IN THE SUPREME COURT OF WISCONSIN

NO. 2023AP1399-OA

Rebecca Clarke, Ruben Anthony, Terry Dawson, Dana Glasstein, Ann Groves-Lloyd, Carl Hujet, Jerry Iverson, Tia Johnson, Angie Kirst, Selika Lawton, Fabian Maldonado, Annemarie McClellan, James McNett, Brittany Muriello, Ela Joosten (Pari) Schils, Nathaniel Slack, Mary Smith-Johnson, Denise Sweet and Gabrielle Young,

       Petitioners,

Governor Tony Evers, in his official capacity; Nathan Atkinson, Stephen Joseph Wright, Gary Krenz, Sarah J. Hamilton, Jean-Luc Theffeault, Somesh Jha, Joanne Kane and Leah Dudley,

       Intervenors-Petitioners,

   v.

Wisconsin Elections Commission; Don Millis, Robert F. Spindell, Jr., Mark L. Thomsen, Ann S. Jacobs, Marge Bostelmann, and Carrie Riepl, in their official capacities as Members of the Wisconsin Election Commission; Meagan Wolfe, in her official capacity as the Administrator of the Wisconsin Elections Commission; Andre Jacque, Tim Carpenter, Rob Hutton, Chris Larson, Devin LeMahieu, Stephen L. Nass, John Jagler, Mark Spreitzer, Howard Marklein, Rachael Cabral-Guevara, Van H. Wanggaard, Jesse L. James, Romaine Robert Quinn, Dianne H. Hesselbein, Cory Tomczyk, Jeff Smith, and Chris Kapenga, in their official capacities as Members of the Wisconsin Senate,

       Respondents,

Wisconsin Legislature; Billie Johnson, Chris Goebel, Ed Perkins, Eric O'Keefe, Joe Sanfelippo, Terry Moulton, Robert Jensen, Ron Zahn, Ruth Elmer and Ruth Steck,

       Intervenors-Respondents.

1

IN AN ORIGINAL ACTION TO THE
SUPREME COURT OF WISCONSIN

CORRECTED EXPERT REPORT OF KENNETH R. MAYER, Ph.D.
IN SUPPORT OF REMEDIAL MAPS PROPOSED BY
THE DEMOCRATIC SENATOR RESPONDENTS

Executive Summary

In this report, I describe the features of a remedial redistricting plan for the Wisconsin Assembly and Senate districts, proposed in the above-captioned matter by Senators Tim Carpenter, Chris Larson, Mark Spreitzer, Dianne H. Hesselbein and Jeff Smith (the "Democratic Senator Respondents"). That plan is referred to herein as the "proposed map" (or individually as the "proposed Assembly map" and the "proposed Senate map, or "proposed "plans"). A visual depiction of the proposed plans are attached as Appendix B.

I have analyzed the proposed map according to the criteria set forth in the Wisconsin Supreme Court's December 22, 2023 Decision and the December 26, 2023 Memorandum to the Court on Technical Specifications and Data Requirements for Proposed Remedial Maps Submissions (the "Technical Memo"). More specifically, recognizing the Court's goal to remedy the unconstitutionality of the current maps with a remedial map that rejects a "least change" approach, meets all legal requirements, considers traditional districting criteria, and maintains political neutrality, my analysis focuses on population equality, political subdivision splits, contiguity, compactness, compliance with federal law, communities of interest, and political neutrality.

As detailed below, the proposed map:
- Is comprised of districts with total population deviations (the difference between the most- and least-populous district divided by the ideal population) of 1.86% for the proposed Assembly map and 1.36% for the proposed Senate plan;
- Respects political subdivision boundaries consistent with the requirements of equal population, contiguity, and compactness, with 118 and 83 political subdivision splits in the Assembly and Senate, respectively, and only a single ward split;
- Contains no non-contiguous territory within districts;
- Preserves important communities of interest throughout the state;
- Scores well on compactness measures (considerably improved over the current maps);
- Complies with the requirements of federal law, preserving the right of minority populations to have an equal opportunity to elect candidates of choice;
- Is politically neutral, aggregating votes into seats in a far more symmetrical and less biased manner than the existing maps, giving both parties equivalent opportunities to win legislative majorities near 50% of the statewide vote share.

Detailed Report

The analysis and opinions described herein are based on the technical and specialized knowledge that I have gained from my education, training, and experience, and are consistent with widely accepted and reliable methodologies and practices in the areas of redistricting and political science. The opinions I express in this report are made to a reasonable degree of professional certainty, and are based on my review of the information and data referenced and described herein.

I.   Data and Methods

The proposed map was produced using WISE-District software, a custom software extension to ESRI's ArcGIS Desktop software, created by the Wisconsin Legislative Technology Services Bureau ("LTSB"). In analyzing the map, I relied on the following data:

- A block assignment file for the proposed map, listing Census Block assignments for each Assembly and Senate district
- Shape files of the proposed Assembly and Senate districts
- Population, political subdivision splits, contiguity, and compactness reports provided by counsel and replicated on Dave's Redistricting App, a mapping web site recommended by consultants retained by this Court, Dr. Bernard Grofman and Dr. Jonathan Cervas.
- Population and demographic data on district populations obtained via Dave's Redistricting App using the 2020 Census.
- Measures of neutrality, including partisan bias, partisan symmetry, declination, mean-median, and efficiency gap calculations made through the Dave's Redistricting App.
- Election data from the Wisconsin Elections Commission
- Compactness metrics for the current Assembly and Senate
- The peer reviewed and other academic literature cited in this report.
- Court filings cited in this report.

My understanding of the map drawing process is that the Democratic Senator Respondents used the August 2021 Redistricting Dataset referred to in the December 30, 2023 Joint Stipulation as to the Redistricting Data, including Appendix A ("Data Stipulation"), did not rely on any racial data in drawing Assembly or Senate districts, and did not take incumbent residential addresses into account. In addition, district lines and compactness measures excluded unpopulated Census blocks consisting of water unless those blocks were assigned to a ward or are surrounded by one or more municipalities. In layman's terms, this excluded blocks in Lake Michigan, Lake Superior, and Lake Winnebago, unless the block was included in a district to maintain contiguity across a water area to a land area.

II.   Qualifications and Experience

I have a Ph.D. in political science from Yale University, where my graduate training included courses in econometrics and statistics. My undergraduate degree is from the University of California, San Diego, where I majored in political science and minored in applied mathematics.

I have been on the faculty of the political science department at the University of Wisconsin-Madison since August 1989, and a Full Professor since 2000.

I was part of a research group retained by the Wisconsin Government Accountability Board in 2008 to review their compliance with federal mandates and reporting systems under the Help America Vote Act, and to survey local election officials throughout the state. I serve on the Steering Committee of the Wisconsin Elections Research Center, a unit within the UW-Madison College of Letters and Science. In 2012, I was retained by the United States Department of Justice to analyze data and methods regarding Florida's efforts to identify and remove claimed ineligible noncitizens from the statewide file of registered voters. In 2022 I chaired the Dane County (WI) Election Security Review Committee, which produced a report for county officials on the physical security of election infrastructure.

I have served as an expert witness in 5 previous redistricting cases in Wisconsin since 2002: *Johnson, et al., v. WEC, et al.*, 2021 WI 87 (Wis. 2021), *Whitford et al. v. Gill et* al, 218 F. Supp. 3d 837 (W.D. Wis. 2016), *Baldus et al. v. Brennan et al.,* 849 F. Supp. 2d 840 (E.D. Wis. 2012), *County of Kenosha v. City of Kenosha,* No. 22-CV-1813 *(*Wis. Cir. Ct., Kenosha Cty. 2011), and *Baumgart et al. v. Wendelberger et al.*, 2002 WL 34127471 (E.D. Wis. 2002). In the six years I have also served as an expert witness in redistricting cases in Michigan, *League of Women Voters of Michigan, et al. v. Johnson*, No. 2:17-cv-14148-DPH-SDD (E.D. Mich. 2018) and Georgia, *Dwight et al. v Raffensperger*, No: 1:18-cv-2869-RWS (N.D. Ga. 2019).

In the past four years, I have testified as an expert witness in trial or deposition in the following cases:

Federal: *Northeast Ohio Coalition for the Homeless et al. v .Frank LaRose,* Case No. 1:23-cv-26-DCN (E.D. Ohio).; *LULAC Texas, et al., v. John Scott, et al.,* No. 1:21-cv-0786-XR (W.D. Tex.); *League of Women Voters of Fla.., Inc., et al. v. Lee, et al.*, No. 4:21-cv-00186-MW-MAF (N.D. Fla.); *Fair Fight Inc., et al. v. True the Vote, Inc., et al.*, No. 2:20-cv-00302-SCJ (N.D. Ga.); *Fair Fight Action v. Raffensperger,* No. 1:18-cv-05391-SCJ (N.D. Ga.); *Kumar v. Frisco Indep. Sch. Dist.*, *et al.*, No. 4:19-cv-00284-ALM (E.D. Tex.).

State: *Missouri State Conference of the NAACP, et. al. v. State of Missouri, et al.,* Case 22AC-CC04439 (Cir. Ct. of Cole Cnty., MO); *Lake v. Hobbs, et al.*, CV-2022-095403 (Maricopa Cty. Sup. Ct, AZ); *Montana Democratic Party and Mitch Bohn v. Christi Jacobsen,* consolidated Case No. DV 21-0451 (13th Judicial Ct. Yellowstone Cty, MT); *League of Women Voters v. Thurston*, No. 60CV-21-3138 (5th Div. Cir. Ct. Pulaski Cnty., AR); *Driscoll v. Stapleton*, No. DV 20 0408 (13th Judicial Ct. Yellowstone Cnty., MT);

Courts have repeatedly accepted my expert opinions and the basis for those opinions. No court has ever excluded my expert opinion under *Daubert* or any other standard. Courts have cited my expert opinions in their decisions, finding my opinions reliable and persuasive. *See Driscoll v. Stapleton*, No. DV 20 0408 (13th Judicial Ct. Yellowstone Cnty., MT); *Priorities U.S.A., et al. v. Missouri, et al.*, No. 19AC-CC00226 (Cir. Ct. Cole Cnty., MO); *Whitford v. Gill*, 218 F. Supp. 3d 837 (W.D. Wis. 2016); *One Wis. Inst.*, *Inc. v. Thomsen*, 198 F. Supp. 3d 896 (W.D. Wis. 2016); *Baldus v. Members of Wis. Gov't Accountability Bd.*, 849 F. Supp. 2d 840 (E.D. Wis.

2012); *Milwaukee Branch of the NAACP v. Walker*, 851 N.W. 2d 262 (Wis. 2014); *Baumgart v. Wendelberger*, No. 01-C-0121, 2002 WL 34127471 (E.D. Wis. May 30, 2002).

I am being compensated at a rate of $450 per hour for my services in this matter. My work in this case is independent and impartial. My compensation is not contingent on either the substance of my opinion or the outcome of this case.

III. Analysis of the Proposed Maps

As a starting point, I note that some traditional metrics for evaluating redistricting plans are not applicable in this case, because the Court has specifically noted that it will not use a "least change" criterion. Any contiguous, compact, and politically neutral map will require substantial and fundamental changes from the current map, which is an extreme partisan gerrymander with a significant number noncontiguous geographies and non-compact districts (see section F below).[1]

A. Population Equality

Tables A1 and A2 in Appendix A show the population deviation in the proposed plan, based on the ideal population of 59,533 for Assembly districts and 178,598 in Senate districts.

The total population deviation (the difference between the most- and least-populous district divided by the ideal population) is 1.86% for the Assembly plan and 1.36% for the Senate plan.

B. Political Subdivision Splits

I calculate the number of political subdivision splits in 2 ways: the number of municipalities, counties, and wards that are split into more than 1 district, and the total number of splits in each county and municipality.

Table 1 contains summary data, and shows that the proposed Assembly plan splits 51 counties and 67 municipalities (cities, towns, or villages), with a total of 118 split political subdivisions. The proposed Senate plan splits 42 counties and 41 municipalities, for a total of 83 split political subdivisions.

---

[1] A federal court held that the Assembly map enacted in 2011 was an extreme gerrymander "intended and accomplished an entrenchment of the Republican Party likely to endure for the entire decennial period. They did so when the legitimate redistricting considerations either required nor warranted the implementation of such a plan." *Whitford v. Gill,* 218 F. Supp. 3d 837, 883 (W.D. Wis. 2016). SB 621, which was adopted by the Wisconsin Supreme Court in the *Johnson* litigation as a "least change" revision to the 2011 map, was on some metrics a *more* extreme gerrymander. In the 2022 elections, the first under the SB 621 map, the GOP share of the top ticket statewide vote went down (from 49.7% to 48.3%), but its share of Assembly and Senate seats went *up* (from 61 to 64 in the Assembly and from 21 to 22 in the Senate). See https://legis.wisconsin.gov/; https://elections.wi.gov/elections/election-results#accordion-5601.

Table 1		
Political Subdivision Splits		
	Assembly	**Senate**
County	51	42
Municipal	67	41
Total	118	83

The Technical Memo requests data on "the total number of split pieces for each type of unit" and on "which units are split and how many times each unit is being split." These detail totals are shown in appendix A3 and A4, bearing in mind that many of the county and municipal splits are unavoidable because some county and municipal populations exceed permissible district populations. Furthermore, the number of splits in the proposed plan is not directly comparable to the number of splits in the existing plan, because of the contiguity requirement: eliminating municipal islands will inevitably cause some additional splits.

The proposed map does remarkably well in avoiding ward splits. The August 2021 LTSB shape files show 6,748 populated wards in Wisconsin. The proposed map shows only two split wards, only one of which is an actual split. Both occur in the City of Madison and are unavoidable because it would be otherwise impossible to include an undivided ward within a contiguous district in the proposed map.

The first instance occurs in the City of Madison ward 106, split between Assembly Districts 50 and 78. A single block enclosed within this ward is a noncontiguous part of the Town of Middleton ward 8 (block ID 550250109031023) – a municipal island in the City of Madison. In order to maintain the Town of Middleton entirely in Assembly District 78, the district extends into a single block in Madison ward 106. Maintaining contiguity required either splitting the Town of Middleton or, as chosen here, splitting Madison ward 106 into two separate districts.

The second instance occurs in the Town of Madison ward 3, split between Assembly Districts 47 and 78. Three census blocks in the Town of Madison ward 3 (block IDs 5500250004073004, 5500250004073022, and 5500250004073023) are in the middle of City of Madison ward 109 – a municipal island within the City of Madison. While this appears in the plan as a split based on the stipulated data, the Town of Madison no longer exists after annexation into the City of Madison on October 31, 2022.[2] As a result, this should not be counted as a true split.

C. Contiguity

Contiguity is defined as all parts of a geographic area being connected to each other; the Court's December 22, 2023 Decision cites Grofman's definition as "a district may be defined as contiguous

---

[2] https://www.cityofmadison.com/sites/default/files/city-of-madison/city-hall/town-of-madison/documents/ToM_attachment_Factsheet_April2022_FINAL_English.pdf.

if every part of the district is reachable from every other part without crossing the district boundary" (Grofman 1985, 84).

There are no noncontiguous land areas in the proposed plan. In 2 cases, a district is comprised of noncontiguous populated land areas separated by water (literal islands of land). These are Madeline Island in Assembly District 73 (Senate District 25), and Washington Island in Assembly District 1 (Senate District 1).

In addition, 5 Senate districts[3] and 7 Assembly districts[4] have a noncontiguous unpopulated land island separated from the rest of the district by water.

The remaining cases of apparent non-contiguity stem from ward fragments resulting from errors in the underlying Census data, which the parties have agreed should not be counted as noncontiguous.[5] *See* Data Stipulation at ¶¶ 8-9.

There are two cases of point contiguity (or "touch point contiguity," the term used by the Court), in which a contiguous area in a district is connected with the rest of the district by a single point. One occurred in the Town of Mosinee in Marathon County. Here, a single Census Block (Block ID 550730012023061, population 15) in Mosinee is point-contiguous to the rest of the Town, which is otherwise within Assembly District 86. Including this block in that district prevents a municipal split and maintains the Town boundaries within a single district.

The other occurs in the Village of Mount Pleasant in Racine County, on the border of Assembly districts 66 and 62. One unpopulated Census block in ward 16 (Block ID 551010017031008) is point contiguous with the rest of the ward which is otherwise in Assembly district 66. Including this point in district 66 prevents a municipal split and maintains the entire ward within a single district.

D. Compactness

Compactness calculations were affected by the presence of Census blocks with incorrect ward assignments ("ward fragments"). My understanding is that all parties agreed to not count as splits or noncontiguity instances where such ward fragments exist.[6] However, depending on the characteristics of a specific proposed plan, those ward fragments would affect compactness calculations, particularly if the ward fragment was far away from the correct ward and municipality. To determine compactness measures more accurately, I calculated Reock and Polsby-Popper scores after manually reassigning the fragments from affected districts to the GEOID reflected in the far right column of the Appendix to the Data Stipulation.[7] The ward fragments remain in the final plan.

---

[3] Senate districts 2, 12, 19, 21, and 30.

[4] Assembly districts 4, 36, 56, 63, 74, and 88.

[5] These occur in Assembly districts 44, 45, 48, 91, 92, and 98; and Senate districts 16 and 33.

[6] See Data Stipulation, paragraphs 8-9.

[7] Removing the ward fragments increased the plan average Reock score from 0.396 to 0.403 and the Polsby-Popper score 0.307 to 0.31 in the Assembly; it did not affect the overall average scores in the Senate.

I use two of the most common measures of compactness. The Reock measure is the area of a district divided by the area of the smallest circle that completely encloses the district. The Polsby-Popper measure is the area of a district divided by the area of a circle with the same circumference as the perimeter of the district. The Reock measure captures the shape of a district, while Polsby-Popper captures the regularity of the district border (see Grofman and Cervas 2020, 4-5).

Table 2 shows overall plan average compactness measures (Reock and Polsby-Popper) for Assembly and Senate Districts. The plan average Reock value for the proposed map is 0.403 for the Assembly and 0.36 for the Senate, compared to SB 621 Reock values of 0.358 and 0.37 for the Assembly and Senate, respectively.

Table 2 - Mean Plan Compactness Measures		
	Reock	Polsby-Popper
Assembly	0.403	0.31
Senate	0.361	0.255

Appendix table A5 shows district-level measures for Assembly districts. Appendix table A6 shows district-level compactness measures for Senate districts.

The most compact Assembly District is 84, with a Reock value 0.656:
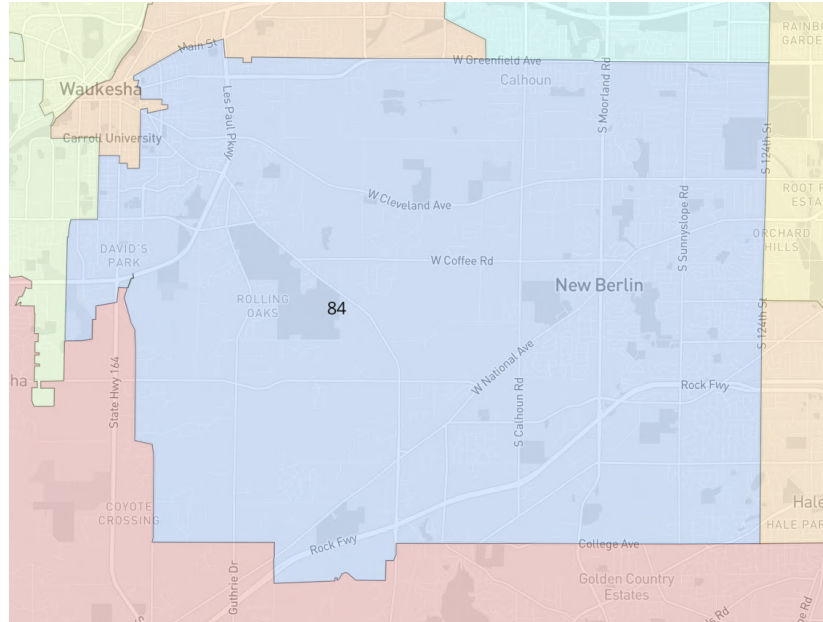
The least compact Assembly district is 1, with a Reock value 0.156:
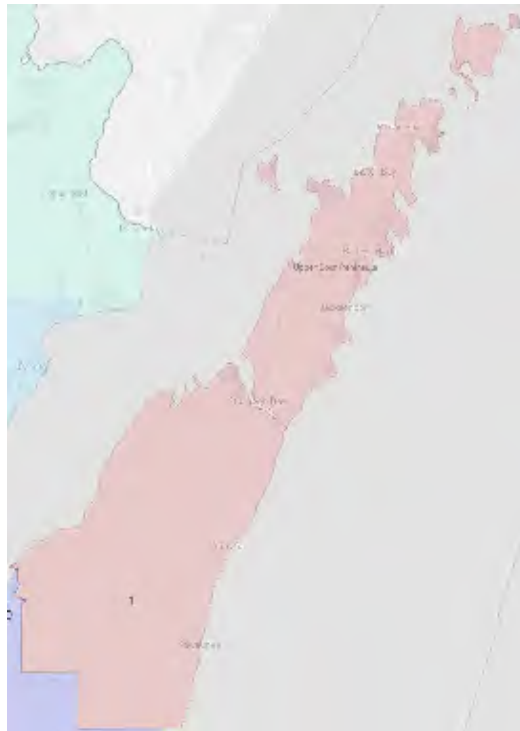
The shape of this district is driven entirely by the geography of the Door peninsula, and includes the entirety of Door County and Kewaunee County, extending into part of Brown County to the southwest in order to achieve the necessary population equality.

The most compact Senate District is 29, with a Reock value 0.573.
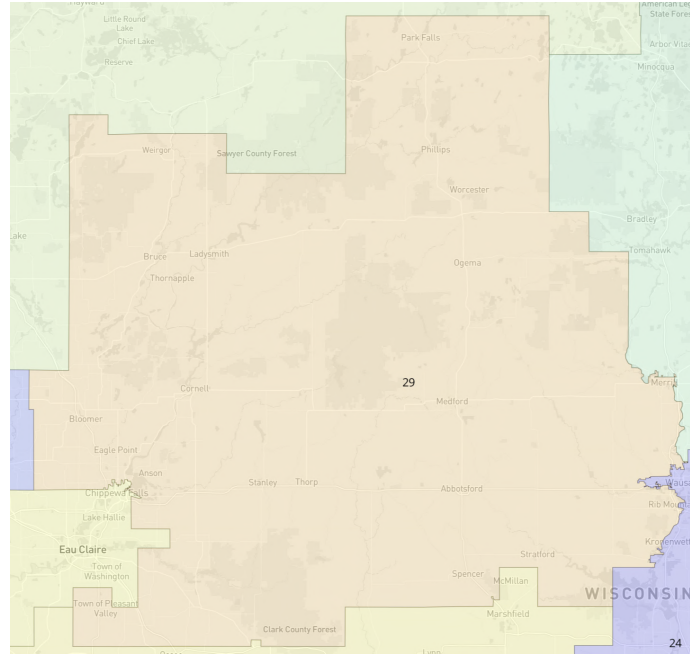
The least compact Senate District is 1, with a Reock value 0.132, which is also driven by the geography of the Door peninsula and the population and boundaries of geographies at the southern edge of the peninsula.

10
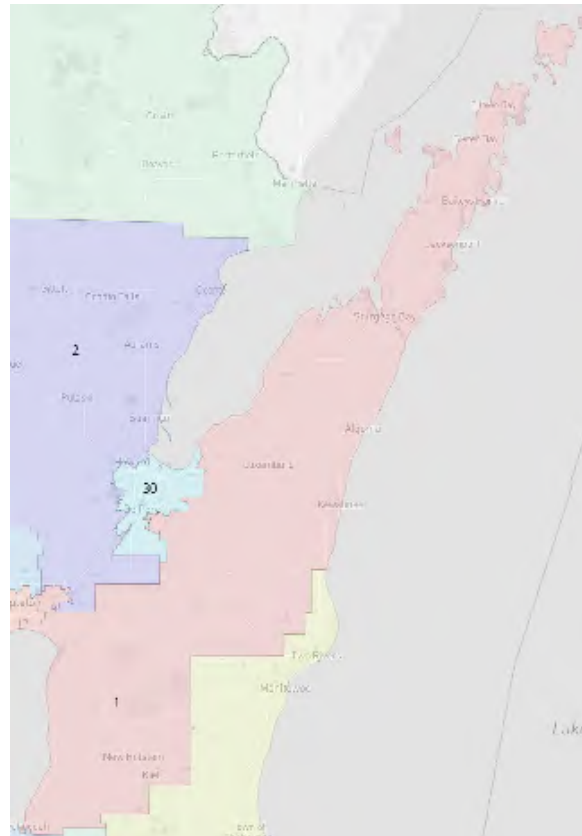
E. Federal Law Compliance – Equal Protection and Voting Rights Act

The Equal Protection Clause of the 14th Amendment of the United States Constitution prohibits legislative maps that sort voters on the basis of race. As noted above, the Democratic Senator Respondents did not consider race in creating their map, and I find no evidence (such as odd shapes, municipal splits, or other departures from traditional redistricting principles), that the proposed map sorts voters on the basis of race.

The Voting Rights Act of 1965 prohibits "vote dilution" of racial minorities in a map which reduces the opportunity of members of a racial group to participate in the political process and elect representatives of their choice, as compared to other members of the electorate.

The following calculations show that the proposed plan resulted from neutral factors and does not dilute minority voting power in the Milwaukee area; significant minority populations are in assembly districts 8, 9, 10, 11, 12, 16, 17 and 18, and senate districts 5 and 6.

The proposed map reunites the Village of Shorewood with other North Shore municipalities in the 23rd Assembly district, respecting the community of interest among the lake shore villages of Shorewood, Fox Point, Bayside, and Whitefish Bay.

The other material change to these districts was eliminating a municipal split in the City of Wauwatosa at the western border of Senate district 6. Under SB 621, the 6th district included 5 wards in Wauwatosa, and the city was split between Senate districts 5 and 6. Under the proposed Senate plan the entire city is contained in the 5th Senate district. This affected Assembly district 18, which under the proposed plan is entirely within the City of Milwaukee.

Table 3 shows core population retention calculations for these districts in the Assembly, with the percentage of populations retained in the proposed districts.[8]

---

[8] The percentage is calculated as the largest core population divided by the population of the proposed district.

11

Table 3 - Core Population Retention Assembly	
District	Core Population Retention (pct)
8	100%
9	97.0%
10	71.3%
11	73.0%
12	84.1%
16	94.4%
17	79.4%
18	79.0%

Table 4 shows core population retention for proposed Senate districts

Table 4 - Core Population Retention Senate	
District	Core Population Retention (pct)
4	86.3%
6	87.3%

Based on the minimal changes to district boundaries, there is no indication that the proposed map denies minority voters in these districts from having an equal opportunity to elect candidates of their choice.

In addition to the elimination of a municipal split in the 6th Senate district, and restoring a community of interest in the North Shore of Milwaukee County (see F 1 below), the proposed districts are more compact than those in the current map. Table 5 shows the Reock values for the altered *Johnson* districts in the proposed Assembly plan and the values for the same districts in the

current map. The mean Reock score for all these districts under the proposed plan (0.443) is higher than mean score for the current map (0.42).

Table 5 - Compactness (Reock)		
District	SB 621	Proposed Map
8	0.586	0.589
9	0.433	0.414
10	0.378	0.358
11	0.38	0.512
12	0.484	0.553
16	0.473	0.485
17	0.352	0.275
18	0.27	0.356
Mean	0.420	0.443

The neutral changes made to Assembly districts 10 and 18, and Senate districts 3 and 4, which produce more compact districts, split fewer municipalities, and preserve communities of interest, protect the rights of minority voters to have an equal opportunity to elect candidates of choice.

F. Preserving Communities of Interest

Definitions of "communities of interest" are subjective, as the term "is a vaguely defined concept without a clear legal definition or one that is widely accepted among social scientists" (Grofman and Cervas 2020, 3). Some recent work has noted that most traditional markers of communities of interest – local political boundaries, for example – are *proxies* that may or may not reliably capture underlying interests in a geographic locality (se Kruse et al. 2023) and explored new metrics that connect spatial mobility (i.e., how people move throughout geographic locations) to preservation of communities of interest in redistricting. This work found generally that more compact districts better preserve COIs as measured by these spatial mobility patterns (see also Lo et al. 2023). Other approaches explore incorporating transportation networks into compactness measures (Grofman and Cervas 2021).

Following Grofman and Cervas, I use their definition as "a geographically bounded set of people who live in a reasonably compact and generally cognizable area, and are a politically cohesive group of people that share a similar social, cultural or economic interests" (Ibid.).

13

For brevity, I focus on some of the most important geographies, and note the differences between the proposed map and the current map (SB 621).

1. Milwaukee North Shore

The proposed map reunites communities in northern Milwaukee County on the shore of Lake Michigan: Shorewood, Whitefish Bay, Fox Point, Bayside, all of which are in Assembly district 23. SB 621 cut through this group of cities, placing Shorewood into district 10.
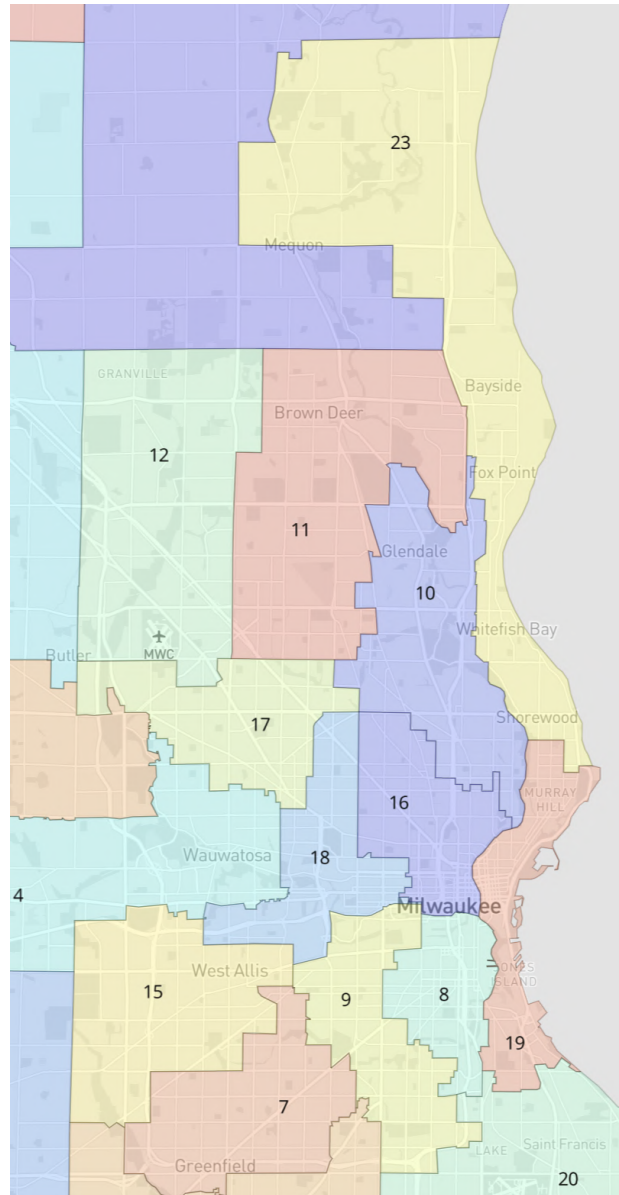
The other change in this area occurred in district 18, which previously extended past the borders of Milwaukee City into a portion of Wauwatosa (which created a municipal split in that city).

Removing that split required changes to district 18, which in turn required changes to other districts in the area in order to achieve population equality. As I noted above in section E, these changes removed an unnecessary split and improved the overall compactness of majority-minority districts in Milwaukee.

2. Green Bay

Under SB 621, Green Bay (population 107,114 in 2020) was divided into four Assembly districts (4, 88, 89, and 90) and 2 Senate districts (2 and 30). The division was such that Lambeau Field – home to the Green Bay Packers – was in a different Senate District (2) than the rest of the city (30). Most of these divisions were entirely unnecessary. Green Bay's population can easily fit within two Assembly districts and a single Senate district.

The proposed plan reunites formerly divided geographies, placing most of Green Bay (including Lambeau Field) in Assembly district 88, with the remainder of the city's population in Assembly district 90.[9]

---

[9] One part of the City of Green Bay (ward 1) is noncontiguous with the rest of the city, and there is no feasible way to connect it to the rest of the city without exceeding population equality limits in districts 1 and 90. As a result, this ward is placed in Assembly district 1.
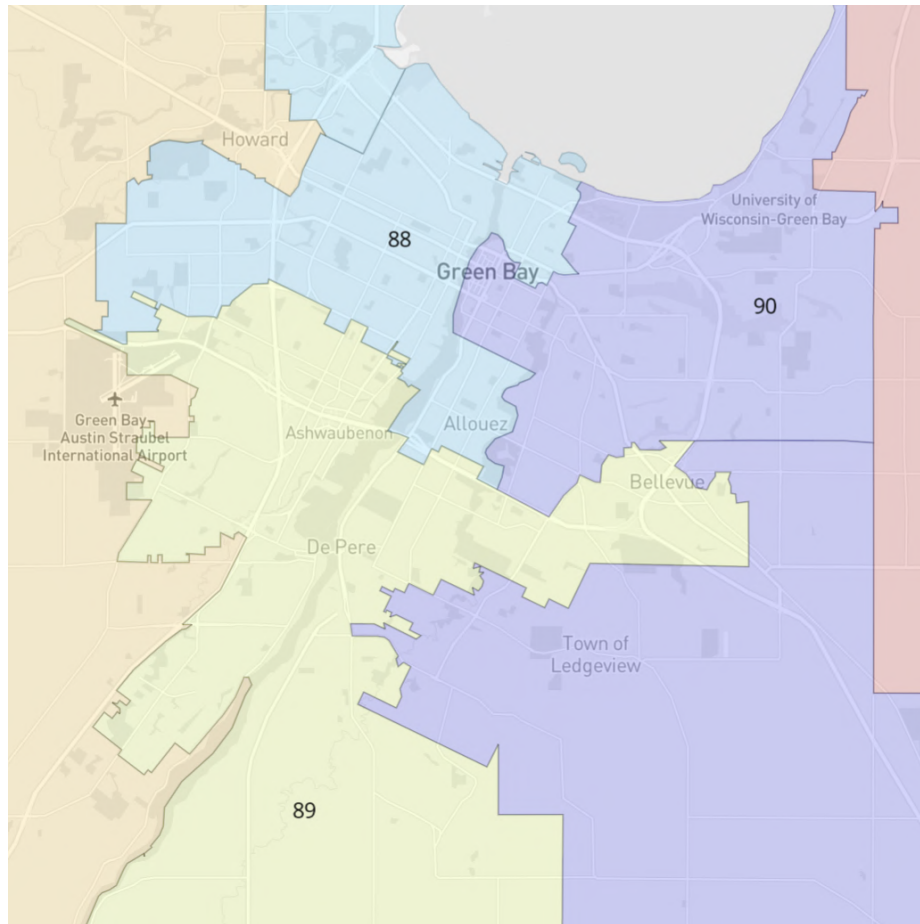
All of Green Bay is in a single Senate district (30).

3. Fox River/Lake Winnebago Shore

Senate district 19, comprised of Assembly districts 55, 56, and 57, includes key municipalities in the Fox River Valley on the Lake Winnebago shoreline. These municipalities are the densest population centers and largest cities on that shoreline.
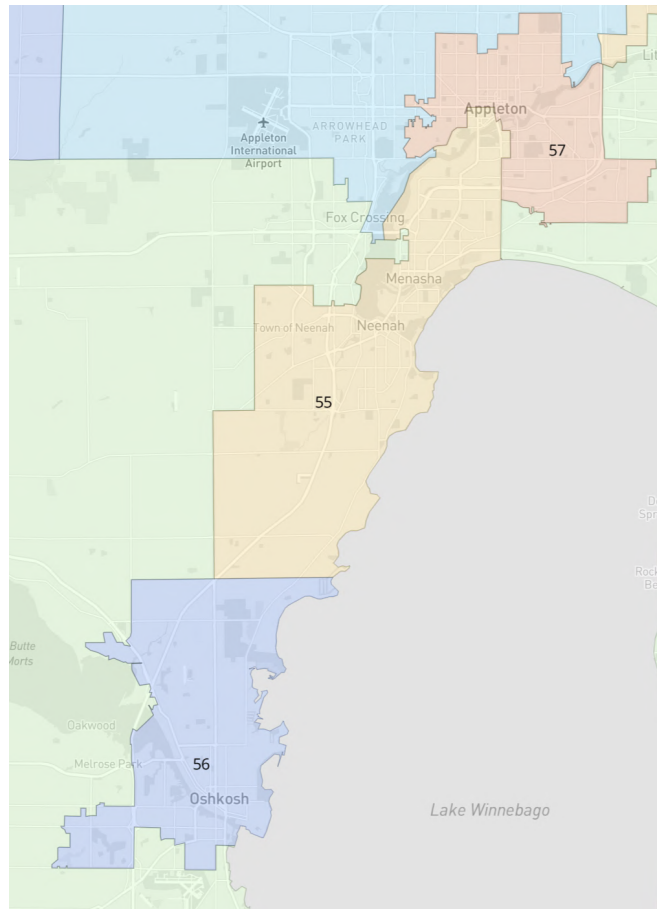
4. Eau Claire/Chippewa Falls

The proposed map maintains Eau Claire and Chippewa Falls in a single Senate district (31), unlike SB 621 which had the cities split between Senate districts 23 and 31.
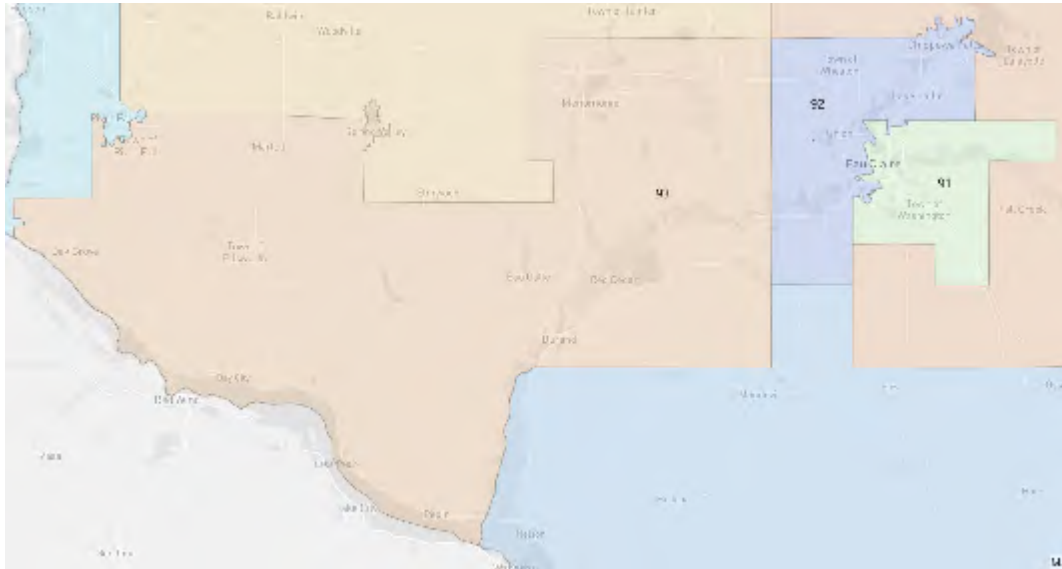
6. Wausau/Stevens Point

Wausau (2020 Census population 39,994) and Stevens Point (population 25,666) are the two largest cities in Central Wisconsin. They are linked economically, geographically, and culturally. The University of Wisconsin-Stevens Point, one of thirteen units in the UW System, has a satellite Campus in Wausau. They are approximately 30 miles apart, connected by an interstate highway and the Wisconsin River.

SB 621 divided these areas into separate Senate districts, placing Stevens Point in SD 24 and Wausau in SD 29. Under SB 621, SD 29 extended from the Town of Franzen in the southeast in a narrow strip to Hayward, almost 150 miles to the northwest. Similarly, SB 621's SD 24 extended 100 miles from the Town of Alban in the northeast nearly to La Crosse on the Mississippi River. Neither of these districts had geographic or representational coherence.

In contrast, the proposed map places Wausau, Stevens Point, and Wisconsin Rapids in the same Senate District (24), uniting these central Wisconsin cities into a geographically coherent and compact district (Reock score 0.534) that largely follows geographic, county, and municipal boundaries:

19
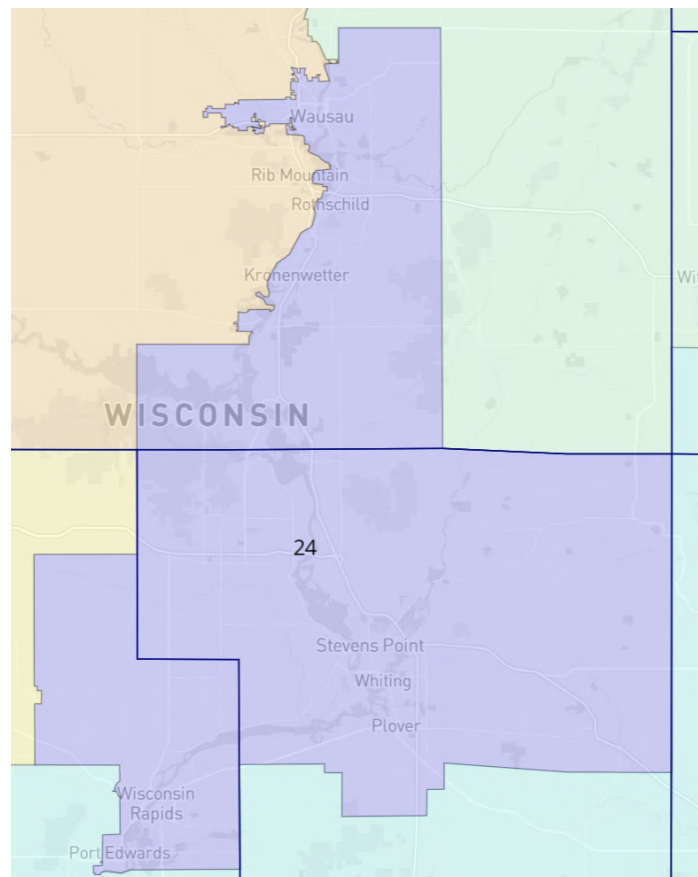
8. Rural Communities in Northern Wisconsin

Outside of cities, Central and Northern Wisconsin have relatively low population densities. In the proposed plan, SD 29 combines all or parts of eight counties into a highly compact rural district that comprises the bulk of the area. The district is connected from east to west by Wisconsin Highway 29, extending from Wausau in the East to Anson and Eagle Point to the west on the outskirts of Chippewa Falls. SD 29 is the most compact in the plan (Reock score 0.573).
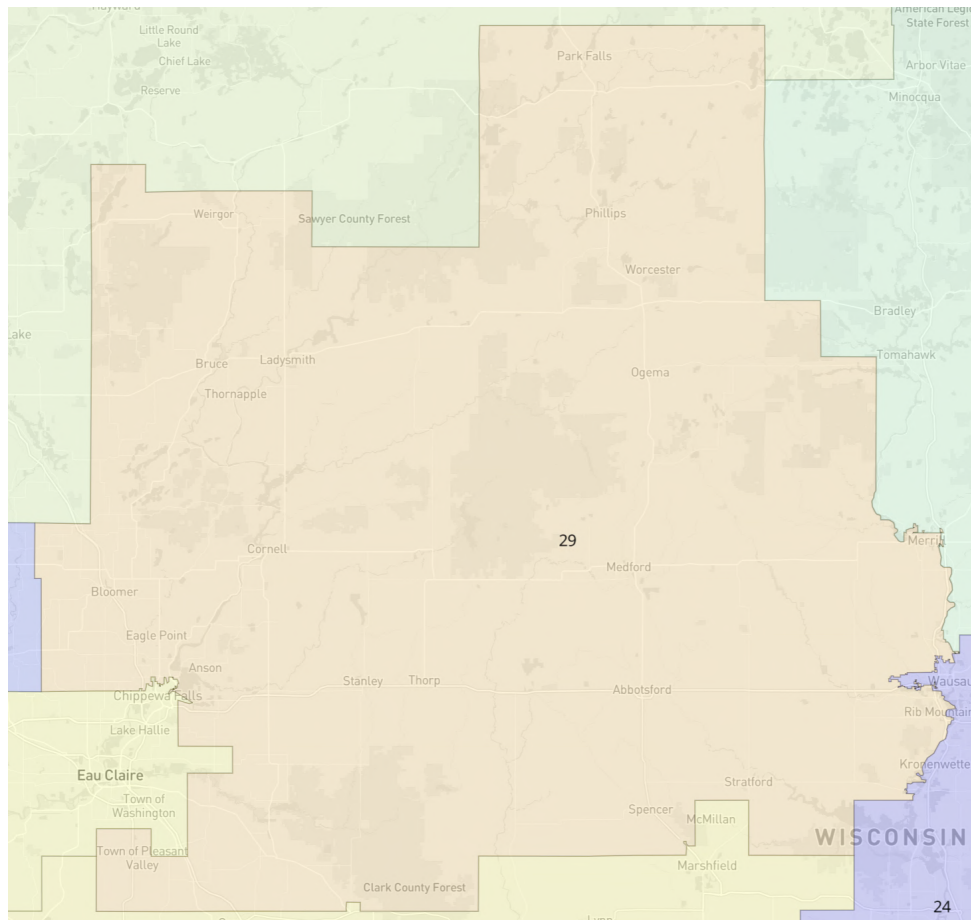
10. Sheboygan, Manitowoc, and Two Rivers

The city of Sheboygan, on Lake Michigan, is small enough (population 49,945) to fit comfortably within a single Assembly district. SB 621 unnecessarily split the city between 2 Assembly districts (26 and 27).

The proposed plan places all of the City of Sheboygan, the Town of Wilson, and most of the Town of Sheboygan in a single Assembly district (26), eliminating a municipal split.

The cities of Manitowoc and Two Rivers have long been linked economically (the cities share the Manitowoc Area Vistors and Convention Bureau).[10] SB 621 split them between two Assembly and two Senate districts.

The proposed plan places both Manitowoc and Two Rivers in the same Assembly district, and knits them together with Sheboygan into the same Senate district (9).

---

[10] https://manitowoc.info/.
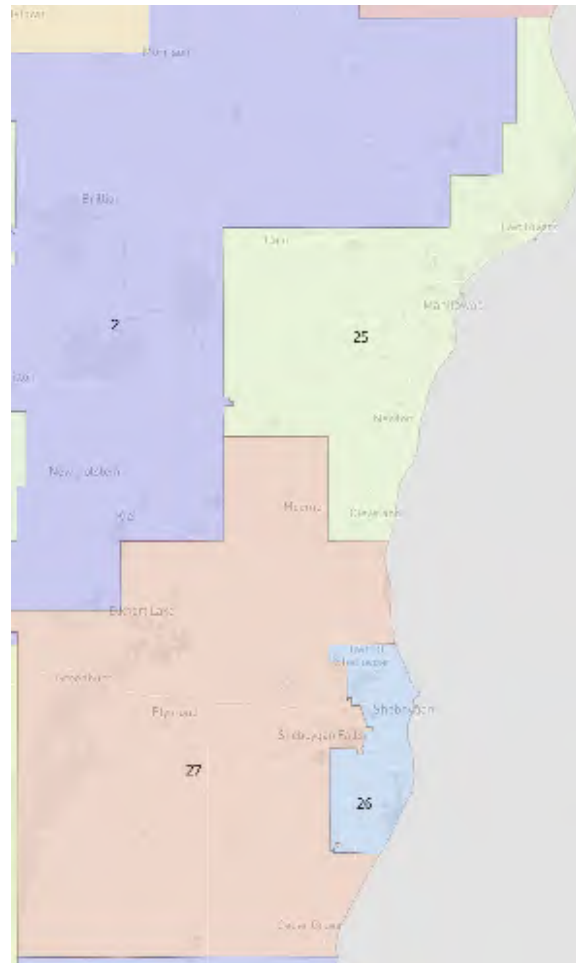
11. Beloit

The city of Beloit has a population (36,657) that can fit easily within a single Assembly district. SB 621 unnecessarily split it between two Assembly districts (31 and 45) and two Senate districts (11 and 15). Further, SB 621 unnecessarily split different pieces of the adjoining Town of Beloit into the same two districts.

The proposed plan maintains the City of Beloit and adjoining municipalities Town of Beloit and Turtle in a single Assembly district (45).
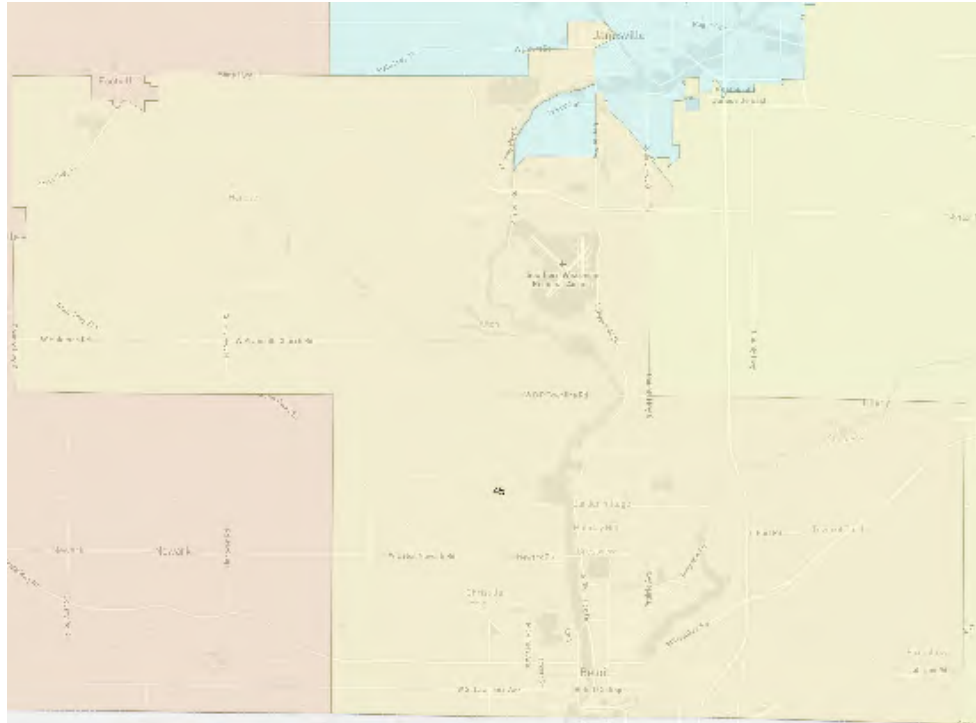
Southwest Wisconsin

Under SB 621, Senate district 17 began at the southwestern-most point in the state, just across the Mississippi River from Dubuque, IA, and extended north for over 200 miles almost to Wisconsin Rapids in central Wisconsin. The district had no geographic or representational coherence.

Under the proposed plan, Assembly districts 49, 50, and 51 comprise the southwest corner of the state, following a key highway (US-151) between Madison and Dubuque. The Senate district (17) follows the Wisconsin River between Spring Green to the Mississippi River, and is the 13th most compact Senate district (Reock value of 0.382).
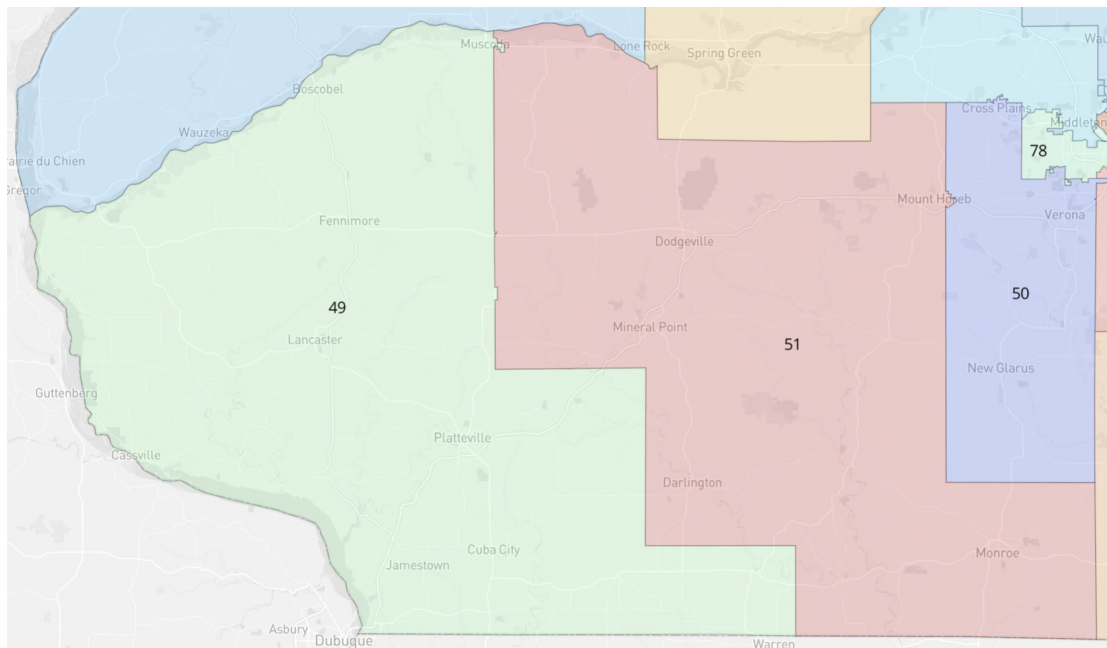
G. Political Neutrality

The Court directed that proposals for a remedial map maintain political neutrality, and the Technical Memo requests specification of metrics used to estimate the degree to which a map satisfies that directive.

The partisan impact of a redistricting plan can be measured several ways, each described further below. A key element of a neutral plan is that votes and seats should track together: a majority of votes should lead to a majority (or near majority) of seats, and the two major parties should obtain roughly the same number of seats at equivalent vote shares.

1. Expected partisanship of district open seat, based on composite

I begin with the composite partisan baseline used in Dave's Redistricting App, which computes party performance using the 2016 and 2020 presidential vote, the 2018 and 2022 U.S. Senate vote,

23

and the 2022 Governor and Attorney General vote.[11]

Appendix table A7 shows the results for the proposed assembly plan at baseline (a 50.5% Democratic -48.2% Republican statewide share, or a two-party vote share of 51.2% Democratic-48.8%% Republican), 47 Democratic Assembly seats, and 16 competitive districts (defined as <10% difference in baseline vote shares between the parties). In table 11, Democratic seats are shaded blue, Republican seats shaded red, and competitive seats in bold with larger font.

Table 12 shows the same data for the Senate. The proposed plan results in 18 Democratic seats, 15 Republican seats and 9 competitive seats at a 51.2%-48.8%% Democratic composite 2-party baseline statewide vote share.

    2. Partisan bias

Partisan bias is a measure of how many "excess" seats a party receives when votes are aggregated into seats (Grofman 1983), most commonly calculated as the number of excess seats a party obtains at 50% of the vote compared to 50% of the seats.

The proposed Assembly plan has a roughly +4-seat Republican partisan bias, indicating that at a 50% statewide vote share, Republicans are expected to win 54 seats (read from the blue curve in the figure; the red line is the Republican seats-votes curve). The plan has a roughly +2.0% Republican vote bias, indicating that Democrats would have to win 52.0% of the statewide vote to obtain a majority of seats.[12]

---

[11] https://davesredistricting.org/maps#aboutdata.

[12] This is considerably better than the current map (SB 621), which has an 11.4% seat bias, and a 4.32% vote bias.

24

Seats-Votes Curve: Democratic Senator Respondents Plan - Assembly
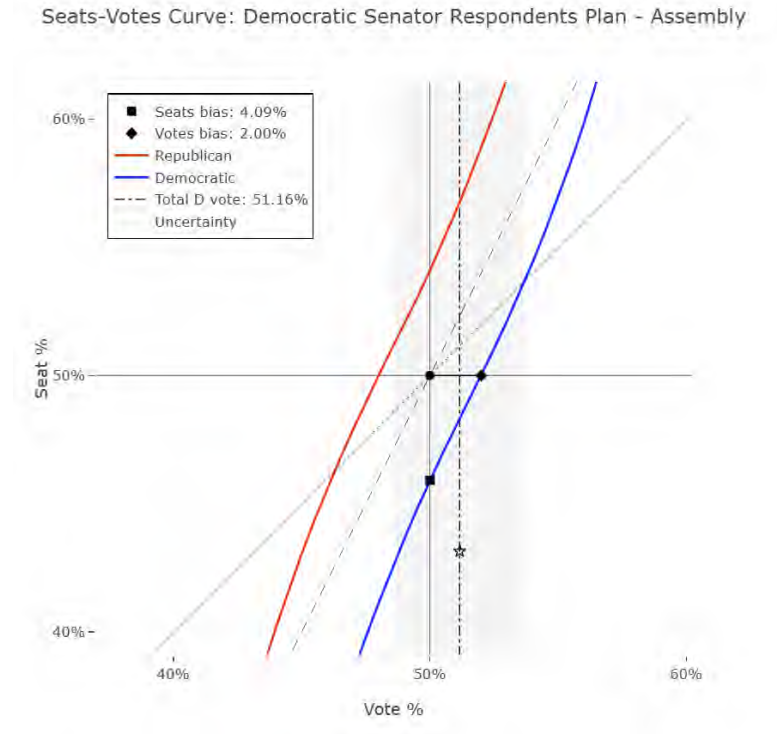
In the Senate, the proposed plan has a 1.8% pro-Republican seat bias, translating into a roughly 1-seat bias at 50% of the statewide vote, and a 0.60% vote bias, indicating that Democrats are expected to win a majority of seats at 50.6.% of the vote.[13]

---

[13] This is, as well, a considerably improvement over SB 621, which has a 14.8% seat bias and a 4.3% vote bias, indicating that Democrats win only 12 of 33 seats at 50% of the vote, and must win over 54% of the statewide vote to obtain a majority of seats.

Seats-Votes Curve: Democratic Senator Respondents Plan - Senate
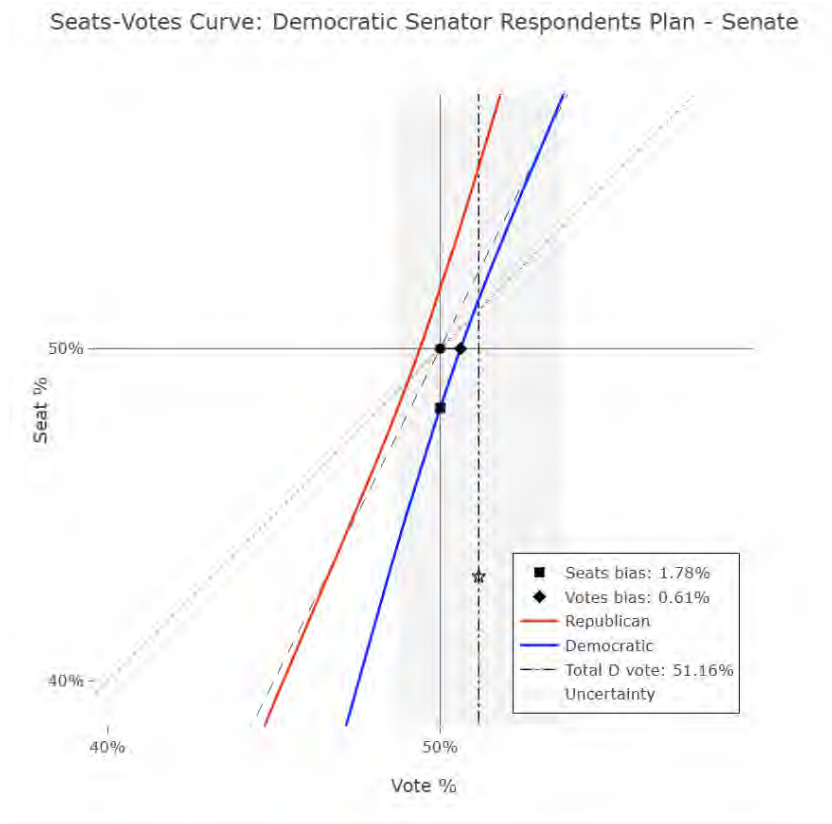
3. Partisan symmetry

Partisan symmetry measures how parties perform at similar percentages of the vote – it captures whether parties are treated equally in the votes to seats conversion (Grofman and King 2007). Under a symmetric plan, parties win the same share of seats at the same share of the statewide vote.

The magnitude and direction of partisan symmetry can be read directly from the seats-votes curve (it is equal to the seat bias at the 50-50 vote split). But it can also be interpreted at different vote shares (under a perfectly symmetric map, the seats-votes curves for Democrats and Republicans would be identical). In the current map, for example, Democrats have to win 54.1% of the vote to win 50 seats in the Assembly. At a 54.1% Republican statewide vote share, Republicans can expect to win 68 seats. Similarly, under the current map Republicans can expect to win 50 seats at 46% of the statewide vote. A Democratic statewide share of 46% nets them only 31 seats. This translates into "globally symmetry" calculated by DRA of +4.6%.

The proposed Assembly map is far more symmetrical at +3.2%.

The proposed Senate map has a global symmetry value of +2.6%, an improvement over SB 621's value of 5.3%.

4. Efficiency gap

The Efficiency Gap ("EG") is a measure of "wasted votes," capturing both packing and cracking (Stephanopoulos and McGhee 2015). By convention, positive values reflect a pro-Republican bias.

The proposed Senate plan has an EG of 0.8%, compared to the current map (SB 621), which has an EG of 14.5%. The proposed Assembly plan has an EG of 4.0%, compared to the current map's EG value of 11.7%.

5. Mean - Median

The mean - median value is the difference between the average vote share for a party and the median vote share. Higher values indicate "skewness" and packing, where voters for one party are concentrated into a small number of districts (Grofman and Cervas 2020, 18; Best at al. 2018).

To set a baseline comparison, SB 621 has a mean-median value of 7.3% for the Assembly and 5.9% for the Senate. The proposed plan has a mean-mean value of 2.3% for the Assembly and - 0.52% for the Senate.

6. Declination

The declination of a plan (Warrington 2018) measures, essentially, how many districts a party wins by slightly more than 50% of the vote. Higher values indicate more imbalance in how many districts are near the 50% threshold.

The proposed Assembly plan has a declination of 10.2 degrees, less than half the value in the current map (SB 621) of 24.5 degrees.

Rank-Votes Graph: Democratic Senator Respondents Plan – Assembly
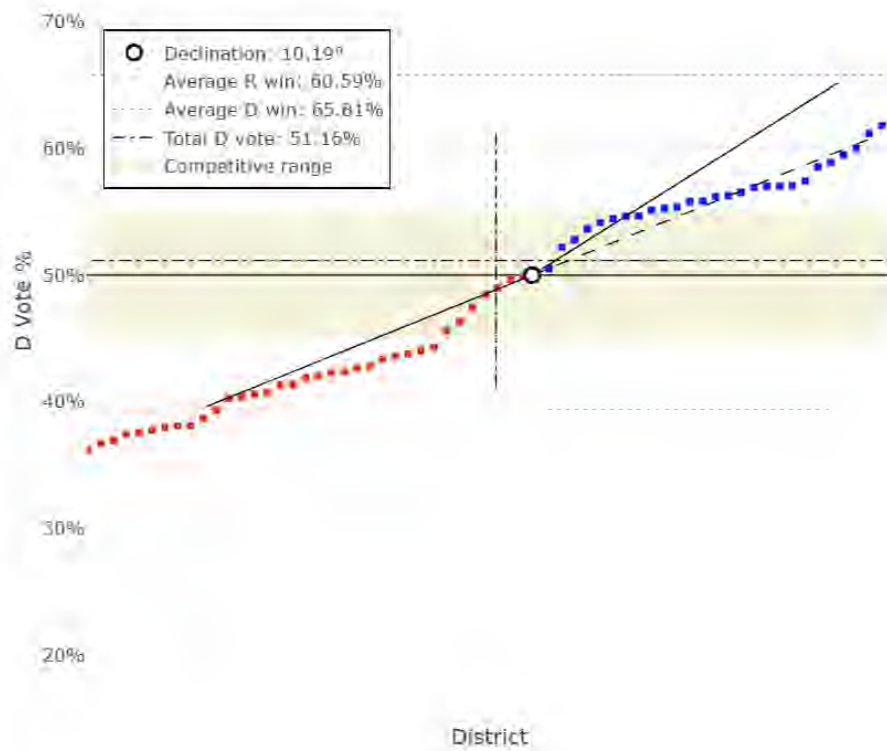
The proposed Senate plan has a declination of 4.5 degrees, less than one sixth of the value in the current map, 28.3 degrees).

Rank-Votes Graph: Democratic Senator Respondents Plan - Senate
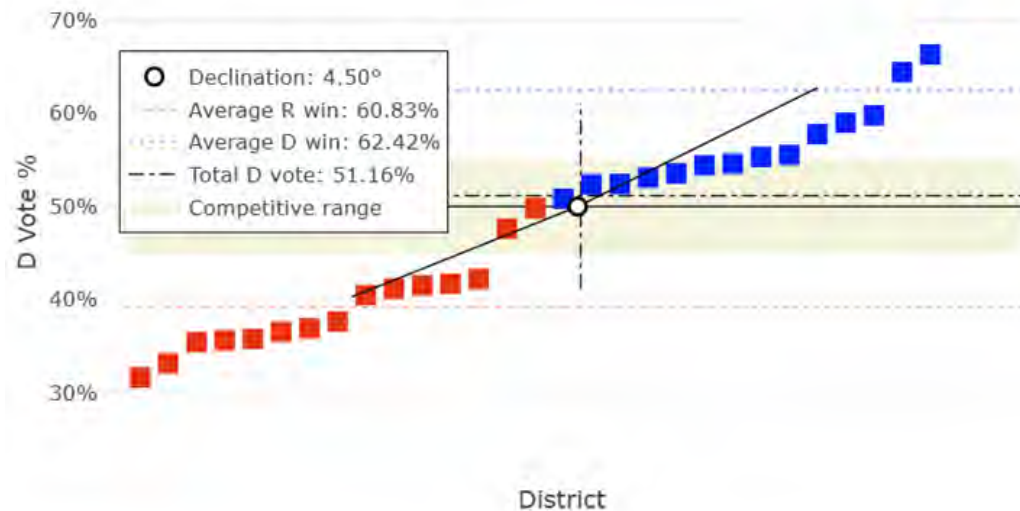
7. Incumbent Pairings

While the proposed map was drawn without regard to incumbency, I can identify cases of pairings in districts where more than 1 current incumbent has a home address. This exercise finds no evidence of a bias in favor of one party or the other, as the share of GOP and Democratic parings is roughly equivalent to the percentage of seats each party holds. This data is in Appendix table A8 for the Assembly and table A9 for the Senate.

In the proposed Assembly map, 9 districts pair Republican incumbents (8 with 2, and 1 district with 3), 2 districts pair Democratic incumbents, and 6 districts pair a Democratic and Republican incumbent. In total, 25 Republican incumbents will have to run against another incumbent, as well as 10 Democrats. GOP incumbents constitute 71% of those paired.

Republicans currently hold 64 of 99 seats (64.6%),[14] and the difference between 65% and 71% is roughly 2 seats. The pairings do not suggest partisan targeting (indeed they could not, as incumbent residency was not considered in drawing the map; any differences are the result of geography).

In the proposed Senate map, 1 district pairs 3 Republican incumbents (District 3), and 4 districts pair a Democratic and Republican incumbent, or 11 incumbents overall. Republicans constitute 7 of 11 parings overall, or 64%, a share below the 70% of seats they hold in the chamber (23 of 33 seats).

---

[14] Based on the GOP Assembly web site,
https://legis.wisconsin.gov/assembly/republicans/members/.

8. Summary of Partisan Neutrality

There is no doubt that the proposed maps for Assembly and Senate districts are *far* more neutral than the existing maps. By every metric – seats-votes curves, partisan bias, partisan symmetry, efficiency gap, mean-median, number of competitive seats – the proposed maps are much more representative and provide both parties with a meaningful opportunity to win a majority of seats once their statewide vote share exceeds 50%. The share of each party's paired incumbents is roughly equivalent to their share of seats in the legislature in both chambers.
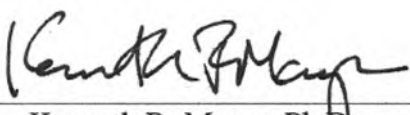
The different measures are summarized in table 6.

	Table 6 - Summary of Measures of Partisan Neutrality									
	Dem Seats at 50-50 vote	Dem Seats at Baseline (51.2%)	Dem Vote Share to Obtain Majority	Comp. Seats	Seats Bias	Votes Bias	Global Symmetry	Efficiency Gap	Mean-Median	Declination
Assembly	45	47	52.0%	16	4.1%	2.0%	3.2%	4.0%	2.3%	10.2°
Senate	16	18	50.6%	9	1.8%	0.6%	2.6%	0.8%	-0.52%	4.5°

IV.   Conclusion

The proposed Assembly and Senate plans meet all of the criteria specified by the Court. They have populations within acceptable deviations. They are contiguous and compact (more so than the existing maps). They comply with all federal requirements. They respect political municipal boundaries, and split only 1 of 6,748 populated wards. They preserve important communities of interest, reuniting areas divided by the existing map. They are politically neutral, with votes aggregated into seats in a fair manner (a dramatic improvement over the extreme gerrymanders in the existing maps), and give both parties plausible, equivalent, and symmetric opportunities to win legislative majorities with statewide vote shares close to 50%.

Respectfully Submitted,

_____
Kenneth R. Mayer, Ph.D.

January 16, 2024

Sources

Best, Robin E., Shawn J. Donahue, Jonathan Krasno,D aniel B. Magleby, and Michael D. McDonald. 2018. "Considering the Prospects for Establish- ing a Packing Gerrymandering Standard." *ElectionLaw Journal* 17(1): 1–20.

Chen, Sandra J., Samual S-H. Wang, Bernard Grofman, Richard F. Ober, Jr., Kyle T. Barnes, and Jonathan R. Cervas. 2022. "Turning Communities of Interest into a Rigorous Standard for Fair Redistricting." *Stanford Journal of Civil Rights & Civil Liberties* 18:1-189.

Grofman, Bernard. 1985. "Criteria for Redistricting: A Social Science Perspective." *UCLA Law Review* 33:77-184.

Grofman, Bernard, and Gary King. 2007. "The Future of Partisan Symmetry as a Judicial Test of Partisan Gerrymandering after *LULAC v. Perry*. *Election Law Journal* 6:2-35.

Grofman, Bernard and Jonathan R. Cervas. 2020. *The Terminology of Redistricting*. University of California, Irvine. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3540444

Grofman, Bernard and Jonathan R. Cervas. 2021. "Recent Approaches to the Definition and Measurement of Compactness." https://ssrn.com/abstract=3919249.

Kruse, Jake, Song Gao, Yuhan Ji, Daniel P. Szabo, and Kenneth R. Mayer. 2023. "Bringing Spatial Interaction Measures into Multi-Criteria Assessment of Redistricting Plans Using Interactive Web Mapping." *Geography and Geographic Information Science* https://doi.org/10.1080/15230406.2023.2264750.

Lo, Adeline, Devin Judge-Lord, Kyler Hudson, and Kenneth R. Mayer. 2023. "Mapping Literature with Networks: An Application to Redistricting." *Political Analysis* 31:669-678.

McDonald, Michael D., and Robin E. Best. 2015. "Unfair Partisan Gerrymanders in Politics and Law: A Diagnostic Applied to Six Cases." *Election Law Journal* 4:312-330.

Stephanopoulos, Nicholas O. 2012. "Redistricting and the Territorial Community." *University of Pennsylvania Law Review*160: 1379-

Stephanopoulos, Nicholas O. and Eric M. McGhee. 2015. "Partisan Gerrymandering and the Efficiency Gap." *University of Chicago Law Review* 82:831-900.

Tufte, Edward S. 1973. "The Relationship between Seats and Votes in Two-Party Systems." *American Political Science Review* 67:540-554.

Warrington, Gregory S. 2018. "Quantifying Gerrymandering Using Vote Distribution." *Election Law Journal* 17:39-57.

APPENDIX A – DATA TABLES

Table A1			
Assembly District Population			
District	**Population**	**Absolute Deviation**	**% Deviation**
1	59,444	-89	-0.15%
2	59,784	251	0.42%
3	60,040	507	0.84%
4	59,443	-90	-0.15%
5	59,660	127	0.21%
6	59,682	149	0.25%
7	59,354	-179	-0.30%
8	59,362	-171	-0.29%
9	59,294	-239	-0.40%
10	59,342	-191	-0.32%
11	59,019	-514	-0.87%
12	58,989	-544	-0.92%
13	59,100	-433	-0.73%
14	59,232	-301	-0.51%
15	59,074	-459	-0.78%
16	59,020	-513	-0.87%
17	59,122	-411	-0.70%
18	59,234	-299	-0.50%
19	59,065	-468	-0.79%
20	59,768	235	0.39%
21	59,859	326	0.54%
22	59,552	19	0.03%
23	59,917	384	0.64%
24	59,438	-95	-0.16%
25	60,036	503	0.84%
26	60,096	563	0.94%
27	59,483	-50	-0.08%
28	59,969	436	0.73%
29	59,579	46	0.08%
30	59,617	84	0.14%
31	59,890	357	0.60%
32	59,738	205	0.34%
33	59,554	21	0.04%
34	59,199	-334	-0.56%
35	59,719	186	0.31%
36	59,898	365	0.61%
37	59,280	-253	-0.43%

38	59,858	325	0.54%
39	59,842	309	0.52%
40	59,992	459	0.77%
41	59,710	177	0.30%
42	59,981	448	0.75%
43	59,563	30	0.05%
44	59,442	-91	-0.15%
45	59,863	330	0.55%
46	59,066	-467	-0.79%
47	59,131	-402	-0.68%
48	59,058	-475	-0.80%
49	59,934	401	0.67%
50	59,447	-86	-0.14%
51	59,245	-288	-0.49%
52	59,265	-268	-0.45%
53	59,447	-86	-0.14%
54	59,814	281	0.47%
55	59,757	224	0.37%
56	60,082	549	0.91%
57	59,259	-274	-0.46%
58	59,263	-270	-0.46%
59	59,514	-19	-0.03%
60	59,102	-431	-0.73%
61	59,252	-281	-0.47%
62	59,589	56	0.09%
63	59,834	301	0.50%
64	59,119	-414	-0.70%
65	59,201	-332	-0.56%
66	59,051	-482	-0.82%
67	59,993	460	0.77%
68	59,905	372	0.62%
69	59,747	214	0.36%
70	59,580	47	0.08%
71	59,491	-42	-0.07%
72	59,100	-433	-0.73%
73	59,043	-490	-0.83%
74	59,208	-325	-0.55%
75	59,110	-423	-0.72%
76	59,159	-374	-0.63%
77	59,468	-65	-0.11%
78	59,210	-323	-0.55%
79	60,084	551	0.92%
80	59,532	-1	0.00%

81	59,716	183	0.31%
82	59,511	-22	-0.04%
83	59,915	382	0.64%
84	59,637	104	0.17%
85	59,535	2	0.00%
86	60,092	559	0.93%
87	59,899	366	0.61%
88	59,835	302	0.50%
89	59,793	260	0.43%
90	59,383	-150	-0.25%
91	59,150	-383	-0.65%
92	59,361	-172	-0.29%
93	59,727	194	0.32%
94	59,910	377	0.63%
95	59,163	-370	-0.63%
96	59,270	-263	-0.44%
97	59,934	401	0.67%
98	59,962	429	0.72%
99	59,762	229	0.38%

Table A2			
Senate District Population			
District	Population	Absolute Deviation	% Deviation
1	179,268	670	0.37%
2	178,785	187	0.10%
3	178,010	-588	-0.33%
4	177,350	-1,248	-0.70%
5	177,406	-1,192	-0.67%
6	177,376	-1,222	-0.69%
7	178,692	94	0.05%
8	178,907	309	0.17%
9	179,615	1,017	0.57%
10	179,165	567	0.32%
11	179,182	584	0.33%
12	178,816	218	0.12%
13	178,980	382	0.21%
14	179,683	1,085	0.60%
15	178,868	270	0.15%
16	177,255	-1,343	-0.76%
17	178,626	28	0.02%
18	178,526	-72	-0.04%
19	179,098	500	0.28%
20	177,879	-719	-0.40%
21	178,675	77	0.04%
22	177,371	-1,227	-0.69%
23	179,645	1,047	0.58%
24	178,171	-427	-0.24%
25	177,361	-1,237	-0.70%
26	177,837	-761	-0.43%
27	179,332	734	0.41%
28	179,063	465	0.26%
29	179,526	928	0.52%
30	179,011	413	0.23%
31	178,238	-360	-0.20%
32	178,343	-255	-0.14%
33	179,658	1,060	0.59%

	Table A3		
	Total Number of Splits in Each Political Subdivision - Assembly		
Unit Type	**Name**	**Splits**	**Assembly Districts Contained in Unit**
County	Ashland	1	73; 74
County	Bayfield	1	73; 74
County	Brown	6	1; 2; 4; 5; 88; 89; 90
County	Burnett	2	28; 73; 75
County	Calumet	4	2; 3; 5; 55; 57
County	Chippewa	1	85; 92
County	Clark	3	68; 69; 85; 86
County	Columbia	2	58; 80; 81
County	Dane	12	38; 39; 43; 46; 47; 48; 50; 51; 76; 77; 78; 80; 81
County	Dodge	3	37; 58; 59; 81
County	Dunn	1	29; 93
County	Eau Claire	3	68; 85; 91; 92
County	Fond du Lac	6	2; 3; 27; 41; 52; 53; 59
County	Forest	1	34; 36
County	Green	3	43; 47; 50; 51
County	Iowa	2	49; 51; 79
County	Jackson	1	68; 69
County	Jefferson	6	31; 37; 38; 39; 43; 58; 99
County	Juneau	1	42; 67
County	Kenosha	4	32; 33; 64; 65; 66
County	La Crosse	2	67; 94; 95
County	Lafayette	1	49; 51
County	Lincoln	1	35; 87
County	Manitowoc	2	2; 25; 27
County	Marathon	4	35; 69; 70; 72; 86
County	Milwaukee	17	7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 23; 63; 82
County	Monroe	2	67; 68; 69
County	Oconto	1	4; 36
County	Outagamie	5	3; 5; 6; 54; 55; 57
County	Ozaukee	2	23; 24; 60
County	Pierce	2	29; 30; 93
County	Polk	1	28; 75
County	Portage	2	42; 71; 72
County	Racine	4	33; 61; 62; 64; 66
County	Rock	3	31; 43; 44; 45
County	Sauk	4	42; 67; 79; 80; 96

County	Sawyer	1	74; 87
County	Shawano	3	4; 6; 35; 40
County	Sheboygan	2	2; 26; 27
County	St. Croix	3	28; 29; 30; 93
County	Taylor	2	85; 86; 87
County	Vernon	1	67; 96
County	Vilas	1	34; 74
County	Walworth	3	31; 32; 33; 43
County	Washburn	2	73; 74; 75
County	Washington	4	22; 24; 59; 60; 97
County	Waukesha	9	13; 14; 22; 37; 82; 83; 84; 97; 98; 99
County	Waupaca	1	6; 40
County	Waushara	2	40; 41; 42
County	Winnebago	4	40; 53; 54; 55; 56
County	Wood	2	42; 69; 72
CTV	Brown, Allouez - V	1	88; 89
CTV	Brown, Bellevue - V	2	2; 89; 90
CTV	Brown, Green Bay - C	2	1; 88; 90
CTV	Brown, Howard - V	1	4; 5
CTV	Brown, Ledgeview - T	1	2; 89
CTV	Calumet, Appleton - C	1	55; 57
CTV	Calumet, Harrison - V	1	3; 57
CTV	Calumet, Hilbert - V	1	2; 3
CTV	Chippewa, Lafayette - T	1	85; 92
CTV	Dane, Burke - T	2	38; 46; 48
CTV	Dane, DeForest - V	1	46; 81
CTV	Dane, Madison - C	7	46; 47; 48; 50; 76; 77; 78; 80
CTV	Dane, Madison - T	2	76; 77; 78
CTV	Dane, McFarland - V	2	38; 47; 48
CTV	Dane, Middleton - T	1	78; 80
CTV	Dane, Monona - C	1	48; 77
CTV	Dane, Windsor - V	1	46; 81
CTV	Eau Claire, Eau Claire - C	1	91; 92
CTV	Jefferson, Aztalan - T	1	37; 39
CTV	Jefferson, Ixonia - T	1	37; 58
CTV	Jefferson, Jefferson - T	1	37; 39
CTV	Jefferson, Whitewater - C	1	31; 43
CTV	Kenosha, Kenosha - C	2	64; 65; 66
CTV	Kenosha, Pleasant Prairie - V	1	65; 66
CTV	Kenosha, Somers - V	1	64; 66
CTV	Kenosha, Wheatland - T	2	32; 33; 66
CTV	La Crosse, La Crosse - C	1	94; 95

CTV	Marathon, Stettin - T	1	70; 86
CTV	Marathon, Weston - V	1	70; 72
CTV	Milwaukee, Franklin - C	1	21; 82
CTV	Milwaukee, Greenfield - C	3	7; 15; 20; 21
CTV	Milwaukee, Milwaukee - C	14	7; 8; 9; 10; 11; 12; 14; 15; 16; 17; 18; 19; 20; 23; 63
CTV	Milwaukee, Wauwatosa - C	2	13; 14; 17
CTV	Milwaukee, West Allis - C	1	7; 15
CTV	Monroe, La Grange - T	1	67; 69
CTV	Outagamie, Appleton - C	2	54; 55; 57
CTV	Outagamie, Buchanan - T	2	3; 5; 57
CTV	Outagamie, Freedom - T	1	5; 54
CTV	Outagamie, Kaukauna - C	1	3; 5
CTV	Outagamie, Little Chute - V	2	3; 5; 54
CTV	Ozaukee, Cedarburg - T	1	24; 60
CTV	Ozaukee, Mequon - C	1	23; 24
CTV	Racine, Caledonia - V	1	61; 62
CTV	Racine, Mount Pleasant - V	2	62; 64; 66
CTV	Racine, Racine - C	3	61; 62; 64; 66
CTV	Rock, Janesville - C	2	31; 44; 45
CTV	Sheboygan, Sheboygan - T	1	26; 27
CTV	Walworth, Lafayette - T	1	31; 32
CTV	Walworth, Whitewater - T	1	31; 43
CTV	Washburn, Beaver Brook - T	1	74; 75
CTV	Washington, Barton - T	1	59; 60
CTV	Washington, Germantown - V	1	22; 24
CTV	Washington, West Bend - T	1	59; 60
CTV	Waukesha, Brookfield - C	1	13; 14
CTV	Waukesha, Lisbon - T	2	97; 98; 99
CTV	Waukesha, Mukwonago - T	1	82; 83
CTV	Waukesha, Oconomowoc - C	1	37; 99
CTV	Waukesha, Oconomowoc - T	2	37; 100
CTV	Waukesha, Summit - V	1	83; 99
CTV	Waukesha, Waukesha - C	4	13; 82; 83; 84; 98
CTV	Waukesha, Waukesha - T	3	82; 83; 84; 98
CTV	Winnebago, Fox Crossing - V	2	53; 54; 55
CTV	Winnebago, Menasha - C	1	53; 55
CTV	Winnebago, Oshkosh - C	1	53; 56
CTV	Winnebago, Oshkosh - T	1	53; 56
CTV	Winnebago, Vinland - T	1	53; 55
CTV	Wood, Saratoga - T	1	42; 72

CTV: Cities, Towns, and Villages

Table A4			
Total Number of Splits in Each Political Subdivision - Senate			
Unit Type	**Name**	**Splits**	**Senate Districts Contained in Unit**
County	Brown	2	1; 2; 30
County	Burnett	1	10; 25
County	Calumet	2	1; 2; 19
County	Chippewa	1	29; 31
County	Clark	1	23; 29
County	Columbia	1	20; 27
County	Dane	5	13; 15; 16; 17; 26; 27
County	Dodge	2	13; 20; 27
County	Dunn	1	10; 31
County	Eau Claire	2	23; 29; 31
County	Fond du Lac	4	1; 9; 14; 18; 20
County	Green	2	15; 16; 17
County	Iowa	1	17; 27
County	Jefferson	4	11; 13; 15; 20; 33
County	Juneau	1	14; 23
County	Kenosha	1	11; 22
County	La Crosse	1	23; 32
County	Lincoln	1	12; 29
County	Manitowoc	1	1; 9
County	Marathon	3	12; 23; 24; 29
County	Milwaukee	7	3; 4; 5; 6; 7; 8; 21; 28
County	Oconto	1	2; 12
County	Outagamie	3	1; 2; 18; 19
County	Ozaukee	1	8; 20
County	Pierce	1	10; 31
County	Polk	1	10; 25
County	Portage	1	14; 24
County	Racine	2	11; 21; 22
County	Rock	1	11; 15
County	Sauk	3	14; 23; 27; 32
County	Sawyer	1	25; 29
County	Shawano	2	2; 12; 14
County	Sheboygan	1	1; 9
County	St. Croix	1	10; 31
County	Vernon	1	23; 32
County	Vilas	1	12; 25
County	Walworth	1	11; 15
County	Washington	2	8; 20; 33

40

County	Waukesha	4	5; 8; 13; 28; 33
County	Waupaca	1	2; 14
County	Winnebago	3	14; 18; 19
County	Wood	3	14; 23; 24
CTV	Brown, Bellevue - V	1	1; 30
CTV	Brown, Green Bay - C	1	1; 30
CTV	Brown, Ledgeview - T	1	1; 30
CTV	Calumet, Harrison - V	1	1; 19
CTV	Chippewa, Lafayette - T	1	29; 31
CTV	Dane, Burke - T	1	13; 16
CTV	Dane, DeForest - V	1	16; 27
CTV	Dane, Madison - C	3	16; 17; 26; 27
CTV	Dane, McFarland - V	1	13; 16
CTV	Dane, Middleton - T	1	26; 27
CTV	Dane, Monona - C	1	16; 26
CTV	Dane, Windsor - V	1	16; 27
CTV	Jefferson, Ixonia - T	1	13; 20
CTV	Jefferson, Whitewater - C	1	11; 15
CTV	Kenosha, Wheatland - T	1	11; 22
CTV	Marathon, Stettin - T	1	24; 29
CTV	Milwaukee, Franklin - C	1	7; 28
CTV	Milwaukee, Greenfield - C	2	3; 5; 7
CTV	Milwaukee, Milwaukee - C	6	3; 4; 5; 6; 7; 8; 21
CTV	Milwaukee, Wauwatosa - C	1	5; 6
CTV	Milwaukee, West Allis - C	1	3; 5
CTV	Outagamie, Appleton - C	1	18; 19
CTV	Outagamie, Buchanan - T	2	1; 2; 19
CTV	Outagamie, Freedom - T	1	2; 18
CTV	Outagamie, Kaukauna - C	1	1; 2
CTV	Outagamie, Little Chute - V	2	1; 2; 18
CTV	Ozaukee, Cedarburg - T	1	8; 20
CTV	Racine, Mount Pleasant - V	1	21; 22
CTV	Racine, Racine - C	1	21; 22
CTV	Rock, Janesville - C	1	11; 15
CTV	Walworth, Whitewater - T	1	11; 15
CTV	Waukesha, Oconomowoc - C	1	13; 33
CTV	Waukesha, Summit - V	1	28; 33
CTV	Waukesha, Waukesha - C	2	5; 28; 33
CTV	Waukesha, Waukesha - T	1	28; 33
CTV	Winnebago, Fox Crossing - V	1	18; 19
CTV	Winnebago, Menasha - C	1	18; 19
CTV	Winnebago, Oshkosh - C	1	18; 19
CTV	Winnebago, Oshkosh - T	1	18; 19

42

| CTV | Winnebago, Vinland - T | 1 | 18; 19 |
| CTV | Wood, Saratoga - T | 1 | 14; 24 |

CTV: Cities, Towns, and Villages

Table A5 - Assembly District Compactness Measures		
District	Reock	Polsby Popper
1	0.156	0.094
2	0.35	0.236
3	0.298	0.157
4	0.436	0.305
5	0.517	0.169
6	0.449	0.353
7	0.426	0.338
8	0.589	0.356
9	0.414	0.228
10	0.358	0.228
11	0.512	0.411
12	0.553	0.637
13	0.243	0.233
14	0.248	0.244
15	0.46	0.464
16	0.485	0.388
17	0.275	0.27
18	0.356	0.241
19	0.224	0.106
20	0.413	0.332
21	0.48	0.292
22	0.543	0.531
23	0.203	0.228
24	0.23	0.187
25	0.332	0.321
26	0.468	0.334
27	0.56	0.441
28	0.442	0.306
29	0.365	0.342
30	0.398	0.308
31	0.469	0.179
32	0.453	0.226
33	0.563	0.587
34	0.485	0.459

35	0.375	0.378
36	0.418	0.316
37	0.354	0.259
38	0.39	0.325
39	0.41	0.377
40	0.538	0.397
41	0.559	0.517
42	0.491	0.371
43	0.248	0.238
44	0.564	0.231
45	0.384	0.357
46	0.365	0.229
47	0.503	0.362
48	0.221	0.224
49	0.33	0.422
50	0.48	0.453
51	0.353	0.401
52	0.347	0.278
53	0.379	0.211
54	0.54	0.395
55	0.296	0.273
56	0.314	0.147
57	0.37	0.194
58	0.458	0.39
59	0.574	0.349
60	0.352	0.29
61	0.352	0.233
62	0.408	0.206
63	0.533	0.522
64	0.256	0.182
65	0.551	0.321
66	0.29	0.164
67	0.325	0.303
68	0.375	0.393
69	0.452	0.347
70	0.359	0.142
71	0.439	0.47
72	0.377	0.301
73	0.183	0.107
74	0.317	0.277
75	0.517	0.461
76	0.308	0.257
77	0.449	0.16

78	0.336	0.144
79	0.5	0.496
80	0.312	0.208
81	0.312	0.241
82	0.25	0.235
83	0.496	0.253
84	0.656	0.559
85	0.503	0.356
86	0.38	0.298
87	0.337	0.356
88	0.313	0.137
89	0.375	0.099
90	0.399	0.286
91	0.457	0.302
92	0.373	0.247
93	0.32	0.298
94	0.344	0.291
95	0.53	0.369
96	0.469	0.499
97	0.455	0.556
98	0.414	0.358
99	0.554	0.38

Table A6 - Senate Compactness Measures		
District	Reock	Polsby Popper
1	0.132	0.082
2	0.375	0.194
3	0.355	0.279
4	0.413	0.443
5	0.337	0.247
6	0.29	0.206
7	0.283	0.122
8	0.268	0.204
9	0.284	0.333
10	0.444	0.253
11	0.34	0.254
12	0.409	0.324
13	0.343	0.29
14	0.474	0.305
15	0.337	0.265
16	0.387	0.141
17	0.382	0.507
18	0.337	0.134
19	0.189	0.093
20	0.357	0.306
21	0.508	0.425
22	0.33	0.286
23	0.356	0.271
24	0.543	0.24
25	0.442	0.152
26	0.284	0.133
27	0.409	0.294
28	0.296	0.294
29	0.573	0.292
30	0.368	0.126
31	0.217	0.215
32	0.384	0.346
33	0.475	0.358

Table A7 - Baseline Democratic and Republican Vote Share, Assembly 2016-2022 Baseline		
District	Baseline Democratic	Baseline Republican
1	43.9%	55.2%
2	34.1%	64.8%
3	41.8%	57.0%
4	33.4%	65.5%
5	39.8%	59.0%
6	33.0%	66.1%
7	55.0%	43.5%
8	81.0%	17.7%
9	72.0%	26.5%
10	87.0%	12.0%
11	82.1%	16.9%
12	81.2%	17.8%
13	**45.7%**	**52.9%**
14	60.2%	38.2%
15	54.3%	43.7%
16	90.3%	8.5%
17	82.4%	16.5%
18	84.1%	14.5%
19	79.6%	18.3%
20	61.2%	37.1%
21	**49.0%**	**49.7%**
22	40.8%	57.8%
23	65.6%	33.0%
24	43.1%	55.4%
25	42.1%	56.2%
26	**51.3%**	**47.0%**
27	33.6%	65.0%
28	35.7%	63.1%
29	37.5%	60.9%
30	**48.0%**	**50.0%**
31	40.0%	58.5%
32	36.4%	62.2%
33	32.2%	66.7%
34	39.9%	58.9%
35	37.7%	61.4%
36	33.8%	65.4%

37	37.2%	61.3%
38	65.6%	33.0%
39	57.7%	40.9%
40	33.2%	65.7%
41	35.5%	63.5%
42	37.2%	61.8%
43	55.3%	43.1%
44	59.1%	39.4%
45	56.2%	42.3%
46	71.5%	27.2%
47	74.0%	24.6%
48	79.5%	19.3%
49	**44.9%**	**53.5%**
50	71.5%	27.1%
51	56.2%	42.5%
52	43.0%	55.6%
53	38.8%	59.8%
54	42.1%	56.7%
55	**51.8%**	**46.3%**
56	54.7%	43.3%
57	56.6%	41.9%
58	36.4%	62.6%
59	26.1%	73.0%
60	32.0%	66.8%
61	55.8%	42.9%
62	**53.9%**	**44.7%**
63	**49.2%**	**49.3%**
64	58.1%	40.5%
65	56.2%	42.4%
66	42.8%	55.9%
67	41.3%	57.4%
68	41.6%	57.3%
69	40.3%	58.6%
70	**49.8%**	**48.8%**
71	55.4%	43.0%
72	41.9%	57.0%
73	56.3%	42.4%
74	**47.0%**	**52.0%**
75	37.7%	61.3%
76	88.8%	9.6%
77	87.3%	11.0%

48

78	81.7%	17.0%
79	**53.6%**	**45.3%**
80	66.4%	32.2%
81	**52.9%**	**45.7%**
82	34.7%	64.1%
83	33.8%	64.7%
84	40.8%	57.7%
85	37.1%	62.0%
86	33.2%	65.8%
87	35.0%	63.9%
88	**53.7%**	**44.6%**
89	**47.7%**	**50.7%**
90	54.3%	43.9%
91	58.4%	39.8%
92	54.1%	44.1%
93	43.4%	55.1%
94	**53.6%**	**44.8%**
95	60.7%	37.5%
96	**49.4%**	**49.5%**
97	27.6%	71.4%
98	38.2%	60.4%
99	32.8%	65.9%
Statewide	**50.5%**	**48.2%**

Table A8 - Baseline Democratic and Republican Vote Share, Senate 2016=2022 Baseline		
District	Baseline Democratic	Baseline Republican
1	40.1%	58.8%
2	35.4%	63.5%
3	65.4%	33.2%
4	83.6%	15.3%
5	**53.5%**	**44.8%**
6	85.2%	13.6%
7	63.3%	35.0%
8	**50.1%**	**48.5%**
9	41.6%	56.9%
10	40.6%	57.9%
11	36.1%	62.6%
12	37.3%	61.7%
13	**53.8%**	44.8%
14	35.3%	63.7%
15	56.9%	41.6%
16	75.1%	23.6%
17	58.9%	39.6%
18	41.2%	57.5%
19	54.3%	43.9%
20	31.3%	67.6%
21	**52.8%**	**45.8%**
22	**51.7%**	**46.9%**
23	41.1%	57.8%
24	**49.1%**	**49.5%**
25	**47.1%**	**51.8%**
26	85.9%	12.6%
27	58.2%	40.5%
28	36.4%	62.2%
29	35.1%	63.9%
30	**51.5%**	**46.8%**
31	**52.2%**	**46.1%**
32	54.7%	43.8%
33	32.8%	66.0%
Statewide	**50.5%**	**48.2%**

Table A8 - Incumbent Pairing, Assembly			
District	**Democratic**	**Republican**	**Total**
2		2	2
3		2	2
5		2	2
14	1	1	2
23	1	1	2
27		2	2
47	1	1	2
53		2	2
61	1	1	2
64	2		2
69		3	3
78	2		2
81	1	1	2
82		2	2
85		2	2
91	1	1	2
99		2	2
Totals	10	25	35

Table A9 - Incumbent Pairing, Senate			
District	Democratic	Republican	Total
7	1	1	2
18	1	1	2
27	1	1	2
30		3	3
31	1	1	2
Totals	4	7	11

APPENDIX B – IMAGES OF PROPOSED PLAN
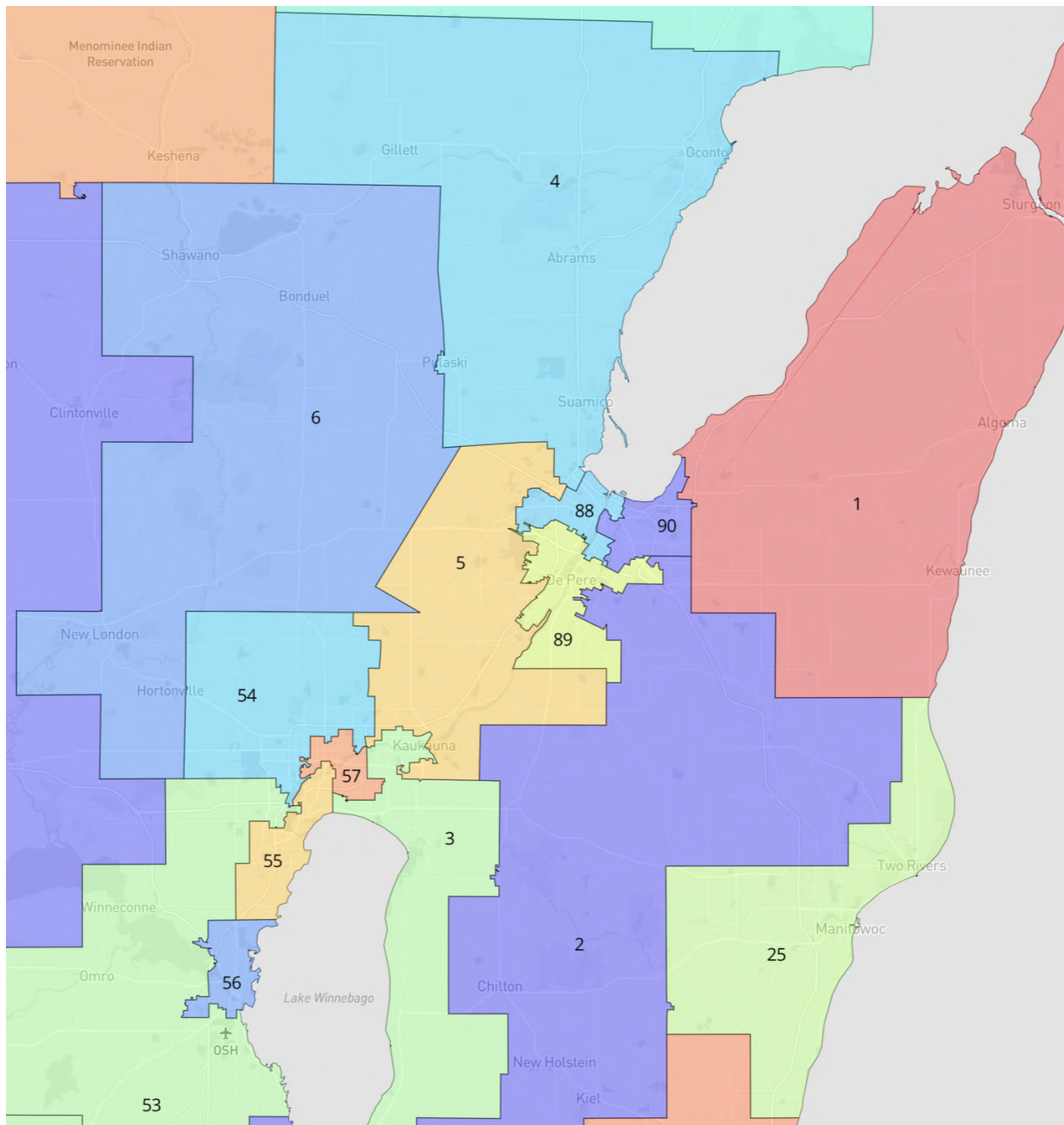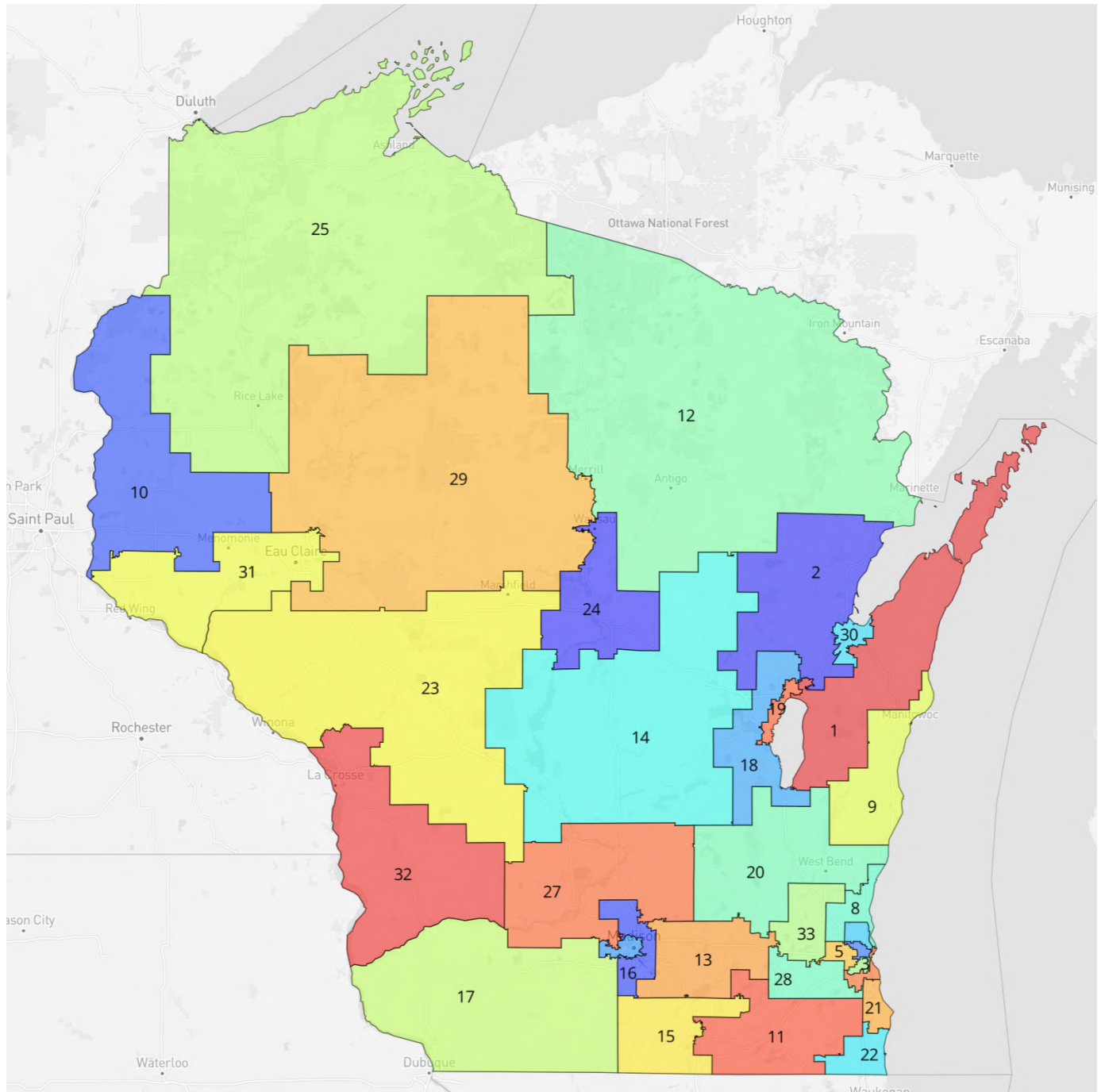
Assembly Plan – Statewide
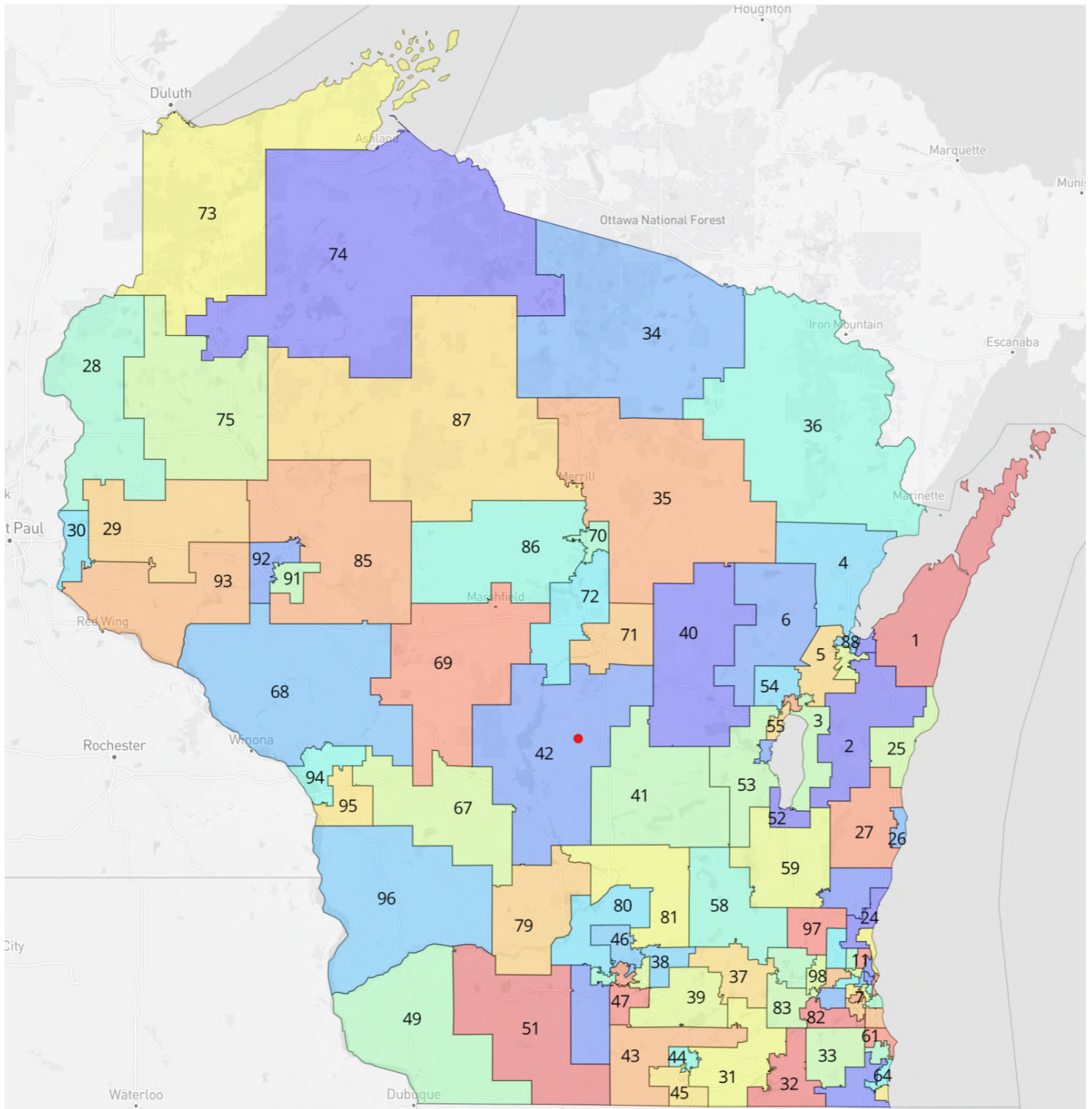
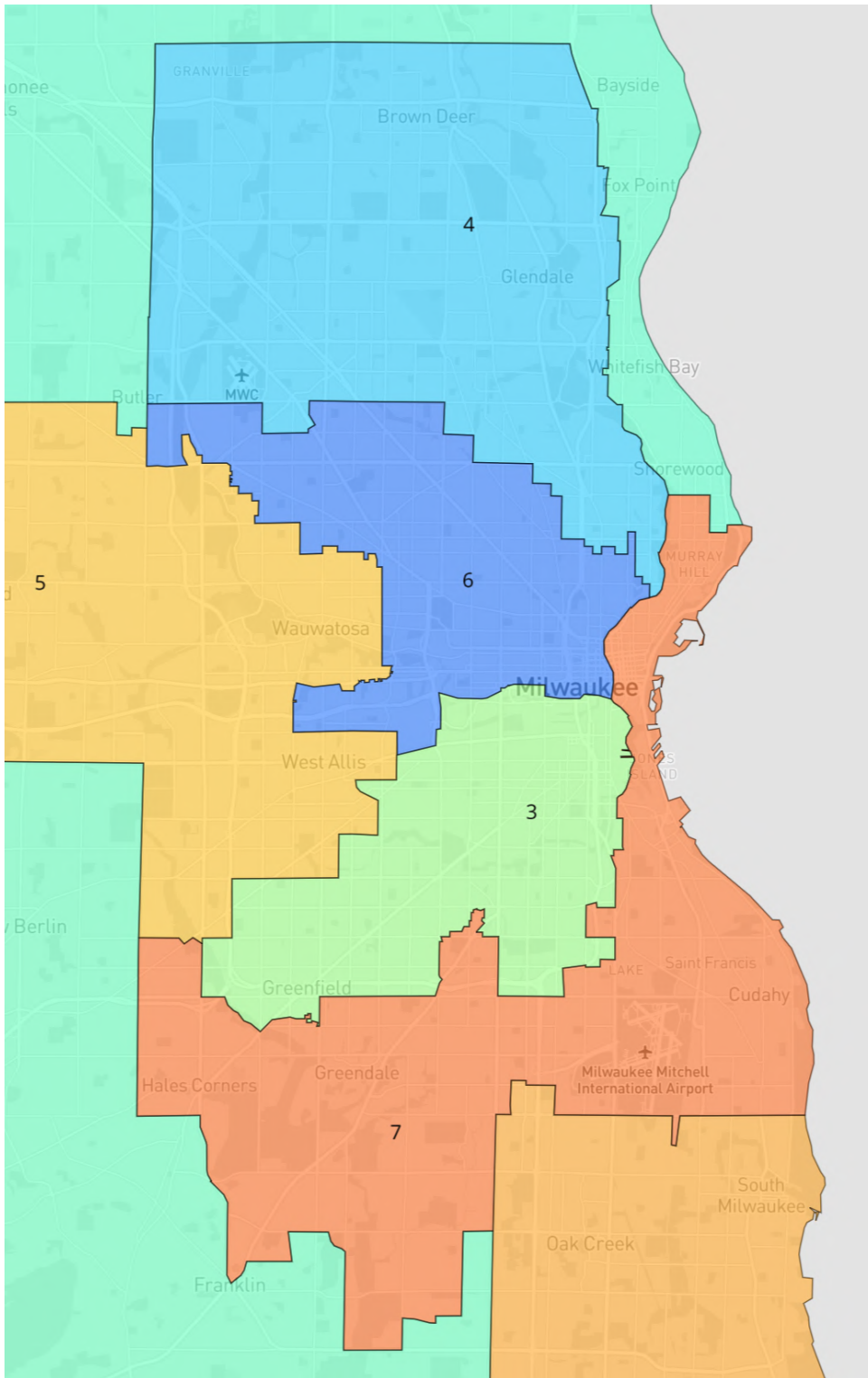Assembly Plan – Milwaukee Area
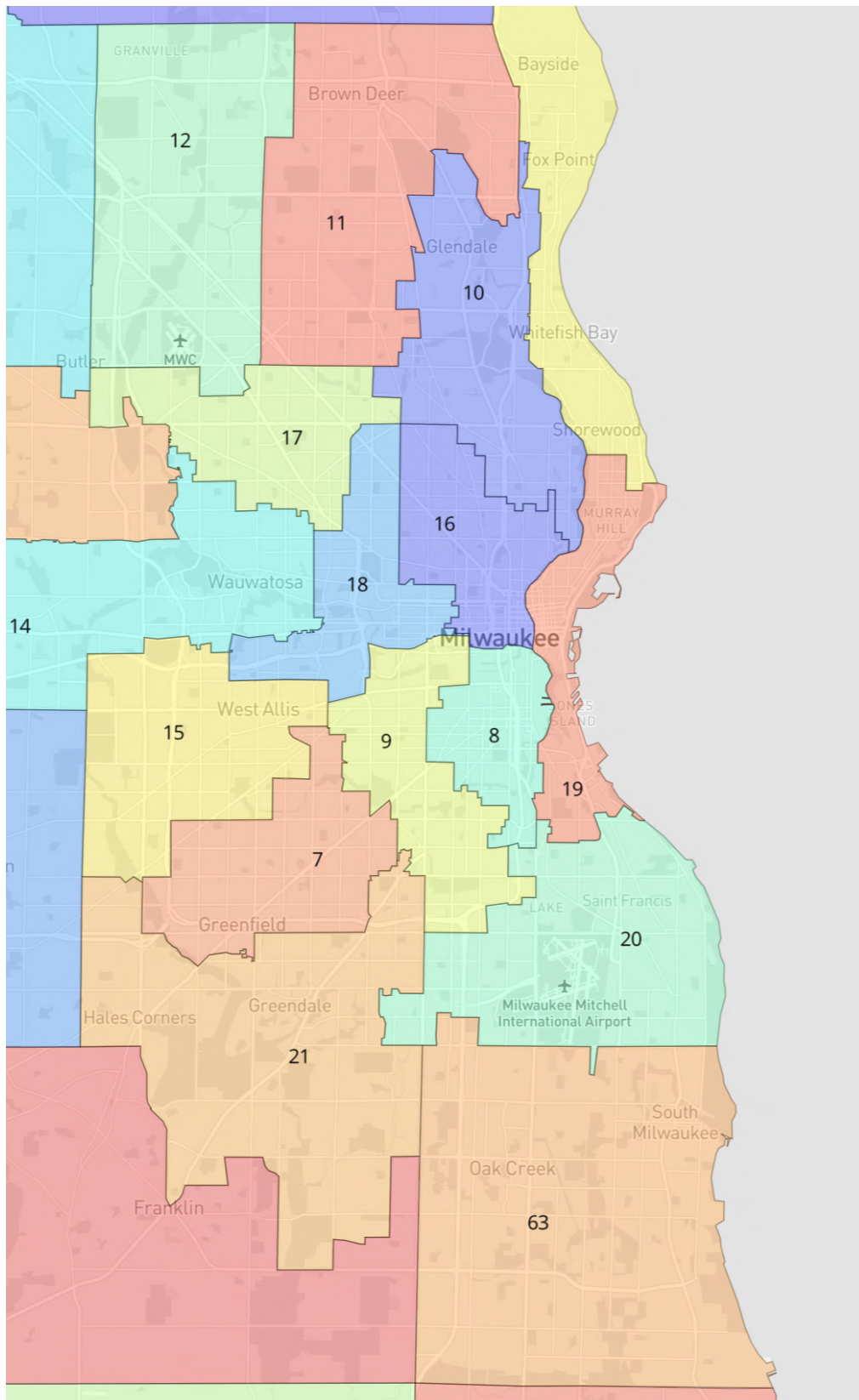
Assembly Plan – Madison Area
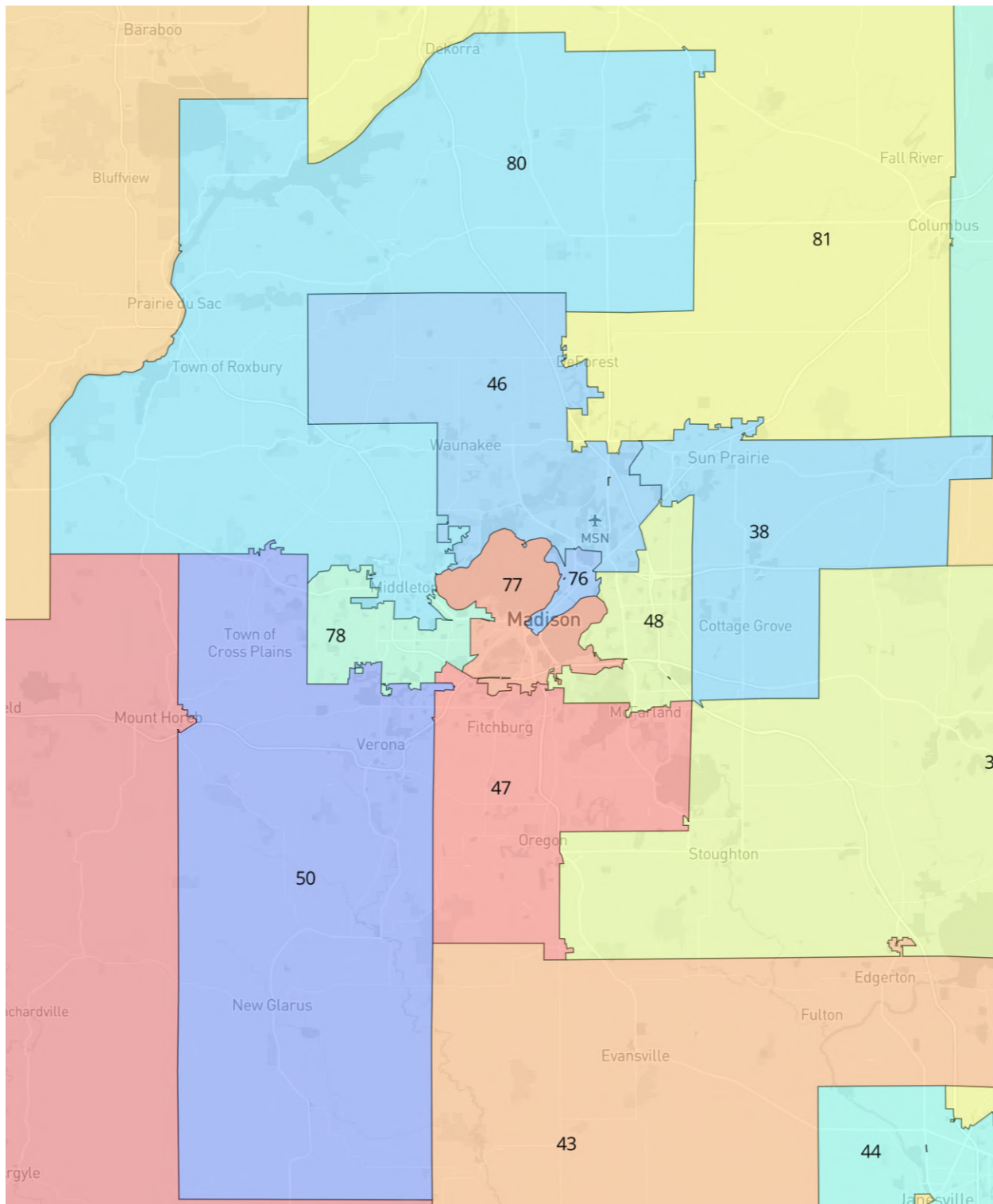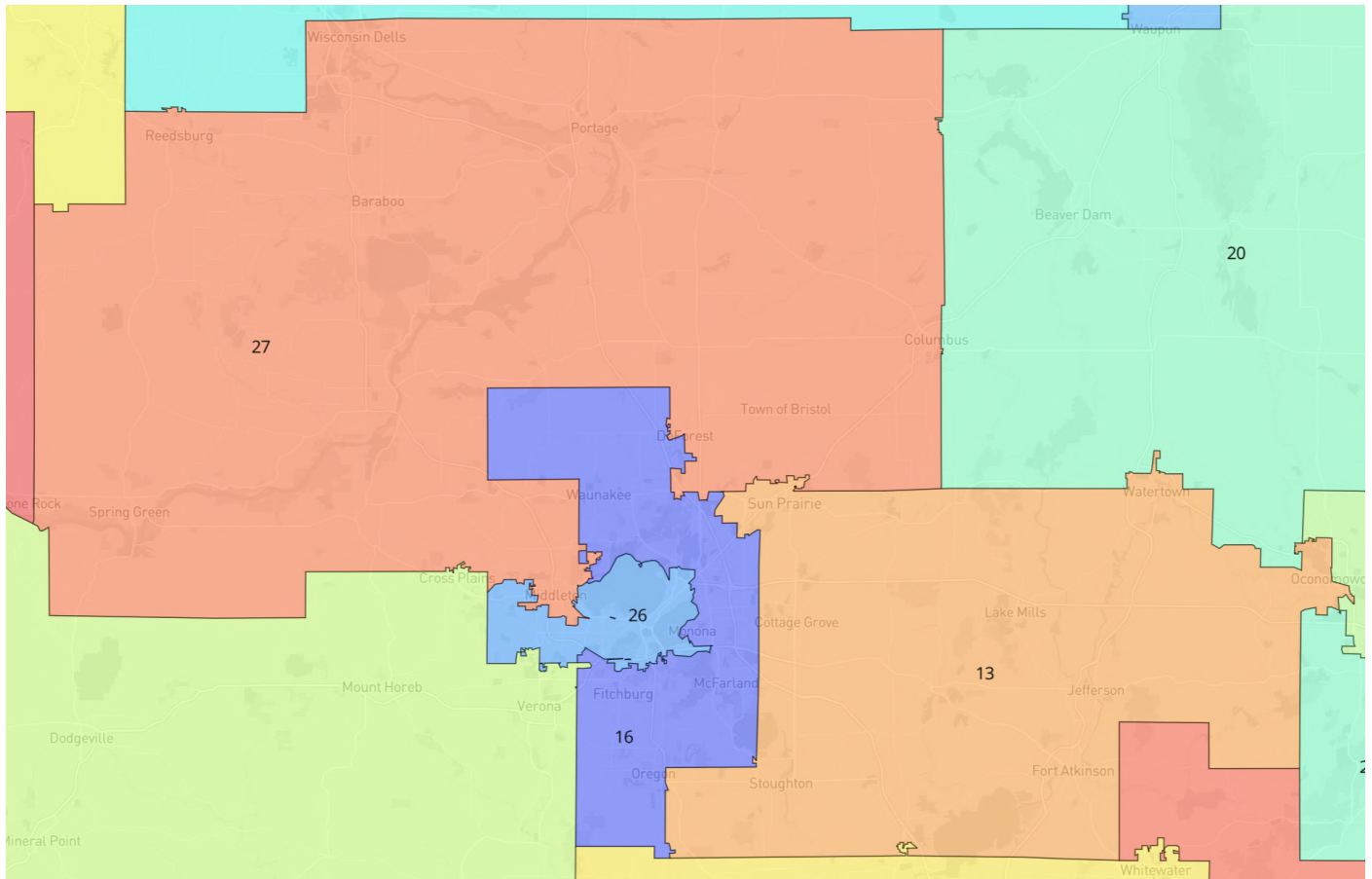
Assembly Plan – Green Bay Area

Senate Plan – Statewide

Senate Plan – Milwaukee Area

Senate Plan – Madison Area

Senate Plan – Green Bay Area