* https://legis.wisconsin.gov/ltsb/gisdocs/Data2010/act43_act44_w_bvb_by_ward.pdf. In this data, a "municipality" that crosses county lines is defined as one municipality, not two. However, because the data about the 2011 Maps excludes municipal splits that fall along county lines, the split count for the MathSci Proposed Maps, if anything, inflates the number of municipal splits compared to the data provided for the 2011 Maps.

By prioritizing respect for the integrity of counties and wards, the MathSci Proposed Maps best comply with the plain text of Article IV, Section 4 of the Wisconsin Constitution as well as judicial precedent. Further, the Citizen Mathematicians and Scientists accomplish this while attaining a level of population equality that would be unparalleled in the history of Wisconsin legislative redistricting. *See supra* at 11-12.

2. Contiguity

The Wisconsin Constitution requires that assembly districts "consist of contiguous territory." Wis. Const. art. IV, § 4. This contiguity requirement "generally means a district 'cannot be made up of two or more pieces of detached territory.'" Order ¶ 36 (quoting *Cunningham*, 83 Wis. at 148, 53 N.W. at 57). Likewise, under the Wisconsin Constitution, senate districts should consist of "convenient contiguous territory." Wis. Const. art. IV, § 5; Order ¶ 37. Finally, contiguity has always been considered a traditional redistricting criterion for congressional districts.

An exception to this general rule of contiguity lies where "annexation by municipalities creates a municipal 'island.'" Order ¶ 36. Such annexations are common in Wisconsin.[27] In that circumstance, a district may contain detached portions of a single municipality and still be deemed contiguous for purposes of the state constitutional requirement, so long as "the distance between town and [annexed] island is slight." *Prosser*, 793 F. Supp. at 866; *see also id.* ("literal contiguity" not required, where municipal islands are

[27] Since 2012, over 800 proposed annexations by cities and villages were reviewed and categorized as "in the public interest." Municipal Data System, available at https://mds.wi.gov/View/Petitions (filtering for "in the public interest") (last accessed Dec. 14, 2021).

concerned); Order ¶ 36. Wards, too, are sometimes themselves discontiguous due to these "islands." Wis. Stat. §§ 5.15(1)(b), 5.15(2)(f)(3). While the caselaw does not specifically discuss discontiguous wards, any discontiguity in districts created by these ward "islands" should be subject to the same rule as discontiguous municipalities.

* * *

The MathSci Proposed Maps are contiguous as defined under Wisconsin law. Wis. Const. art. IV, § 4; Order ¶ 36.

3. Geographic Compactness

The Wisconsin Constitution mandates that assembly districts be "in as compact form as practicable." Wis. Const. art. IV, § 4; Order ¶ 37; *Zimmerman I*, 23 Wis. 2d at 606. "The term 'compact' has not been defined in Wisconsin, but other states with similar constitutional requirements have defined 'compact' as meaning closely united in territory." *AFL-CIO*, 543 F. Supp. at 634 (citing *People ex rel. Woodyatt v. Thompson*, 40 N.E. 307 (Ill. 1895)). While this requirement does not technically apply to senate districts, due to Wisconsin's nesting system, the compactness requirement for assembly districts necessarily implicates senate districts. Moreover, while compactness is not a legal requirement for congressional districts, it has always been considered a traditional redistricting criterion.

The level of compactness required by the Wisconsin Constitution is defined not in absolute terms, but in relation to what is "practicable." This Court and others have been clear, however, that compactness remains a constitutional *requirement*. Indeed, within the limits of what is practicable, and balanced against other constitutional requirements, including population equality, compactness can be a proper basis for choosing one plan over another. *See Zimmerman I*, 23

Wis. 2d at 607 (rejecting certain plans for lack of compactness and ruling that "compactness compelled adoption of the alternatives embodied in the present judgment"); *see also Baumgart*, 2002 WL 34127471, at *7 (court endeavored to "create physically compact senate districts" and noted that "[d]istrict compactness levels" in its plans were higher than in the plans submitted by the parties).

The enshrining of compactness within the Wisconsin Constitution recognizes that compactness is a "desirable feature[]" in a district. *Prosser*, 793 F. Supp. at 863. Compactness "reduce[s] travel time and costs," in turn "mak[ing] it easier for candidates for the legislature to campaign for office and once elected to maintain close and continuing contact with the people they represent." *Id.* Further, compactness is one of several "proxies for homogeneity of political interests." *Id.*

Although this Court has not adopted a metric for compactness, Order ¶ 37, other courts have relied on mathematical measures of compactness including the Polsby-Popper and Reock scores. *See*, *e.g.*, *Cooper*, 137 S. Ct. at 1475; *League of Women Voters of Fla. v. Detzner*, 179 So. 3d 258, 283 (Fla. 2015); *League of Women Voters of Pa. v. Commonwealth*, 178 A.3d 737, 818 (Pa. 2018); *Vesilind v. Va. State Bd. of Elections*, 813 S.E.2d 739, 743 (Va. 2018); *see also Baumgart*, 2002 WL 34127471, at *4, *7 (using "perimeter to area" and "smallest circle" measures); *Prosser*, 793 F. Supp. at 863–64 (citing 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)).

The Polsby-Popper score compares a district's area to its perimeter to measure its jaggedness. Duchin Report § 5.2. The Reock score compares a district's area to the area of the smallest circle that

could circumscribe the district, thus measuring the district's elongation. *Id.* A circular district gets a perfect score of 1 under both measures.[28]

The "cut edges" score is another metric used to calculate compactness. It counts how many adjacent pairs of geographical units receive different district assignments—*i.e.*, how much work would have to be done to separate the districts from each other. *Id.* Unlike Polsby-Popper and Reock, it does not measure the compactness of each district's shape, but rather computes a compactness score for the entire map. And unlike the other two measures, a cut-edges score improves if it gets lower, not higher.

* * *

The districts in each of the MathSci Proposed Maps score well on each of these three measures of compactness, including when compared to the last validly enacted plan:

TABLE 6: Compactness[29]

	2011 Maps			**MathSci Proposed Maps**		
	Block Cut Edges (lower is better)	**Average Polsby-Popper** (higher is better)	**Average Reock** (higher is better)	**Block Cut Edges** (lower is better)	**Average Polsby-Popper** (higher is better)	**Average Reock** (higher is better)
Assembly	18,994	0.260	0.390	17,781	0.282	0.406
Senate	10,928	0.230	0.402	9,754	0.260	0.402
Congressional	4,293	0.209	0.440	3,228	0.305	0.464

4. Nesting

[28] These measures are more useful for comparing districts within the same State, rather than comparing districts across different States, since they depend on various factors (*e.g.*, the shape of the State's external boundary) that are not relevant to the reasons for demanding geographically compact districts.

[29] Duchin Report, Tables 4, 9, 15.

The Wisconsin Constitution provides that no assembly district may be "divided in the formation of a senate district." Wis. Const. art. IV, § 5; Order ¶ 37. In other words, assembly districts must be cleanly nested inside senate districts. *Zimmerman I*, 23 Wis. 2d at 607 ("Assembly district lines are held inviolable. Senate districts consist of whole assembly districts …"). Further, "the number of the members of the assembly shall never be less than fifty-four nor more than one hundred. The senate shall consist of a number not more than one-third nor less than one-fourth of the number of the members of the assembly." Wis. Const. art. IV, § 2. Coupled with the population-equality standard, this means that each senate district must contain the same number of assembly districts. Since membership in the Wisconsin Legislature is fixed at 33 State Senators and 99 Representatives to the Assembly, three assembly districts must be nested in each senate district. *See* Wisconsin Legislative Reference Bureau, *Redistricting in Wisconsin 2020: The LRB Guidebook* 19 n.80 (2020).[30]

* * *

The MathSci Proposed Maps satisfy this requirement, since the 99 assembly districts nest perfectly into 33 senate districts.

IV. THE MATHSCI PROPOSED MAPS APPROPRIATELY REFLECT TRADITIONAL REDISTRICTING CRITERIA.

Justice Hagedorn's concurring opinion recognizes that "[l]egal standards . . . are not the only permissible judicial considerations when constructing a proper remedy." Order ¶ 83 (Hagedorn, J., concurring).

[30] *Available at* https://docs.legis.wisconsin.gov/misc/lrb/wisconsin_elections_project/redistricting_wisconsin_2020_1_2.pdf.

Certain "traditional and neutral" redistricting criteria, though not legally mandated, can help a court sitting in equity in "exercising [its] judgment to choose the best" map among several that meet the legal requirements. *Id.*

By adhering to a neutral, scientific approach, the Citizen Mathematicians and Scientists can offer maps that appropriately take into account these traditional redistricting criteria without compromising compliance with any legal requirements or straying from the least-change principle.

As noted above, for congressional maps, the only true legal "requirements" are absolute population equality and adherence to the VRA. *See Mahan v. Howell*, 410 U.S. 315, 322 (1973) (population equality); Order ¶ 27 (VRA). Nonetheless, several of the factors considered under the Wisconsin Constitution—respect for political subdivisions, compactness, and contiguity—are traditional redistricting criteria that powerfully inform the selection of a congressional map among several that satisfy applicable legal requirements. The application of these factors to congressional maps, however, may be less stringent than to the assembly and senate maps, for which these same factors function as constitutional requirements.

In addition, there are at least two traditional and neutral redistricting criteria that can and should influence this Court's choice among maps that meet all other requirements: respect for communities of interest (which applies to both congressional and state legislative plans) and minimizing the number of Wisconsin citizens who must wait six years, from 2018 to 2024, for the opportunity to choose their state senator (which applies only to the senate plans).

A. Respect for Communities of Interest

Communities of interest are a "universally recognized redistricting criterion." Order ¶ 83 (Hagedorn, J., concurring). This criterion is an "appropriate, useful, and neutral factor to weigh," even if it is not legally required. *Id.*; *see Abrams v. Johnson*, 521 U.S. 74, 100 (1997) (district court properly considered preserving communities of interest in formulating redistricting plans). Consistent with this principle, federal courts in Wisconsin have taken communities of interest into account in evaluating and developing prior redistricting plans. For example, in *Baumgart*, the court noted that "[w]hen making the necessary changes to the boundaries of the existing districts, the court was guided by the neutral principles of maintaining municipal boundaries and uniting communities of interest." 2002 WL 34127471, at *7. The objective of preserving communities of interest overlaps with and is served by certain legal requirements for redistricting discussed above. As courts have recognized, this objective is "[c]losely related to the goal of maintaining the integrity of county and municipal lines." *AFL-CIO*, 543 F. Supp. at 636; Wis. Stat. § 5.15(1)(b) ("To suit the convenience of the voters residing therein each ward shall, as far as practicable, be kept compact and observe the community of interest of existing neighborhoods and other settlements."); *see also Prosser*, 793 F. Supp. at 863 ("There is some although of course not a complete correlation between geographical propinquity and community of interests."). Additionally, an "important aspect" of preserving communities of interest is "avoiding any dilution in the voting strength of racial and ethnic minorities." *AFL-CIO*, 543 F. Supp. at 636; *see also Abrams*, 521 U.S. at 94 (analyzing minority population in a particular district as a community of interest).

In general, "communities of interest" or "COIs" refer to distinct geographic areas whose residents have common social, cultural, economic, or policy interests. Duchin Report § 5.4. A map is deemed to preserve a community of interest if a single district mostly or wholly contains it (in the case of smaller COIs) or if the community of interest mostly or wholly contains a district (in the case of larger COIs). *Id.* Communities of interest generally are defined from within the community by the people who live there. In connection with the 2021 redistricting cycle, the People's Maps Commission requested and received 1,191 submissions from Wisconsin residents concerning proposed communities of interest that residents wanted to see preserved in the redistricting process. Duchin Report § 5.4. Mathematicians then analyzed those submissions and synthesized them into 36 distinct communities of interest, including five predominantly Black neighborhoods on the north side of Milwaukee. *Id.* Each community of interest was defined by its shared interests, as described more fully in Appendix C to Professor Duchin's report. Mathematicians then devised a way to measure whether and how a redistricting plan preserved a community of interest by defining a "threshold" percentage for preservation. *Id.* If a community of interest has above that threshold percentage of its residents within a single district, the COI is preserved. *Id.* Similarly, if the proportion of a district's residents that belong to a single community of interest is above that threshold percentage, the COI is preserved. *Id.*

* * *

The MathSci Proposed Maps substantially preserve the 36 communities of interest identified through the People's Maps Project. Using 85% as the relevant threshold percentage—meaning that a COI is preserved either if a district has 85% of its population in the COI or

if at least 85% of the COI's population resides in a single district—the MathSci Proposed Congressional Map preserves 23 communities of interest, Duchin Report § 6; the MathSci Proposed Senate Map preserves 17 communities of interest, *id.* § 7; and the MathSci Proposed Assembly Map preserves 31 communities of interest. Moreover, the MathSci Proposed Maps enhance preservation of communities of interest by creating minority opportunity districts in northern Milwaukee County, consistent with Section 2 of the VRA. *See supra* at 16-17. Likewise, by following ward boundaries and minimizing other municipal splits, the MathSci Proposed Maps serve the additional objective of preserving communities of interest. *See supra* at 25, 27.

B. Minimizing Number of Voters Who Must Wait Six Years Before Voting in State Senate Elections.

An additional "traditional and neutral redistricting criterion that may assist [the Court], but does not implicate a legal right per se, is the goal of minimizing the number of voters who must wait six years between voting for their state senator." Order ¶ 83 n.9 (Hagedorn, J., concurring). The Wisconsin Constitution provides that "senators shall be chosen alternately from the odd and even-numbered districts for the term of 4 years." Wis. Const. art. IV, § 5. Residents of odd-numbered districts voted in state senate elections in 2018, while residents of even-numbered districts voted in state senate elections in 2020. To the extent possible without compromising legal redistricting requirements, the map adopted by the Court should preserve the normal cycle of voting for a state senator once every four years by keeping voters from old odd-numbered districts in new odd-numbered districts and keeping voters from old even-numbered districts in new even-numbered districts. *See Prosser*, 793 F. Supp. at 864.

* * *

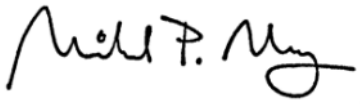
The MathSci Proposed Senate Map moves only 422,492 residents, or 7.17% of all Wisconsinites, from odd to even districts.

CONCLUSION

The MathSci Proposed Maps provide remedies that ensure the preservation of the justiciable and cognizable rights explicitly protected under the United States Constitution, the Voting Rights Act, and Article IV, Sections 3, 4, and 5 of the Wisconsin Constitution, while minimizing deviation from existing law and appropriately considering traditional neutral redistricting criteria. The Citizen Mathematicians and Scientists urge the Court to adopt their Proposed Maps for Congress, the Senate, and the Assembly.

Dated this 15th day of December 2021.

BOARDMAN & CLARK LLP
By



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FORM & LENGTH CERTIFICATION

I hereby certify that this brief conforms to the rules contained in § 809.19(8)(b) and (c) for a brief produced with a proportional serif font. The length of this brief is 9,171 words.

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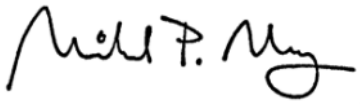

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This electronic brief is identical in content and format to the printed form of the brief filed as of this date.

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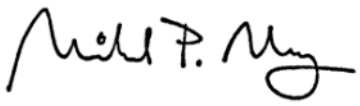

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