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IN THE SUPREME COURT OF WISCONSIN

No. 2023AP1399

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 Thiffeault, 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, Carrie Riepl, in their Official Capacities as Members of the Wisconsin Elections 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 Streck,

Intervenors-Respondents.

BRIEF OF AMICUS MATTHEW PETERING, PhD REGARDING PROPOSED REMEDIAL MAPS

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INTEREST OF AMICUS CURIAE

Matthew Petering, PhD is an Associate Professor of Industrial and Manufacturing Engineering at UW-Milwaukee and owner of District Solutions LLC, a Milwaukee-based redistricting consulting company. He earned a PhD and Master's Degree, both in Industrial and Operations Engineering, from the University of Michigan. He has more than 20 years of experience developing algorithms to optimize the productivity of seaports, warehouses, universities, and high-speed railway, car-sharing, and healthcare systems. Petering has also developed a redistricting algorithm, named *FastMap,* which produces fair maps based upon objective criteria.

On December 22, 2023, the Court held that the current state legislative district maps are unconstitutional and asked the six parties to submit proposals for new maps. They did so on January 12, 2024. At the same time, Petering submitted a map proposal (*173#008*) created by his *FastMap* redistricting algorithm and petitioned the Court to include it in the group of proposals to be evaluated. The Court denied the request on January 17, 2024.

The purpose of the current brief is to make specific recommendations in support of or opposing one or more of the six map proposals that are before the Court. Petering includes the analytics from his map for comparison purposes only.

I. The Court Should Select The Map Proposal That Best Complies With The Criteria Listed In The Court's Dec. 22, 2023 Decision, In Particular The Criterion Of Political Neutrality.

The Court stipulated five categories of criteria it would consider when evaluating map proposals:

1) *First, the remedial maps must comply with population equality requirements.*
2) *Second, districts must meet the basic requirements set out in Article IV of the Wisconsin Constitution. Assembly districts must be (a) bounded by county, precinct, town or ward lines; (b) composed of contiguous territory; and (c) in as compact form as practicable.*
3) *Third, remedial maps must comply with all applicable federal law. ... maps must comply with the Equal Protection Clause [EPC] and the Voting Rights Act [VRA] of 1965.*
4) *Fourth, the court will consider other traditional districting criteria... These other traditional districting criteria include reducing municipal splits and preserving communities of interest.*
5) *Fifth, we will consider partisan impact when evaluating remedial maps. ... this court must remain politically neutral. We do not have free license to enact maps that privilege one political party over another.*

In assessing the six maps before the Court, it is important to recognize that the numerous criteria above—which are simultaneously in play for both the assembly and senate—and the near-infinite number of possible map proposals make it extraordinarily challenging to assemble a proposal that performs well for all criteria.

Petering notes that item 5 establishes the firm requirement of *political neutrality* that must be met by successful map proposals. Political neutrality means the use of these maps in future elections is expected to result in political membership of the assembly and senate that directly and proportionally reflects the voting preferences of Wisconsin's electorate in those elections.

The importance of political neutrality in the new maps is not just an abstract concept; it has huge consequences for the future of the state as articulated by the *amicus curiae* brief of the Wisconsin Justice Initiative and Wisconsin Fair Maps Coalition (page 22):

> *"Regardless of whether maps are created through the legislature and governor or a court, "[r]edistricting determines the political landscape for the ensuing decade and thus public policy for years beyond." Jensen, 2002 WI 13, ¶ 10.*

The current task facing the Court is to determine which of the six remedial map proposals before it, if any, reach political neutrality, so that deep policy concerns expressed by the parties and *amici* can be addressed by a legislature elected under the new maps.

II. A Detailed Analysis Of The Six Map Proposals Before The Court Shows That None Achieves Political Neutrality, And None Has Districts In As Compact Form As Practicable.

Petering evaluated and compared the six proposals. The proposals are analyzed one criterion at a time with the criteria sequenced as in Petering's previous amicus brief.

Table 1 shows the 11 criteria included in the December 22, 2023 decision. Most consist of two subcriteria, one for assembly (A) and one for senate (S) districts. In Table 1, subcriteria are indicated by a number followed by the letter A or S.

Table 1. Redistricting criteria mentioned in the Court's December 22, 2023 decision

Criterion	Description		
1	Nesting of assembly districts within senate districts		
Assembly Subcriterion	**Description**	**Senate Subcriterion**	**Description**
2A	Population deviation (legal requirmnt)	2S	Population deviation (legal requirmnt)
3A	EPC and VRA compliance	3S	EPC and VRA compliance
4A	Contiguity (strict)	4S	Contiguity (strict)
5A	Political neutrality	5S	Political neutrality
6A	Compactness	6S	Compactness
7A	Keeping counties intact	7S	Keeping counties intact
8A	Keeping municipalities intact	8S	Keeping municipalities intact
9A	Keeping communties of interest intact	9S	Keeping communties of interest intact
10A	Population deviation (beyond leg req)	10S	Population deviation (beyond leg req)
11A	Keeping wards intact	11S	Keeping wards intact

All metrics are computed by DavesRedistricting.org (DRA) unless otherwise noted.

A. Criteria 1-4: Strict Legal Requirements

Table 2 shows Petering's analysis of Criteria 1-4. All proposals meet all the strict legal requirements. Regarding Criterion 1, all proposals nest three consecutively numbered assembly districts in one senate district. Regarding Criterion 2, all proposals have a population deviation below 2%. Regarding Criterion 3, all proposals appear to comply with the EPC and VRA. Regarding Criterion 4, Petering accepts the analysis of John D. Johnson, Marquette Law School Lubar Center Research Fellow, which found that all districts in all proposals are strictly contiguous, except for actual offshore islands. (https://law.marquette.edu/facultyblog/2024/01/analysis-of-proposed-legislative-redistricting-plans-submitted-to-the-wisconsin-supreme-court/).

Table 2. Adherence to strict legal requirements for the map proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Proposal	District Nesting and Numbering Requirements Met?	Overall Range in Population Deviation in Assembly and Senate < 2%?	Complies with Voting Rights Act?	All Assembly and Senate Districts Strictly Contiguous?
Wisconsin Legislature	Y	Y	Y	Y
Johnson	Y	Y	Y	Y
Governor Evers	Y	Y	Y	Y
Democratic Senators	Y	Y	Y	Y
Clarke	Y	Y	Y	Y
Wright	Y	Y	Y	Y
173#008 FastMap Algorithm*	Y	Y	Y	Y

* This proposal is not before the Court but is included in our analysis for purposes of comparison.

B. Criterion 5: Political Neutrality

For a swing state like Wisconsin, most measures of political neutrality are generally consistent. John F. Nagle & Alec Ramsay, *On Measuring Two-Party Partisan Bias in Unbalanced States*, 20 Election Law Journal 116 (2021). Thus, Petering's evaluation of political neutrality focuses on metrics that are most direct and easiest to understand.

1. *The Court should give more weight to the "fractional seats" approach than the "past-the-post" approach when analyzing political neutrality.*

Importantly, every metric for political neutrality can be analyzed using either a "fractional seats" or "past-the-post" approach, and the two approaches can lead to different predictions and assessments of political neutrality. In *past-the-post* accounting, the predicted number of seats won by Party A equals the number of districts where Party A voters outnumber Party B voters. In *fractional seats* accounting, Party A's share of the (two-party) vote in each district is converted to a *fractional value between 0 and 1* which is both the predicted number of seats Party A wins in the district and the chance that Party A wins the district. These

"fractional seat" values are then summed over all districts to give the predicted number of seats won by Party A.

Figures 1-2 show the difference between the *past-the-post* and *fractional seats* accounting in a single district. Each considers Party A's share of the two-party vote. According to Figure 1, *past-the-post* accounting allocates one seat to the party with more voters in a district no matter if the district is lopsided or closely contested.

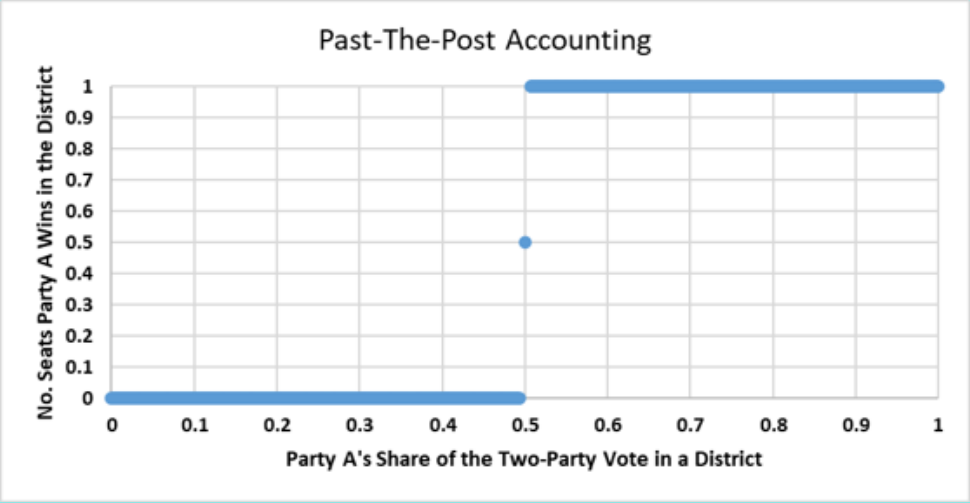

Figure 1. In past-the-post accounting, a district is categorized as a complete loss (win) if a party has less (more) than 50% of the two-party vote in the district.

In contrast, *fractional seats* accounting assumes a district is a total win or loss only if it is lopsided (Figure 2). If the district is competitive, each party is assumed to have a non-zero probability of winning it, i.e., a fractional predicted number of victories in it between 0 and 1. For example, DavesRedistricting.org assumes that a party with a two-party vote share of (50, 52, 54, 56, 58, 60) percent in a district has a (50.0, 69.1, 84.1, 93.3, 97.7, 99.4) percent chance of winning it and is therefore predicted to win (0.5, 0.691, 0.841, 0.933, 0.977, 0.994) seats in the district.

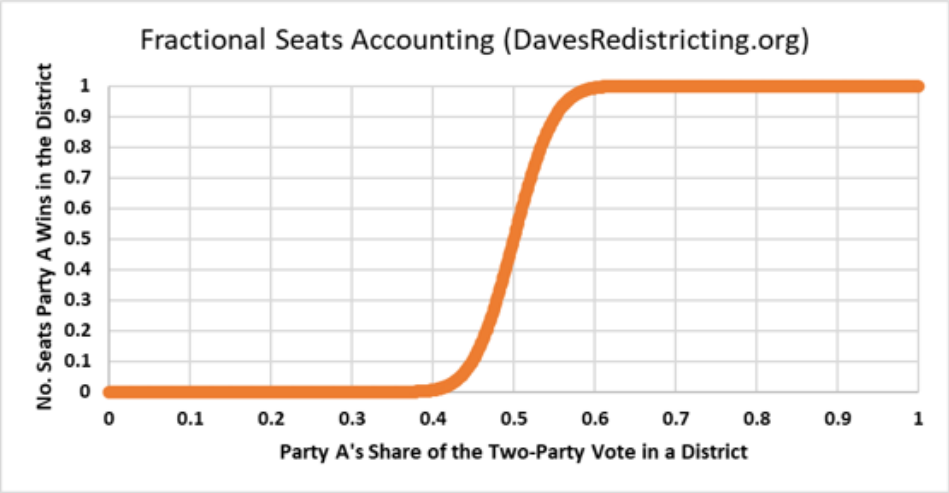

Figure 2. In fractional seats accounting, a district is assumed to be a complete win or loss only if it is lopsided. If a district is competitive, each party is assumed to have a fractional, non-zero probability of winning it (i.e., a fractional, non-zero predicted number of seats it wins in the district).

These alternative approaches lead to different predictions and assessments of political neutrality. For example, in a state with eight districts in which Party A has 52% of the vote share in every district, the fractional seats approach predicts that Party A wins 0.691*8 = 5.53 districts whereas the past-the-post approach predicts that it wins 8.00 districts.

Overall, *fractional seats* accounting is more reasonable than *past-the-post* accounting because it is neither extremely sensitive nor insensitive to changes in voter preferences; the smoothness of the curve in Figure 2 shows that fractional seats predictions always change—but never by a huge amount—when a party's vote share in a district changes within the range from 40% and 60%. In comparison, past-the-post predictions are unresponsive when a party's vote share in a district changes from 40% to 49.9%; hyper responsive when its vote share in a district changes from 49.9% to 50.1%; and unresponsive when its vote share changes from 50.1% to 60%. Fractional seats accounting is conceptually more sound because it considers the uncertainty inherent in campaigns and elections and it

is not particularly sensitive to minor changes in voter preference.[1]

Despite the advantages of *fractional seats* over *past-the-post* accounting, the parties have generally been using the latter approach in their analyses and arguments. This places doubt upon the conclusions of their analyses.

In contrast, the analysis of political neutrality that follows is done mostly through the lens of *fractional seats* accounting. This type of accounting is built into the political neutrality metrics at DavesRedistricting.org.

The degree to which the map proposals embody political neutrality is now evaluated using five metrics: *proportionality*, *efficiency gap*, *chances of winning a proportional seat share*, *number of competitive districts*, and *majority rule*. The first three metrics are computed with *fractional seats* methodology; the final two are computed with *past-the-post* accounting. The first four metrics use DRA's 2016-2022 composite election data. The last uses the results of recent individual elections.

In DRA's 2016-2022 composite election data, the number of votes for Party A in each ward equals the average number of votes for Party A in the ward over the following six statewide elections: 2022 governor, Senate, and attorney general; 2020 president; 2018 U.S. Senate; and 2016 president. Thus, if Party A received 400, 400, 500, 500, 500, and 500 votes in Ward *W* in the six elections, its composite vote total is (400 + 400 + 500 + 500 + 500 + 500)/6 = 466.67. This value is then summed for all wards in a proposed district to give the predicted vote total for Party A in the

[1] Studies have shown *fractional seats* accounting is better than *past-the-post* accounting at predicting actual election results. *See* Petering Amicus Brief, p. 17, Note 3.

district. These results can then passed to the function shown in Figure 2 for fractional seats analyses.

2. Proportionality

According to DRA's 2016-2022 composite election data, Democrats have 51.16% of the statewide, two-party vote in Wisconsin. In a perfectly proportional election this translates to (.5116)*(99) = 50.65 assembly and (.5116)*(33) = 16.88 senate seats for Democrats. Meanwhile, Republicans have received 48.84% of the two-party vote which translates to (.4884)*(99) = 48.35 assembly and (.4884)*(33) = 16.12 senate seats.

Using Figure 2, Petering converted the Democratic percentage of the two-party vote in each district of each map proposal into a predicted fractional number of seats won by Democrats in the district. Petering then summed these values for all districts to get the total number of (fractional) seats that Democrats are predicted to win in the assembly and senate.

Figures 3 and 4 show the results of this analysis for the six map proposals before the Court. Figure 3 shows that none of the proposals gets close to 50.65 Democratic seats in the assembly, although it is clearly possible to get very close to this goal. According to Figure 4, the Democratic Senators' proposal is the only one before the Court to get close to 16.88 Democratic seats in the senate. However, this proposal has poor performance in the assembly (with 47.82 predicted Democratic seats).

Overall, no proposal before the Court achieves political neutrality according to the proportionality metric.

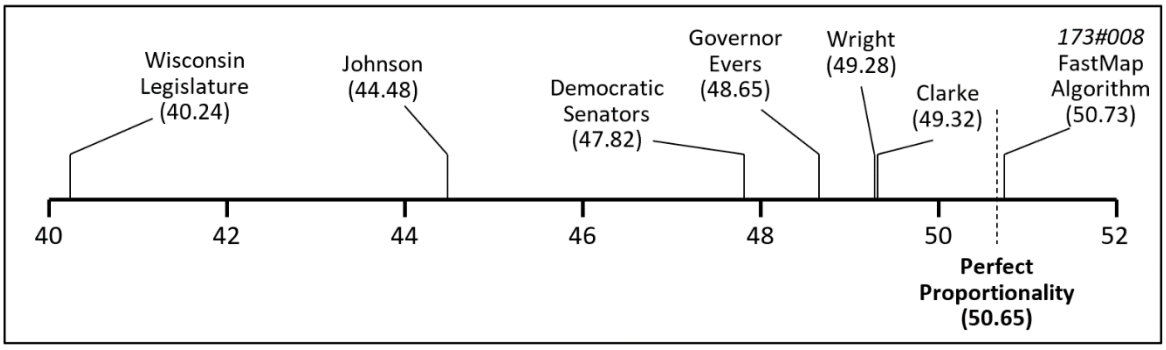

Figure 3. Predicted number of assembly seats won by Democrats for the map proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

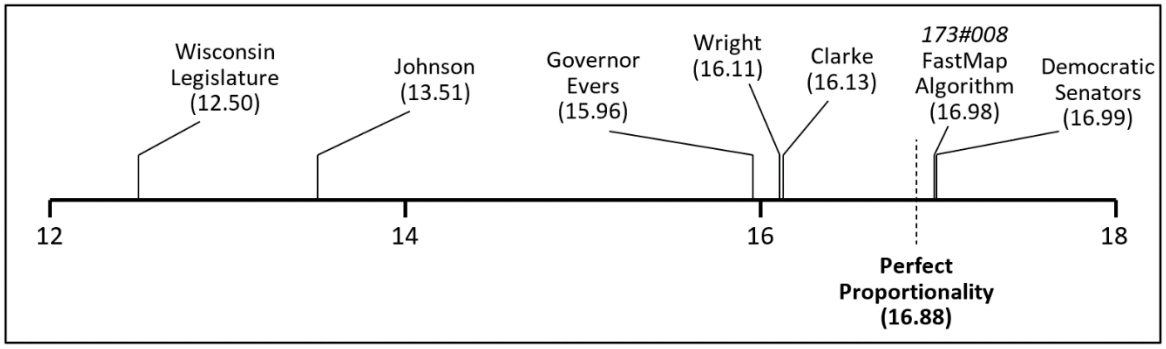

Figure 4. Predicted number of senate seats won by Democrats for the map proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

3. Efficiency Gap

Table 3 and Figure 5 show the efficiency gaps for the proposals, computed using the fractional seats approach. Lower values are better. Overall, no proposal before the Court achieves political neutrality in the assembly according to the efficiency gap metric, and only one achieves it in the senate: the Democratic Senators' proposal.

Table 3. Efficiency gaps for the map proposals before the Court (fractional seats accounting). Results for proposal *173#008* (which is not before the Court) are included for comparison.

Chamber	Wisconsin Legislature	Johnson	Governor Evers	Wright	Clarke	Democratic Senators	*173#008* FastMap Algorithm
Assembly	11.67%	7.39%	3.18%	2.55%	2.51%	4.02%	1.07%
Senate	14.46%	11.38%	3.95%	3.51%	3.46%	0.82%	0.85%

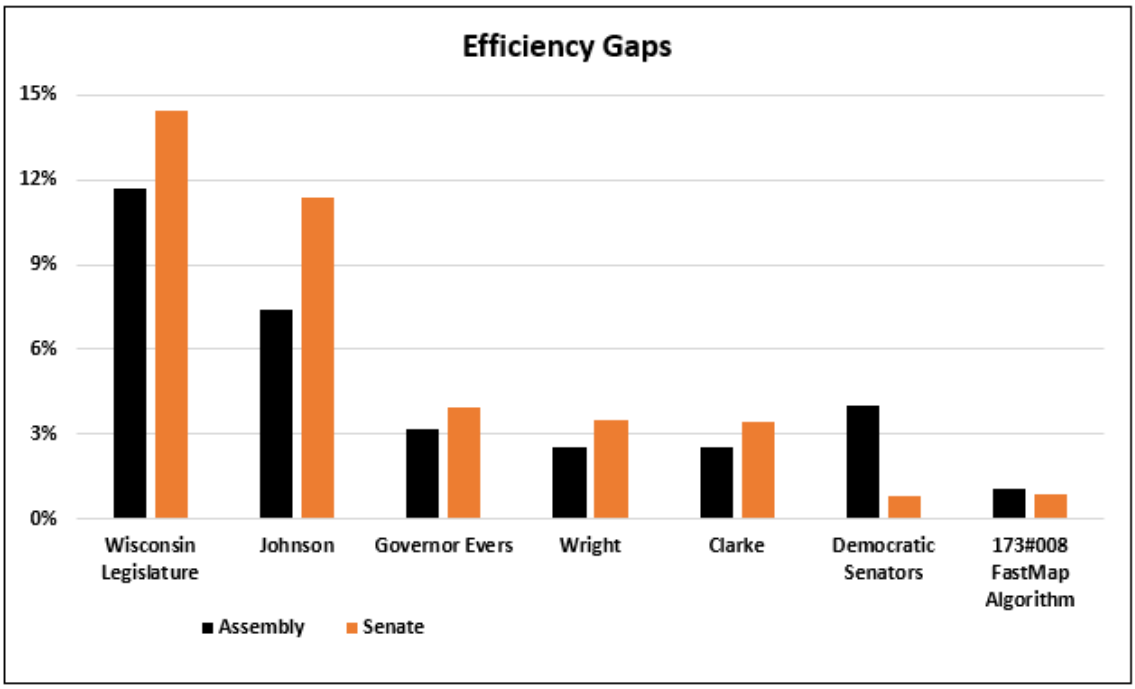

Figure 5. Efficiency gaps for the map proposals before the Court (fractional seats accounting). Results for proposal *173#008* (which is not before the Court) are included for comparison.

4. Chances of Winning a Proportional Seat Share

Political neutrality can also be evaluated by estimating each party's chances of winning a proportional share of seats. Rounded to the nearest integer, a proportional share of assembly (senate) seats for Democrats is 51 (17) and for Republicans is 48 (16). Politically neutral maps should give each party a similar chance of obtaining a proportional seat share.

After converting the Democratic and Republican percentages of the two-party vote in each district into probabilities that each party wins each district (Figure 2), 1,000,000 assembly elections and 1,000,000 senate elections were simulated using Monte Carlo simulation to determine the number of districts won by each party in each election. The number of simulated elections in which each party won at least its proportional share of seats was then computed and divided by 1,000,000 to give the percentage of elections

in which each party won at least its proportional share of seats. This percentage represents the likelihood that each party will win at least its proportional share of seats in a future election.

Table 4 shows the results, ordering the proposals from least to most equitable. No proposal before the Court gives Democrats more than a 30% chance of winning a proportional share of seats in the assembly. However, all such proposals give Republicans at least an 85% chance of winning a proportional share of seats in the assembly. In the senate, only the Democratic Senators' proposal gives both parties at least a 50% chance of winning a proportional share of seats. All other proposals give Republicans a significantly higher chance of winning a proportional share of seats than Democrats.

Overall, no proposal before the Court gives both parties an equal opportunity for proportional representation in both chambers.

Table 4. Chance of each party winning its proportional share of seats in the assembly and senate. The proposals before the Court are ordered from least to most equitable. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Proposal	Democrats' Chances of Proportional Seat Share in the Assembly	Republicans' Chances of Proportional Seat Share in the Assembly	Democrats' Chances of Proportional Seat Share in the Senate	Republicans' Chances of Proportional Seat Share in the Senate
Wisconsin Legislature	0 in a million	100.0000%	0.3%	99.95%
Johnson	0.4%	99.9%	2.4%	99.6%
Governor Evers	16.7%	93.0%	34.3%	87.4%
Clarke	26.4%	87.4%	38.2%	86.1%
Wright	27.9%	85.1%	38.5%	85.1%
Democratic Senators	8.4%	97.0%	64.2%	64.1%
173#008 FastMap Algorithm	52.3%	63.5%	64.4%	65.4%

5. Number of Competitive Districts

Petering computed the number of competitive assembly and senate districts in each proposal. A competitive district is one in which each party's share of the

two-party vote is in the 45%-55% range according to DRA 2016-2022 composite election data. The results are shown in Table 5 and Figure 6. Higher values are better, and the proposals are ordered from least to greatest number of competitive districts in the assembly + senate.

Table 5. Number of competitive districts in the map proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Chamber	Clarke	Wisconsin Legislature	Governor Evers	Democratic Senators	Wright	Johnson	*173#008* FastMap Algorithm
Assembly	15	14	14	16	23	23	29
Senate	7	9	10	9	8	10	10

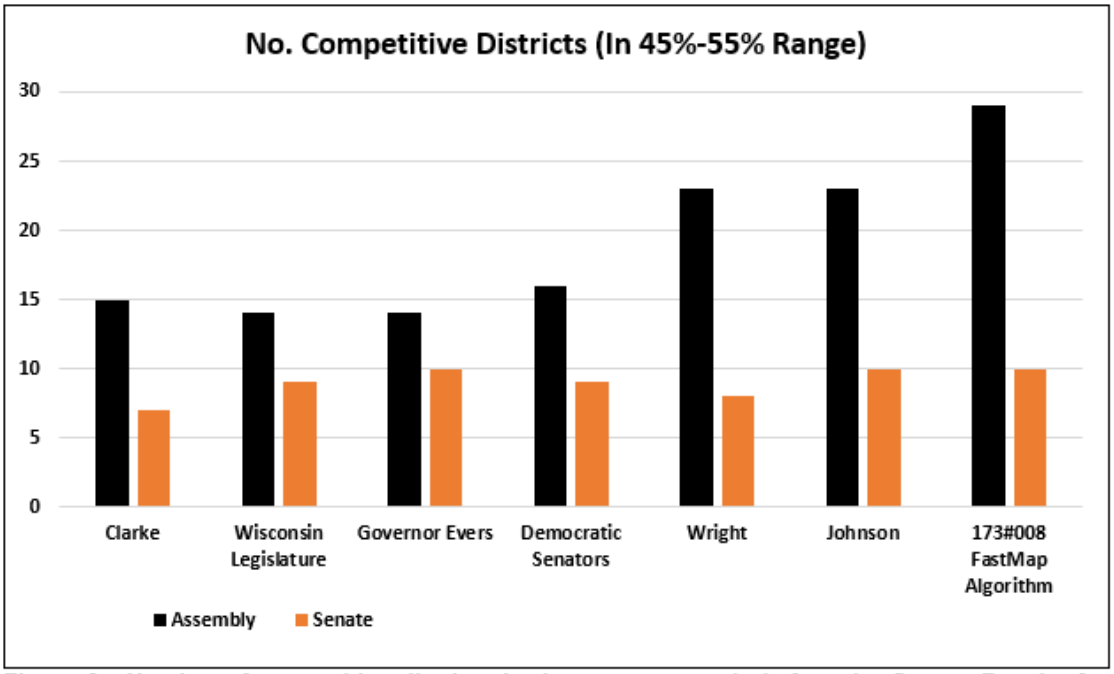

Figure 6. Number of competitive districts in the map proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

6. Majority Rule

Election data were overlaid onto each map proposal to see its performance for eleven recent statewide elections: the most recent two elections for president, governor and attorney general, three elections for U.S. Senate, and one election for secretary of state and treasurer. Democrats won seven such elections, Republicans four. The number of

assembly and senate districts in each proposal that were carried by the winning candidate was computed, and it was determined whether the candidate who won the popular vote also carried a majority of assembly and senate districts in the proposal.

Table 6 shows the results. The best performing proposals—Governor Evers and Clarke—only achieved majority rule in 16 of 22 cases, although better performance is clearly possible. *Overall, no proposal before the Court strongly embodies the principle of majority rule.*

Table 6. Proposals' adherence to the principle of majority rule in eleven recent statewide elections. Majority rule is achieved (Y) if a majority of districts in the proposal are carried by the candidate who won the popular vote. If majority rule is not achieved, the cell is blank. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Assembly Election	Wisconsin Legislature	Johnson	Democratic Senators	Wright	Governor Evers	Clarke	*173#008* FastMap Algorithm
2022 Gov			Y	Y	Y	Y	Y
2022 Sen	Y	Y	Y		Y	Y	Y
2022 AG				Y	Y	Y	Y
2022 SOS				Y		Y	Y
2022 Tres	Y	Y	Y		Y	Y	
2020 Pres				Y		Y	Y
2018 Gov							Y
2018 Sen	Y	Y	Y	Y	Y	Y	Y
2018 AG							Y
2016 Pres	Y	Y	Y	Y	Y	Y	Y
2016 Sen	Y	Y	Y	Y	Y	Y	Y
# Assembly Elections w/ Majority Rule	5	5	6	7	7	9	10
Senate Election	**Wisconsin Legislature**	**Johnson**	**Democratic Senators**	**Wright**	**Governor Evers**	**Clarke**	***173#008* FastMap Algorithm**
2022 Gov			Y	Y	Y	Y	Y
2022 Sen	Y	Y			Y	Y	
2022 AG			Y	Y	Y		Y
2022 SOS			Y	Y	Y		Y
2022 Tres	Y	Y		Y	Y	Y	
2020 Pres			Y	Y	Y	Y	Y
2018 Gov			Y				Y
2018 Sen	Y	Y	Y	Y	Y	Y	Y
2018 AG			Y				Y
2016 Pres	Y	Y	Y	Y	Y	Y	Y
2016 Sen	Y	Y	Y	Y	Y	Y	Y
# Senate Elections w/ Majority Rule	5	5	9	8	9	7	9
Total # Asm. + Sen. Elections w/ Majority Rule	10	10	15	15	16	16	19

C. Criterion 6: Compactness

Table 7 and Figure 7 show the average Reock and Polsby-Popper compactness scores (higher is better) of the districts in each proposal. The proposals before the Court are sequenced from lowest to highest sum of the two scores for the assembly + senate (i.e., from worst to best).

Table 7. Reock and Polsby-Popper compactness scores (higher is better) for the proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Proposal	Assembly Reock Score	Assembly Polsby-Popper Score	Senate Reock Score	Senate Polsby-Popper Score	Sum
Wisconsin Legislature	0.3612	0.2437	0.3687	0.2257	1.199
Clarke	0.3867	0.2995	0.3852	0.2516	1.323
Democratic Senators	0.3932	0.3145	0.3577	0.2596	1.325
Wright	0.3869	0.3098	0.3805	0.2533	1.331
Johnson	0.4128	0.3472	0.3877	0.2793	1.427
Governor Evers	0.3919	0.3488	0.3769	0.3133	1.431
173#008 FastMap Algorithm	0.4443	0.3747	0.3867	0.3233	1.529

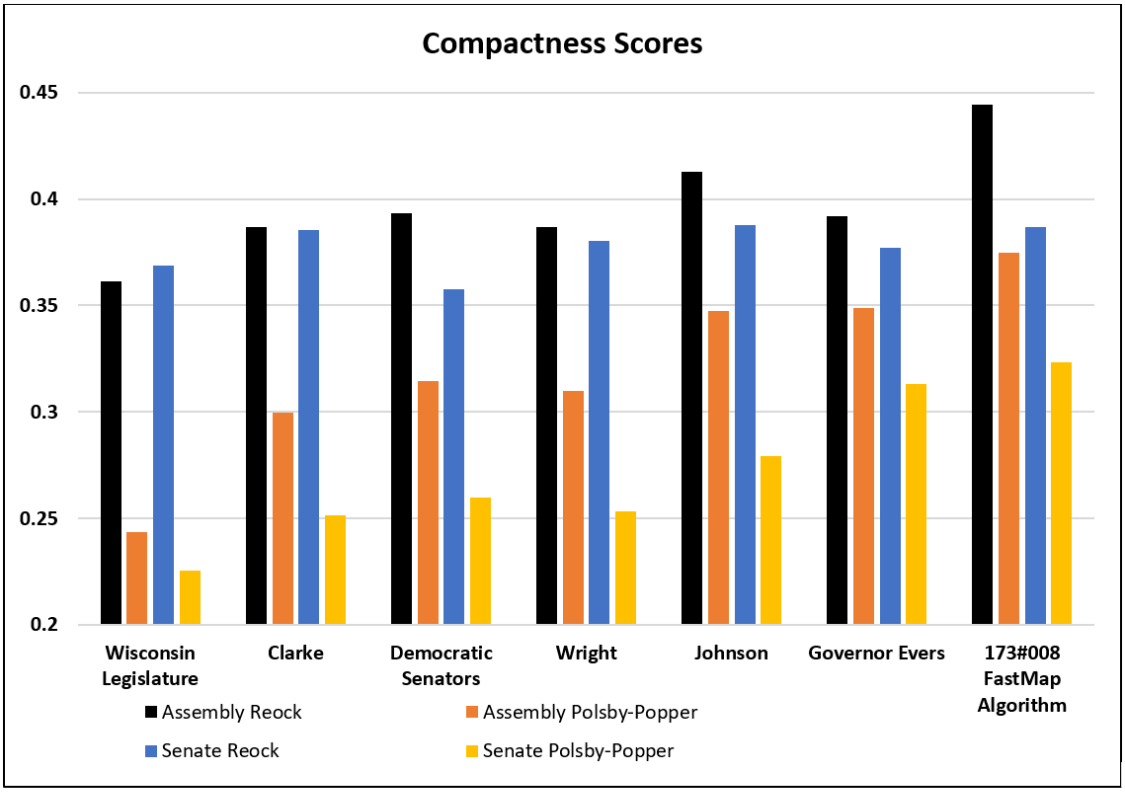

Figure 7. Reock and Polsby-Popper compactness scores (higher is better) for the proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Figures 8-19 show the assembly/senate districts in the six proposals. A significant number of assembly districts in most of the proposals appear contorted and strained, reflecting the challenge to make districts that must simultaneously meet multiple mapping criteria.

Overall, no proposal before the Court has districts in as compact a form as practicable. Petering is certain an algorithm can solve this problem (Figures 20-21).

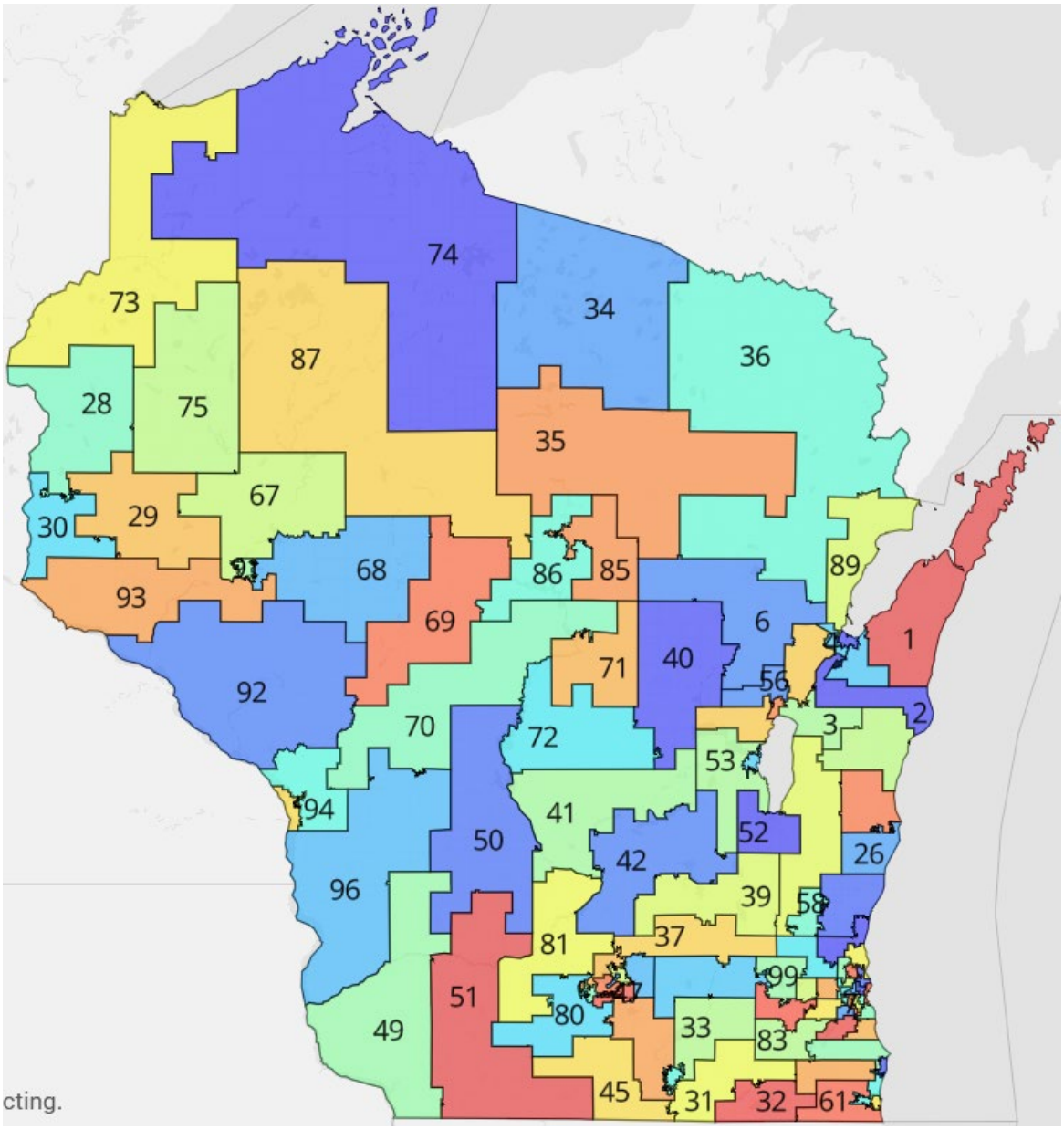

Figure 8. Wisconsin Legislature assembly districts (Reock = 0.3612, Polsby-Popper = 0.2437).

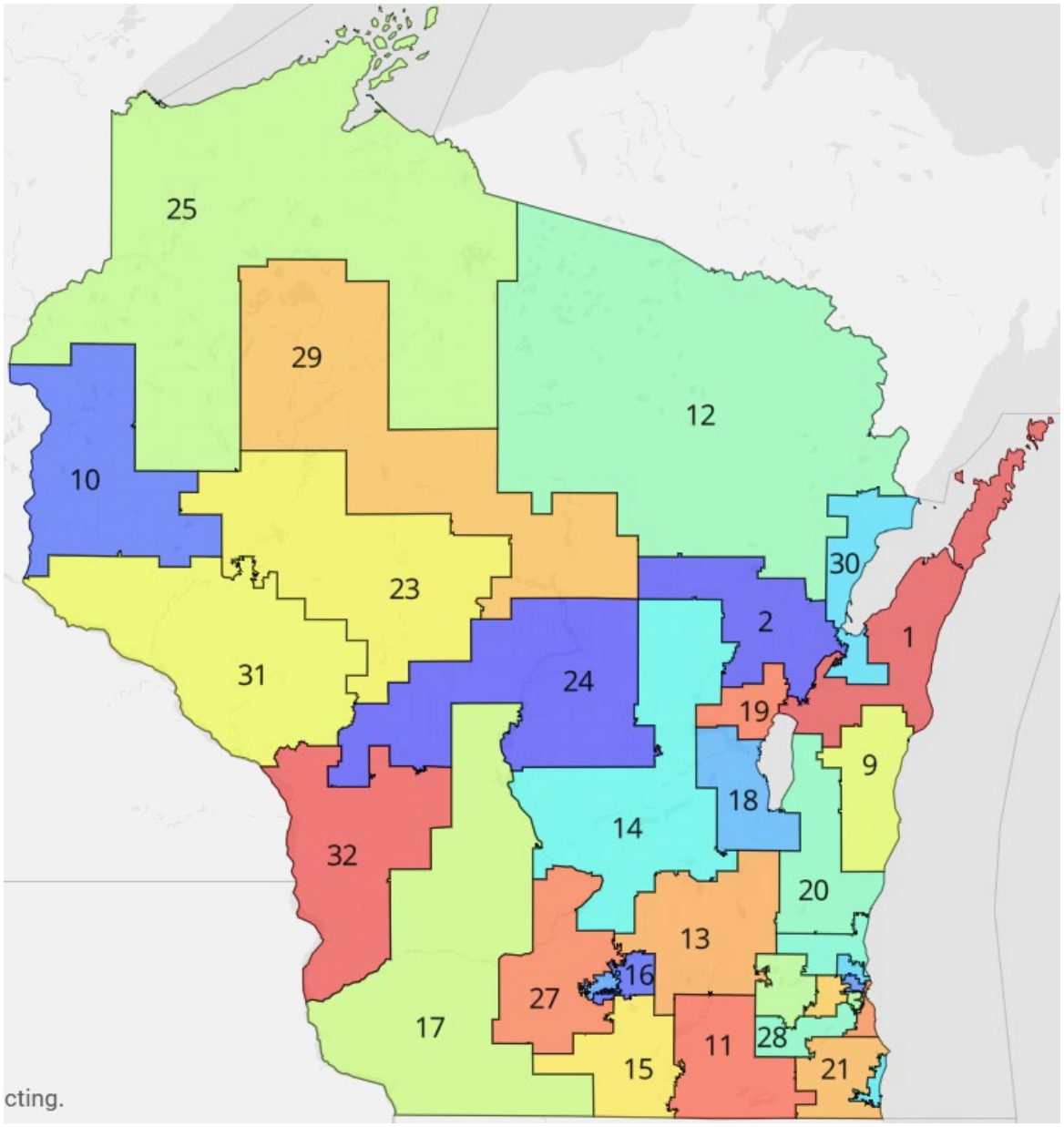

Figure 9. Wisconsin Legislature senate districts (Reock = 0.3687, Polsby-Popper = 0.2257).

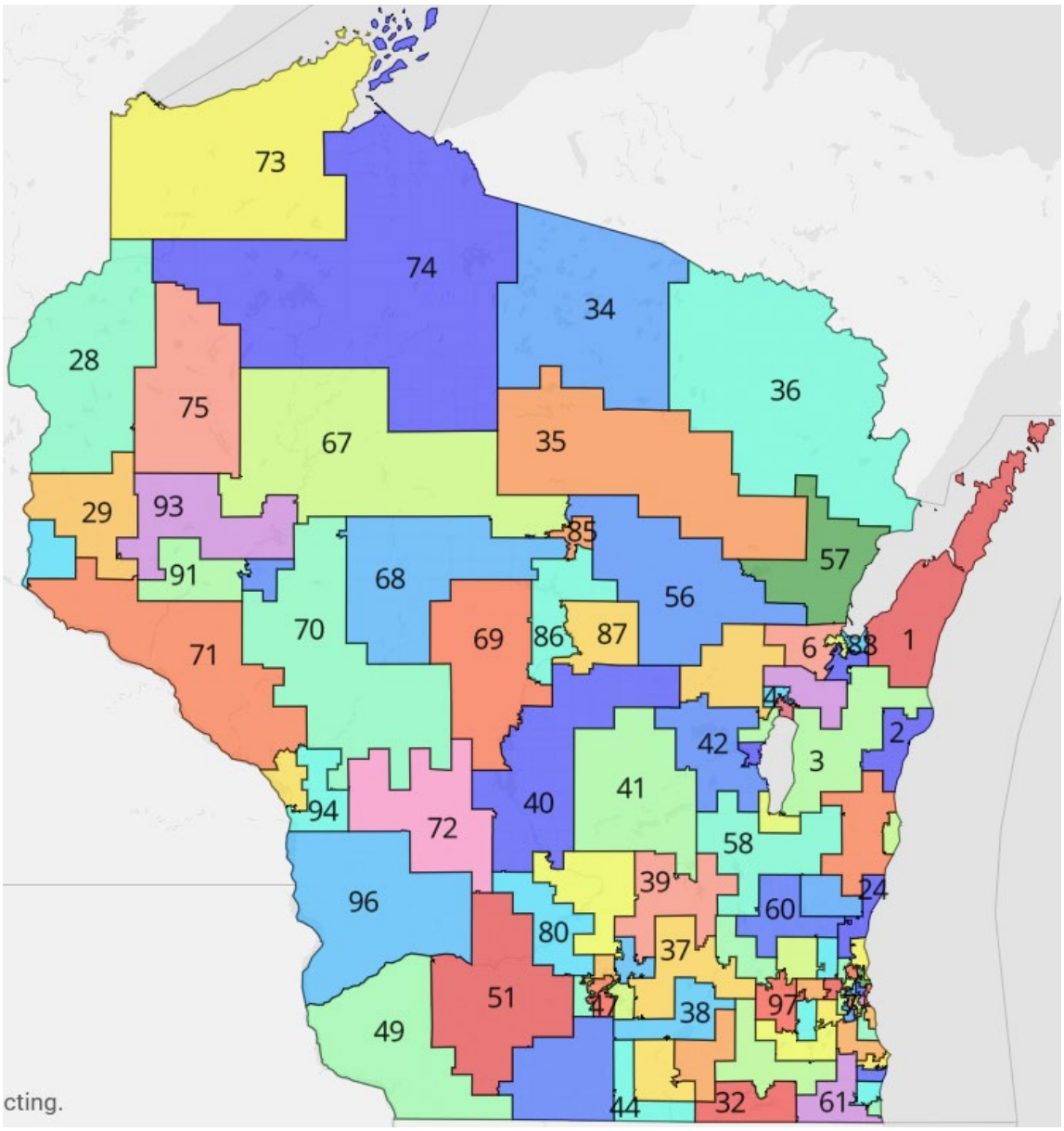

Figure 10. Clarke assembly districts (Reock = 0.3867, Polsby-Popper = 0.2995).

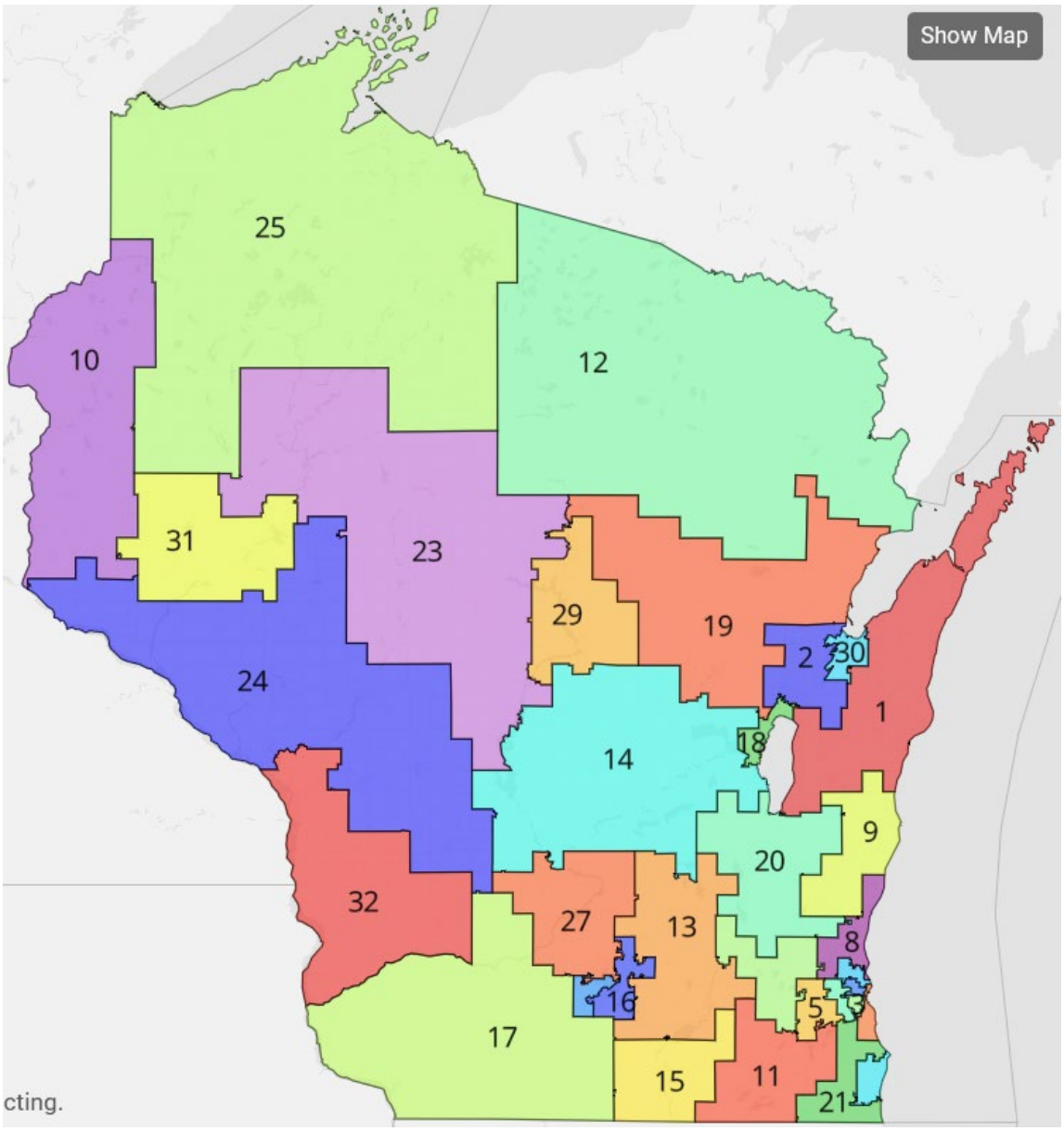

Figure 11. Clarke senate districts (Reock = 0.3852, Polsby-Popper = 0.2516).

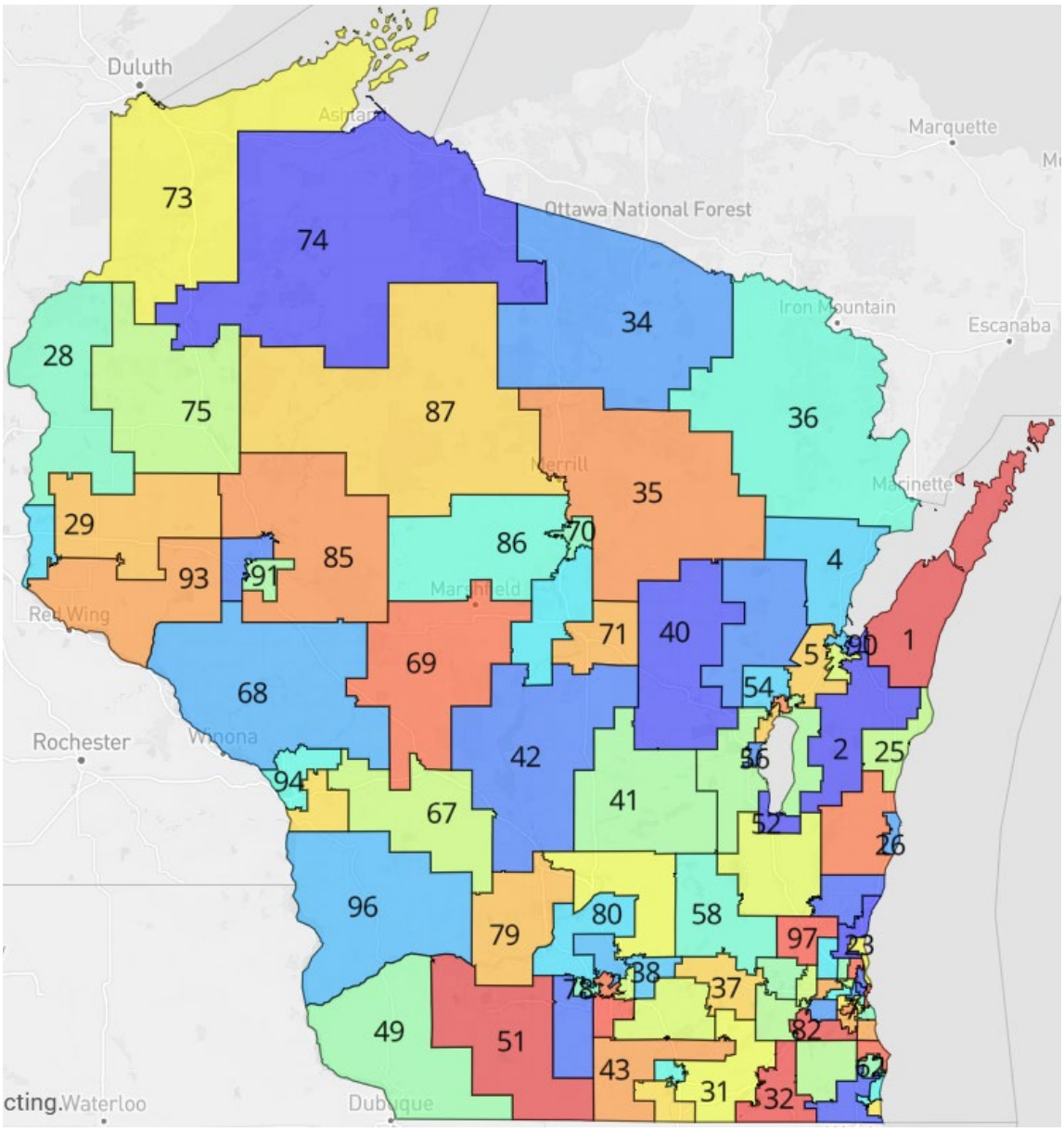

Figure 12. Democratic senators' assembly districts (Reock = 0.3932, Polsby-Popper = 0.3145).

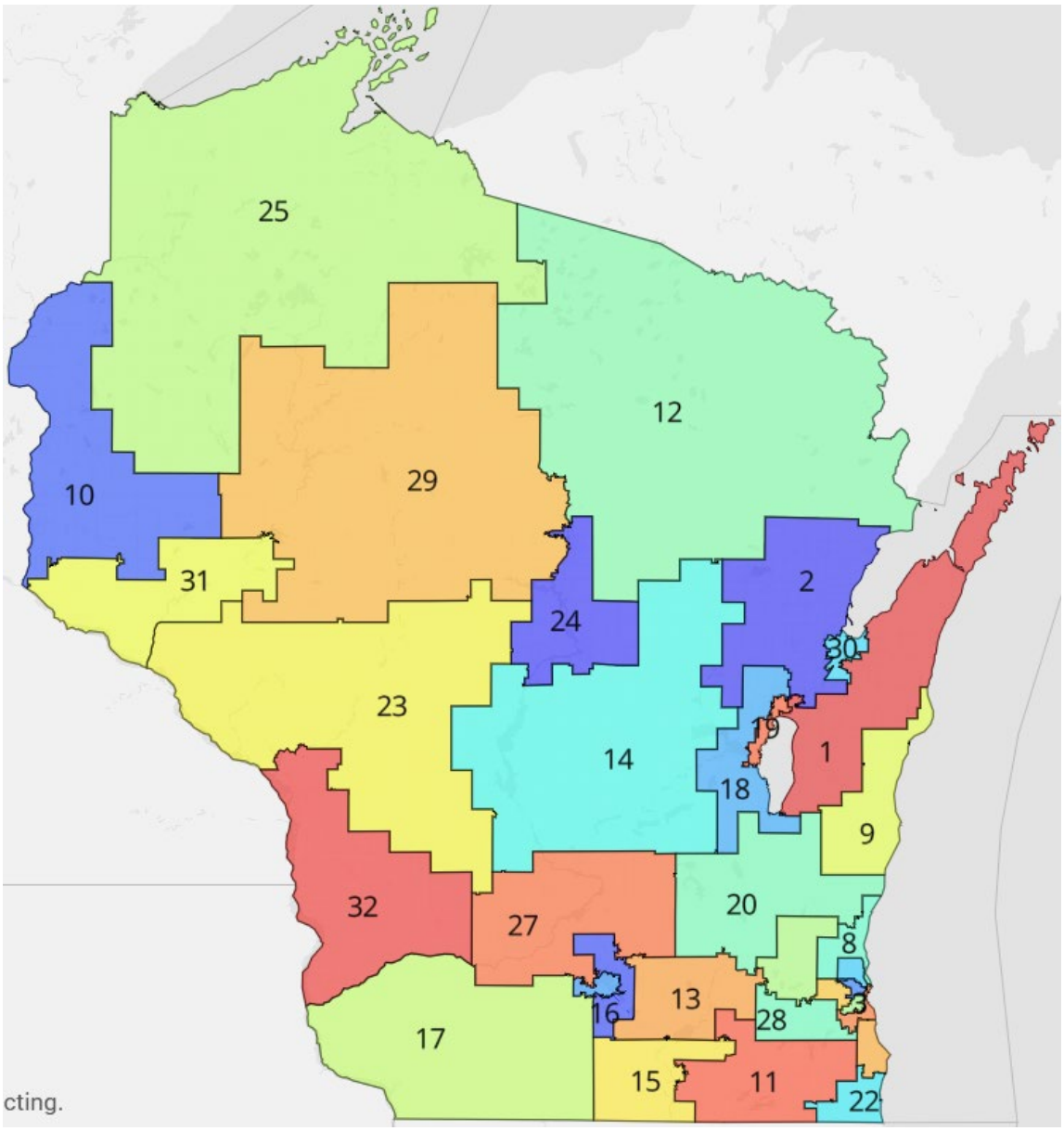

Figure 13. Democratic senators' senate districts (Reock = 0.3577, Polsby-Popper = 0.2596).

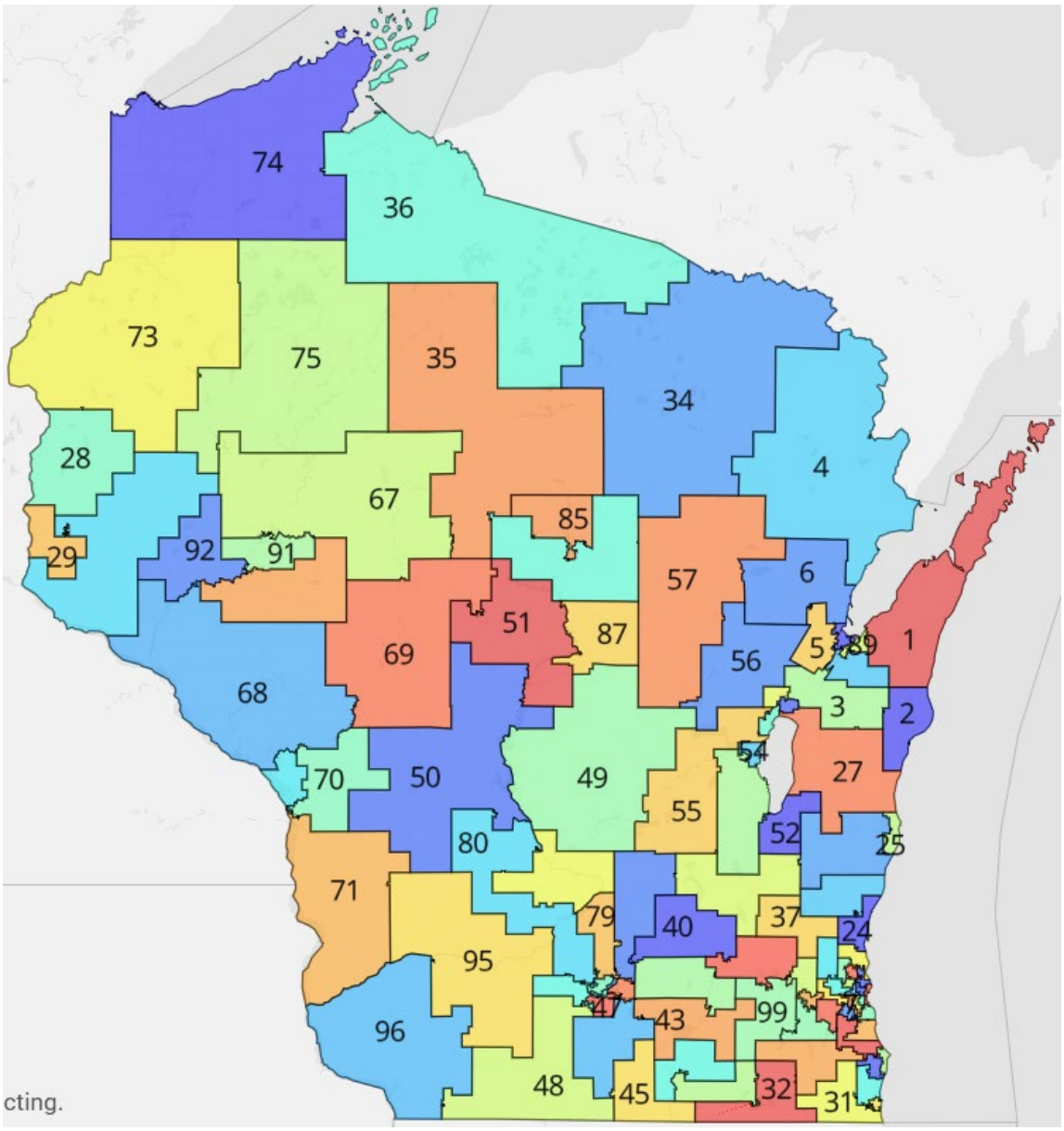

Figure 14. Wright assembly districts (Reock = 0.3869, Polsby-Popper = 0.3098).

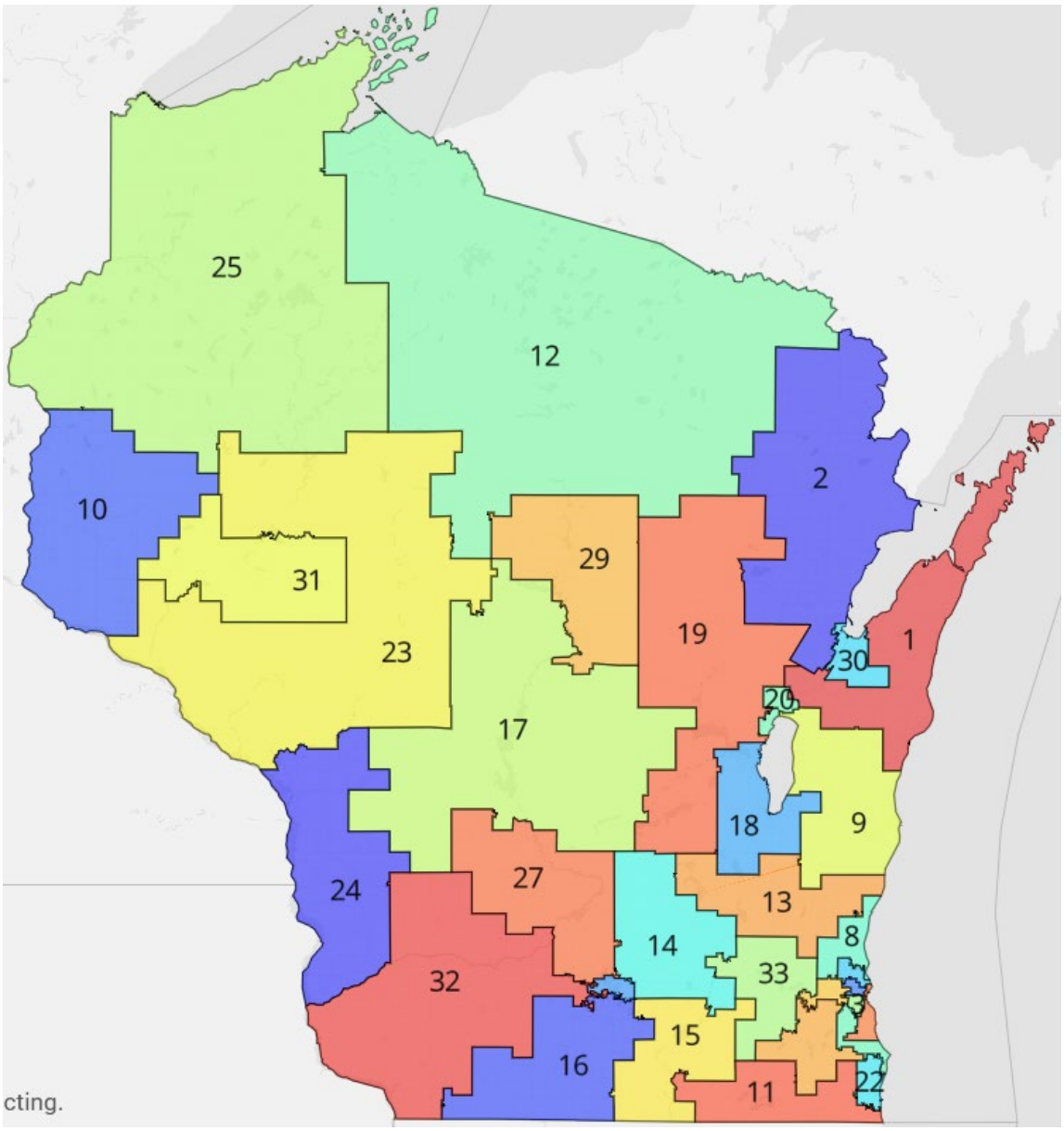

Figure 15. Wright senate districts (Reock = 0.3805, Polsby-Popper = 0.2533).

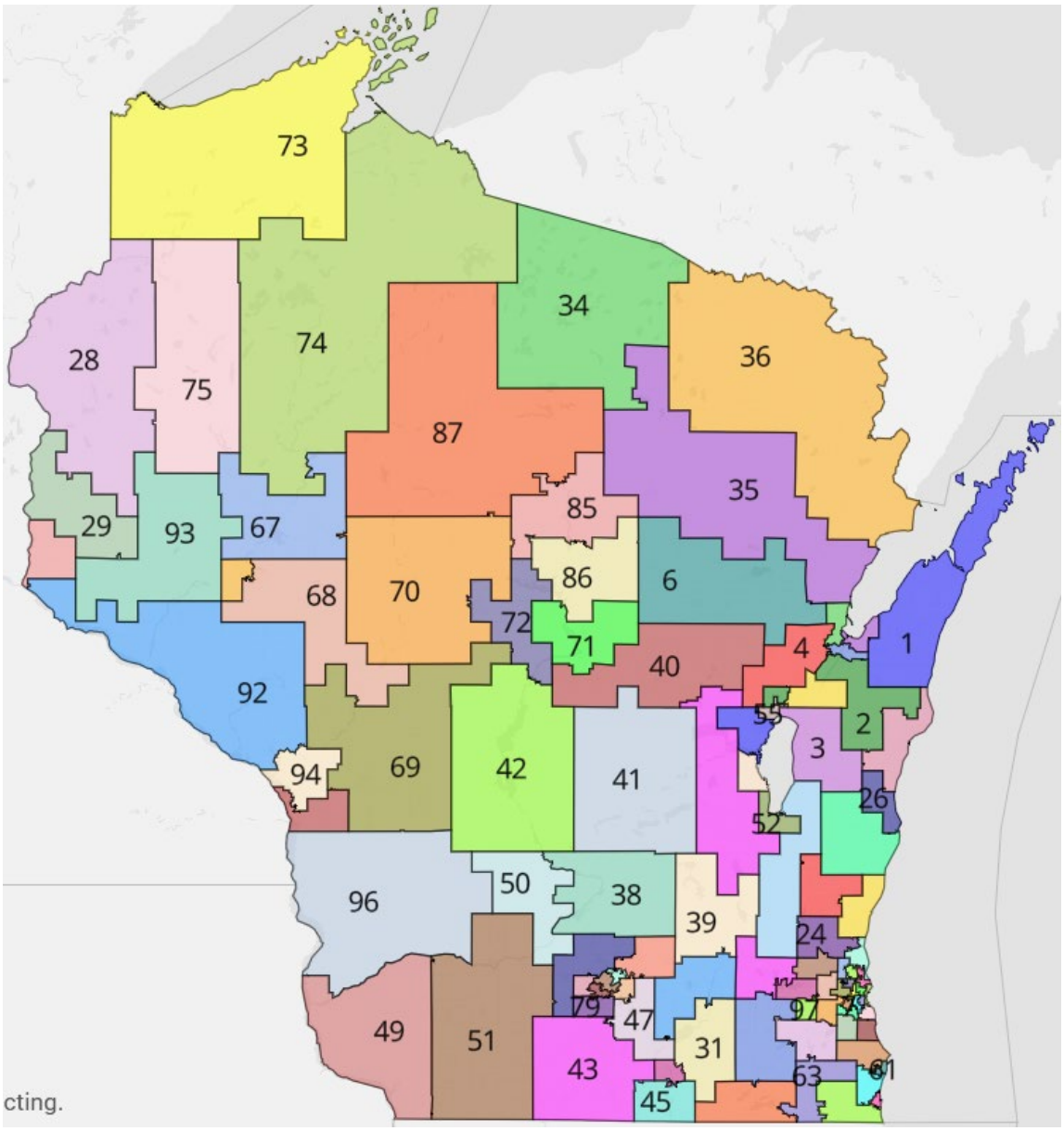

Figure 16. Johnson assembly districts (Reock = 0.4128, Polsby-Popper = 0.3472).

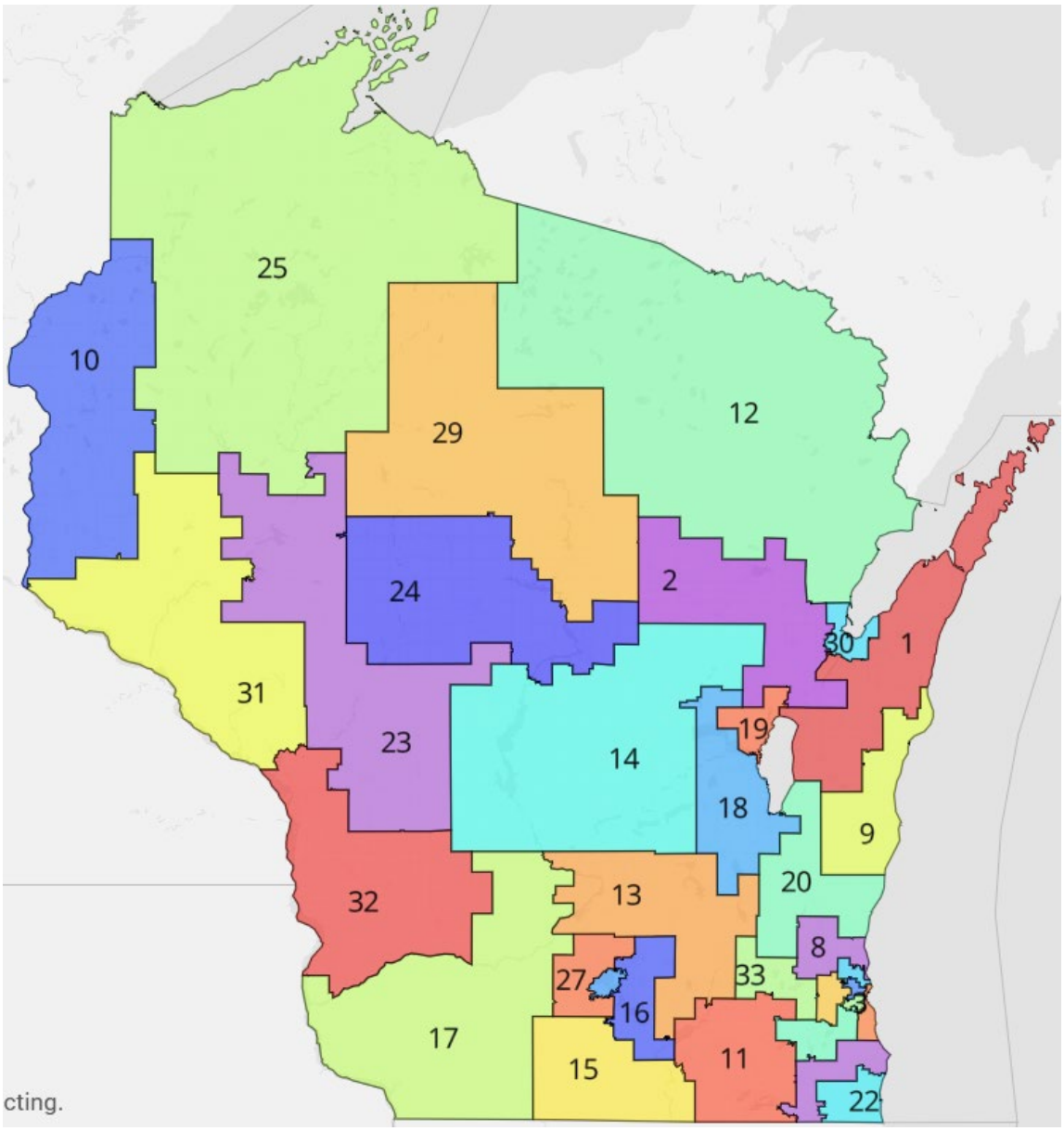

Figure 17. Johnson senate districts (Reock = 0.3877, Polsby-Popper = 0.2793).

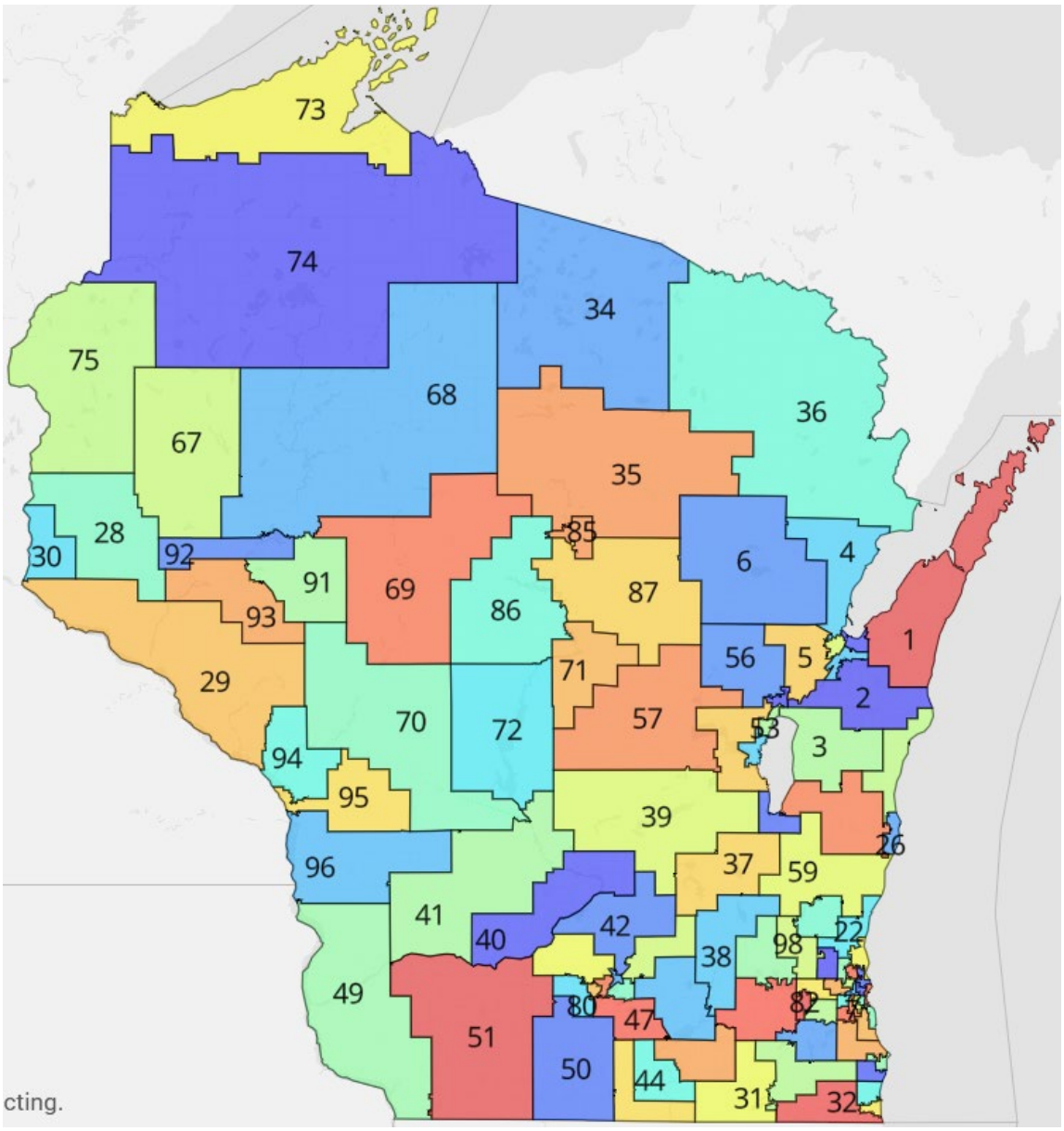

Figure 18. Governor Evers assembly districts (Reock = 0.3919, Polsby-Popper = 0.3488).

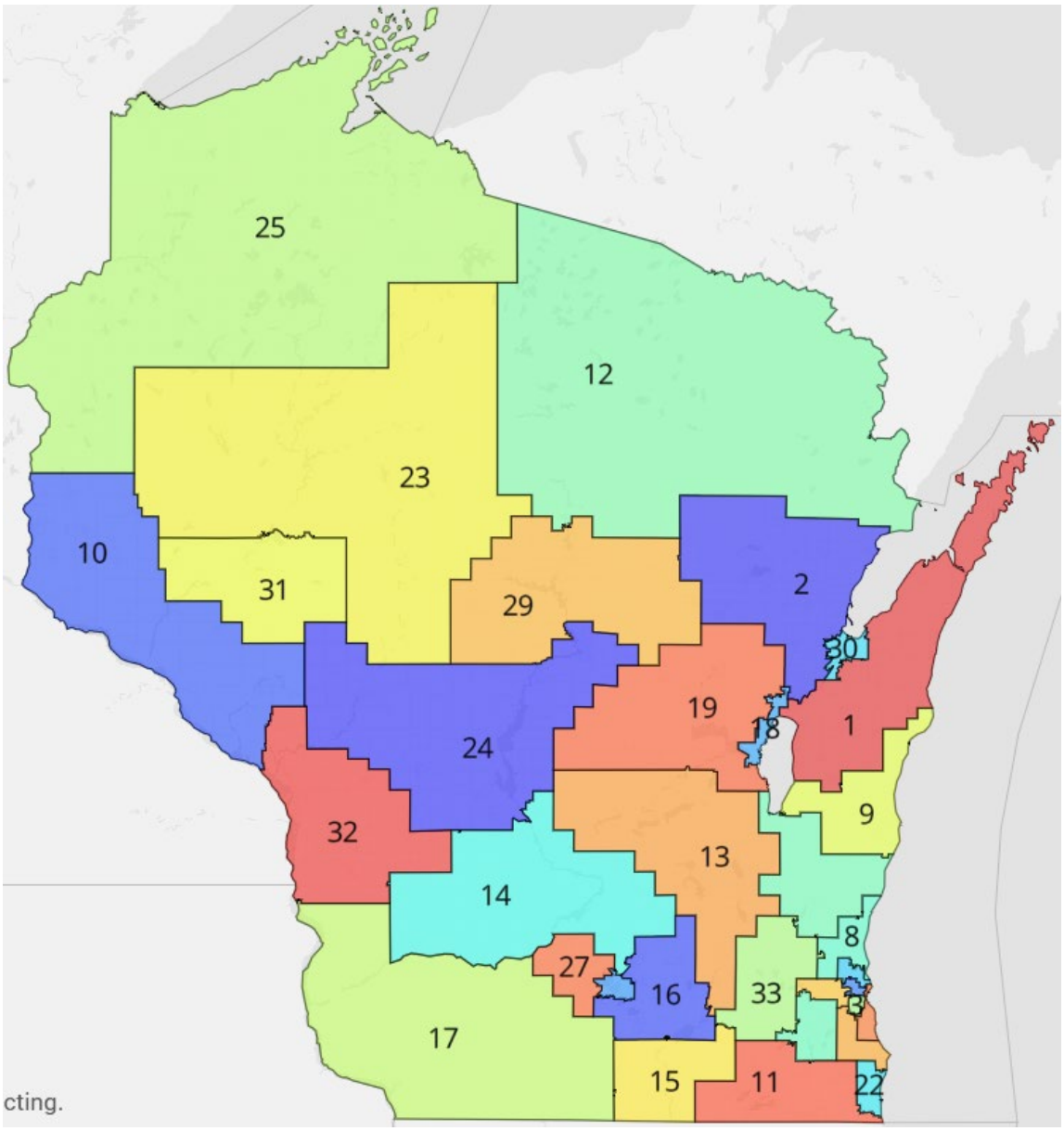

Figure 19. Governor Evers senate districts (Reock = 0.3769, Polsby-Popper = 0.3133).

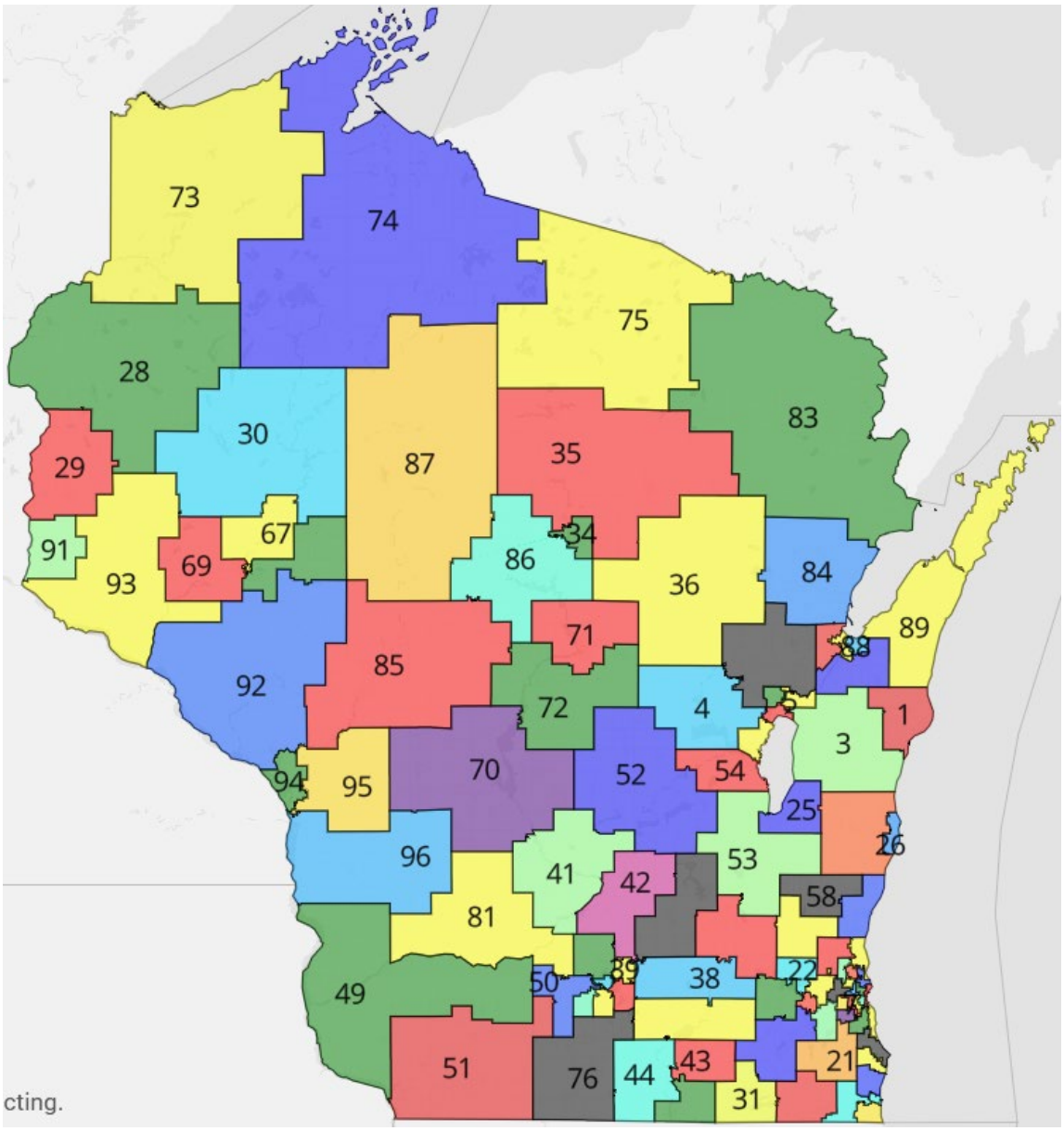

Figure 20. FastMap algorithm assembly districts (Reock = 0.4443, Polsby-Popper = 0.3747).

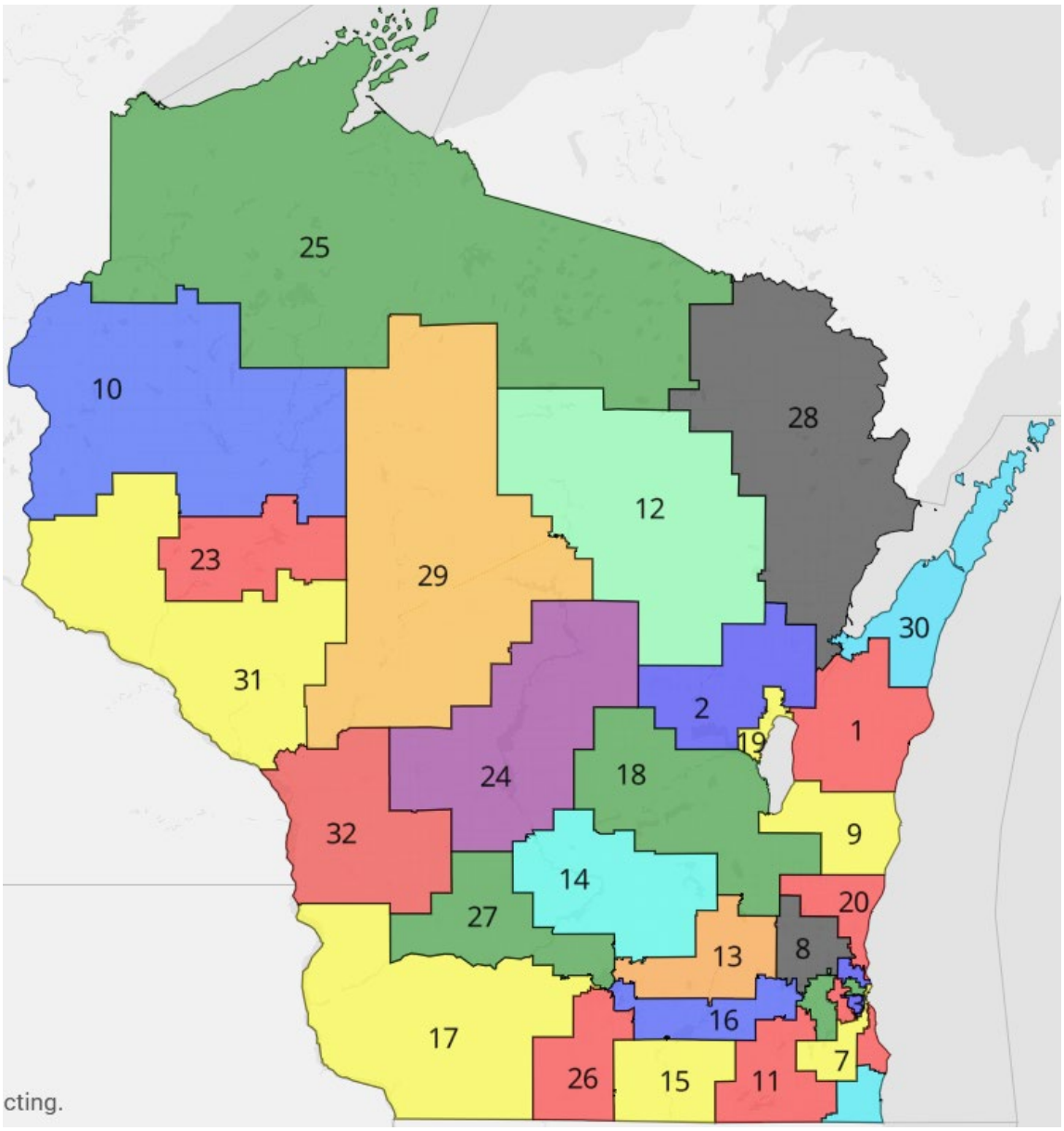

Figure 21. FastMap algorithm senate districts (Reock = 0.3867, Polsby-Popper = 0.3233).

D. Criterion 7: County Splitting

Table 8 and Figure 22 show the number of times counties are split in each proposal. Smaller numbers are better, and the proposals before the Court are sequenced from worst to best.

Table 8. Number of times that counties are split by assembly and senate districts in the proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Chamber	Wisconsin Legislature	Wright	Democratic Senators	Clarke	Governor Evers	Johnson	*173#008* FastMap Algorithm
Assembly	156	153	151	149	146	131	134
Senate	71	74	74	70	67	60	61

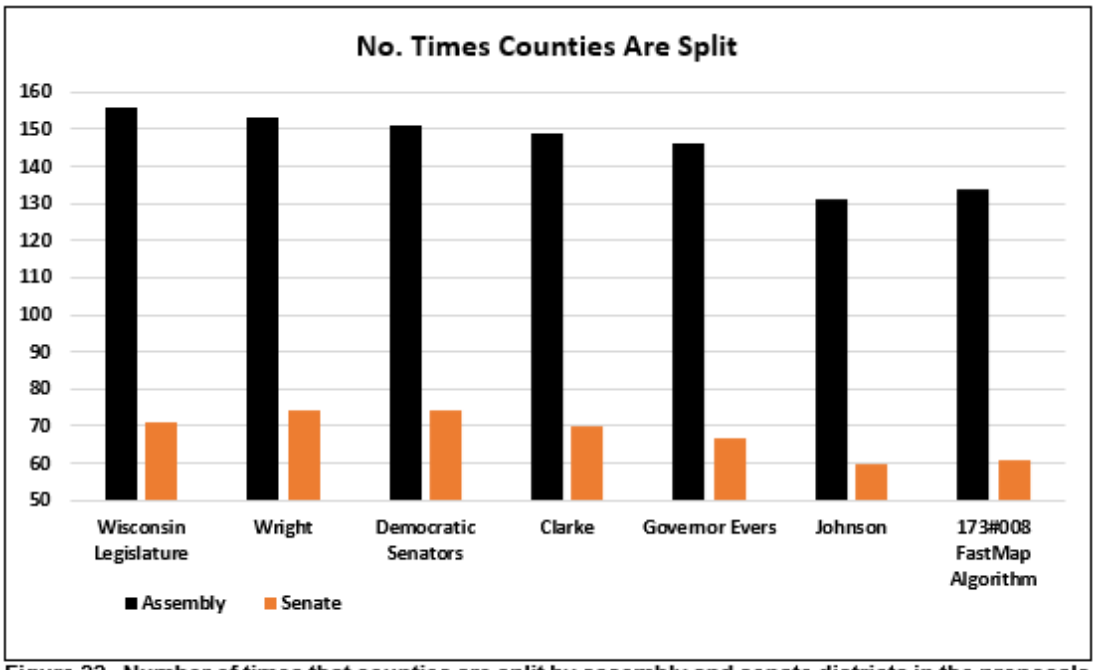

Figure 22. Number of times that counties are split by assembly and senate districts in the proposals before the Court. Proposal *173#008* included for comparison.

E. Criterion 8: Municipality Splitting

Table 9 and Figure 23 show the number of municipalities whose population is split in each proposal. Smaller numbers are better, and the proposals before the Court are sequenced from worst to best. This table considers the splitting of a municipality's population, not its land area.

Table 9. Number of municipalities that are split by assembly and senate districts in the proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Chamber	Wisconsin Legislature	Democratic Senators	Governor Evers	Wright	Clarke	Johnson	*173#008* FastMap Algorithm
Assembly	81	69	55	52	44	35	56
Senate	44	47	33	34	29	23	39

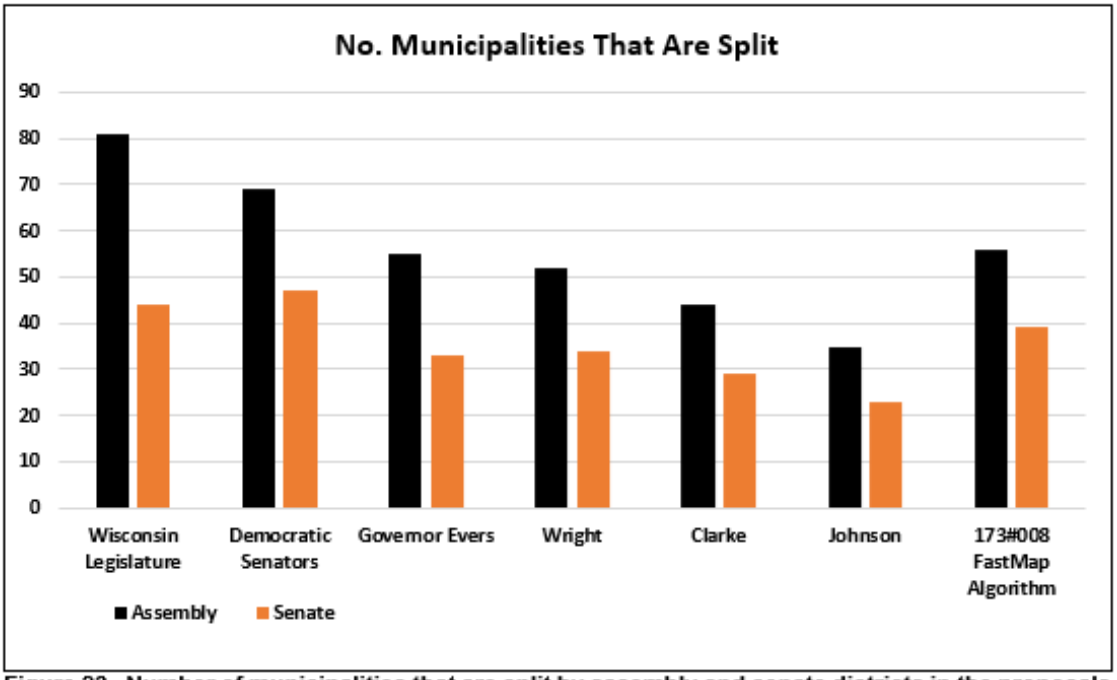

Figure 23. Number of municipalities that are split by assembly and senate districts in the proposals before the Court. Proposal *173#008* is included for comparison.

F. Criterion 9: Communities of Interest

Among several communities of interest, one group stands out for its merits and well-defined boundaries: Native American communities. Hence, the proposals were analyzed in terms of how well they kept Native American persons together in the same district.

Table 10 shows an analysis which identifies the two assembly and two senate districts with the highest Native American VAP percentages in each proposal. As the table shows, the worst performer is the Clarke proposal with a sum of 9.66% + 7.35% + 6.09% + 5.13% = 28.23%, and the best performer is the Governor Evers proposal with a sum of 35.67%.

Table 10. The two assembly and two senate districts with the highest Native American VAP percentages in the proposals before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Proposal	Two Asm. Dists. With Highest % Native American VAP	% Native American VAP	Two Sen. Dists. With Highest % Native American VAP	% Native American VAP
Clarke	74, 6	9.66%, 7.35%	25, 12	6.09%, 5.13%
Johnson	74, 6	9.53%, 7.52%	25, 2	6.07%, 5.54%
Wisconsin Legislature	36, 74	10.45%, 7.75%	2, 12	5.84%, 5.72%
Wright	57, 5	9.67%, 9.64%	25, 2	5.41%, 5.40%
Democratic Senators	74, 35	12.77%, 9.21%	25, 12	7.38%, 4.92%
Governor Evers	6, 73	12.55%, 9.18%	2, 25	7.52%, 6.42%
173#008 FastMap Algorithm	74, 36	14.88%, 12.01%	25, 12	7.08%, 5.23%

G. Criterion 10: Population Deviation (Beyond Legal Requirements)

Table 11 shows the range in population deviation in the proposals. Wisconsin already has some of the strictest population deviation standards in the country. Thus, there is only marginal merit in reducing the population deviation below 2% if it leads to less political neutrality, worse district shapes, and/or additional splits of counties and municipalities.

Table 11. Range in population deviation for assembly and senate districts in each proposal before the Court. Results for proposal *173#008* (which is not before the Court) are included for comparison.

Chamber	Governor Evers	Democratic Senators	Wright	Johnson	Wisconsin Legislature	Clarke	*173#008* FastMap Algorithm
Assembly	1.96%	1.86%	1.83%	0.98%	1.11%	0.92%	1.98%
Senate	1.46%	1.36%	1.19%	0.65%	0.49%	0.65%	1.35%

H. Criterion 11: Ward Splitting

According to paragraphs 3-8 in the January 2, 2024 joint stipulation, the parties agreed to use out-of-date August 2021 information regarding ward boundaries when evaluating proposed remedial maps. Wisconsin's wards are now vastly different than the wards the parties agreed to use. Whereas the August 2021 dataset contains 7136 wards, Wisconsin now has 7013 wards (LTSB website, July 2023 Wisconsin ward shapefile). All municipalities in

Wisconsin have done local redistricting—changing the shapes and populations of their wards—since the August 2021 redistricting dataset was created.

Figure 24 shows the wards used by the parties to make maps whereas Figure 25 shows the shapes of Wisconsin's wards as of July 2023. Figures 26-27 show the same comparison for the Milwaukee area, and Figures 28-29 show the same information for the Madison area. Clearly, the shapes of a major share of the state's wards have changed since August 2021. Thus, all computations of ward splits are meaningless because *all proposed remedial maps are splitting scores, if not hundreds, of today's wards*.

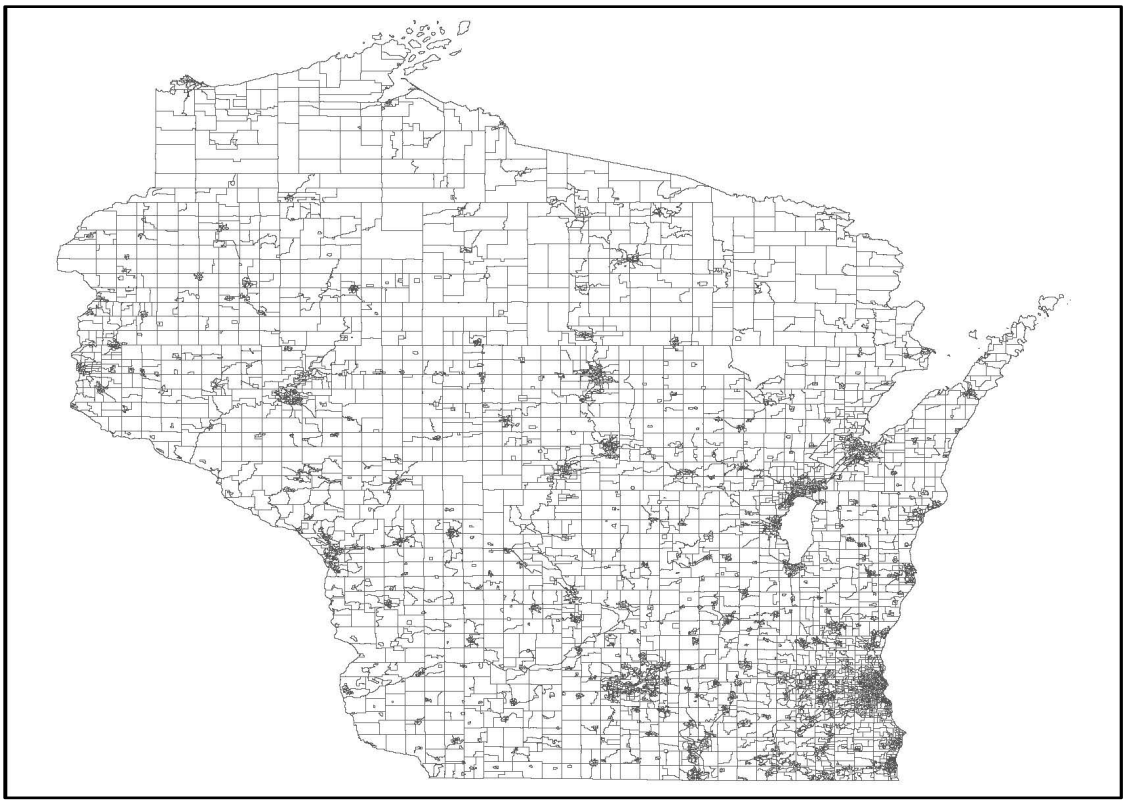

Figure 24. The 7136 wards used by the parties to make maps (August 2021 redistricting dataset).

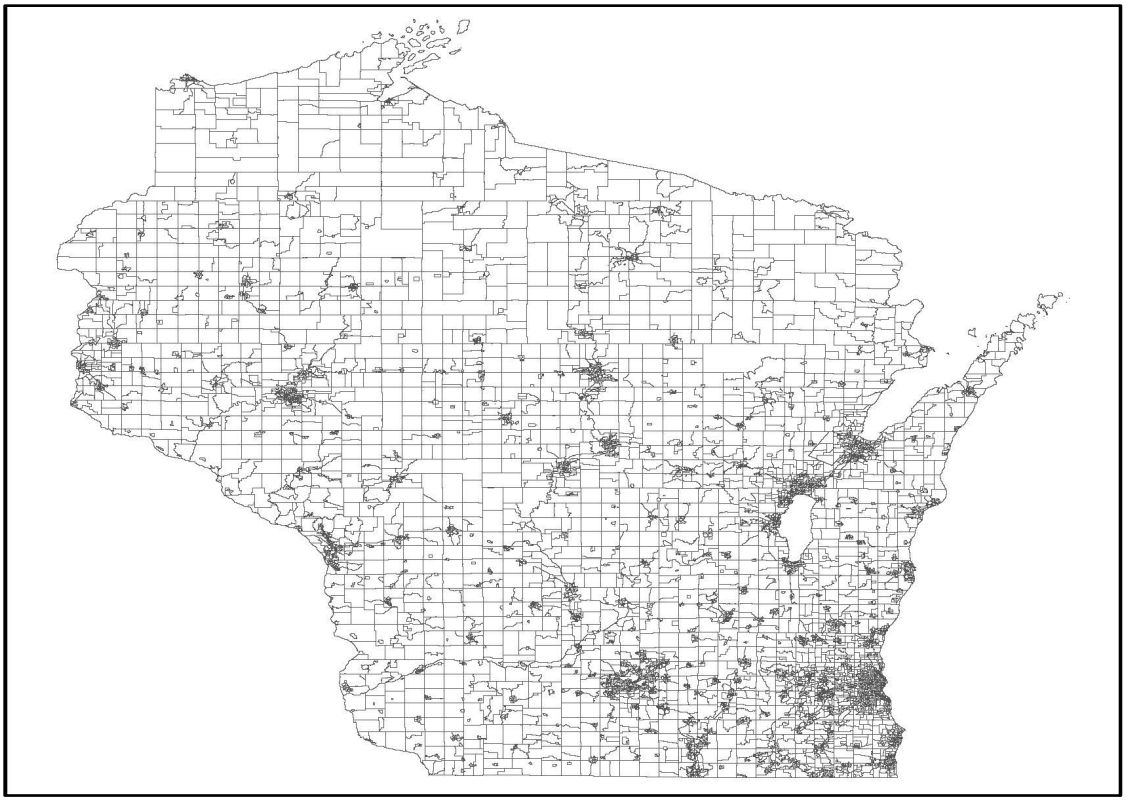

Figure 25. Wisconsin's 7013 wards as of July 2023 (the latest date for which data is available).

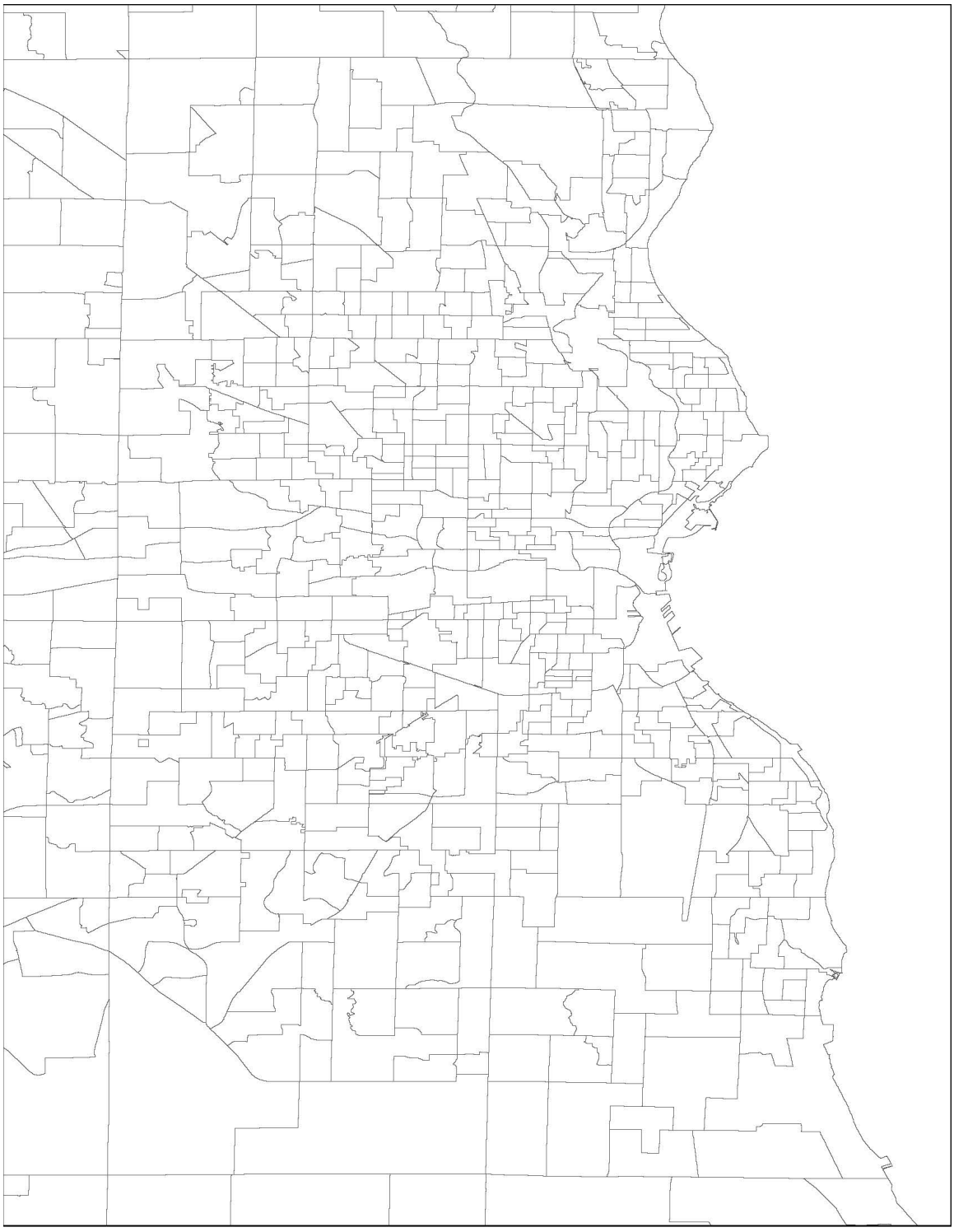

Figure 26. Wards used by the parties to make maps (Milwaukee County zoom-in).

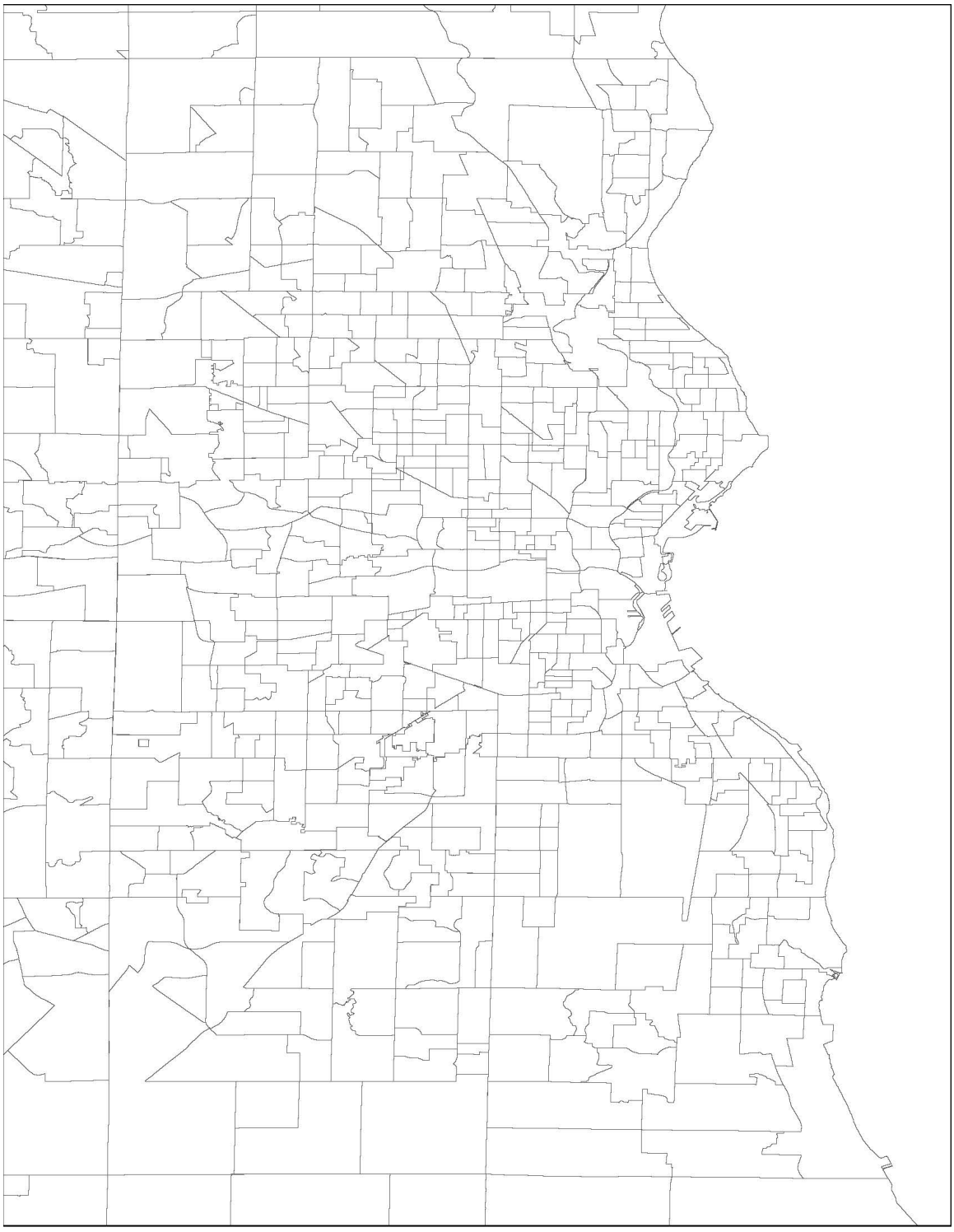

Figure 27. Wisconsin wards as of July 2023 (Milwaukee County zoom-in).

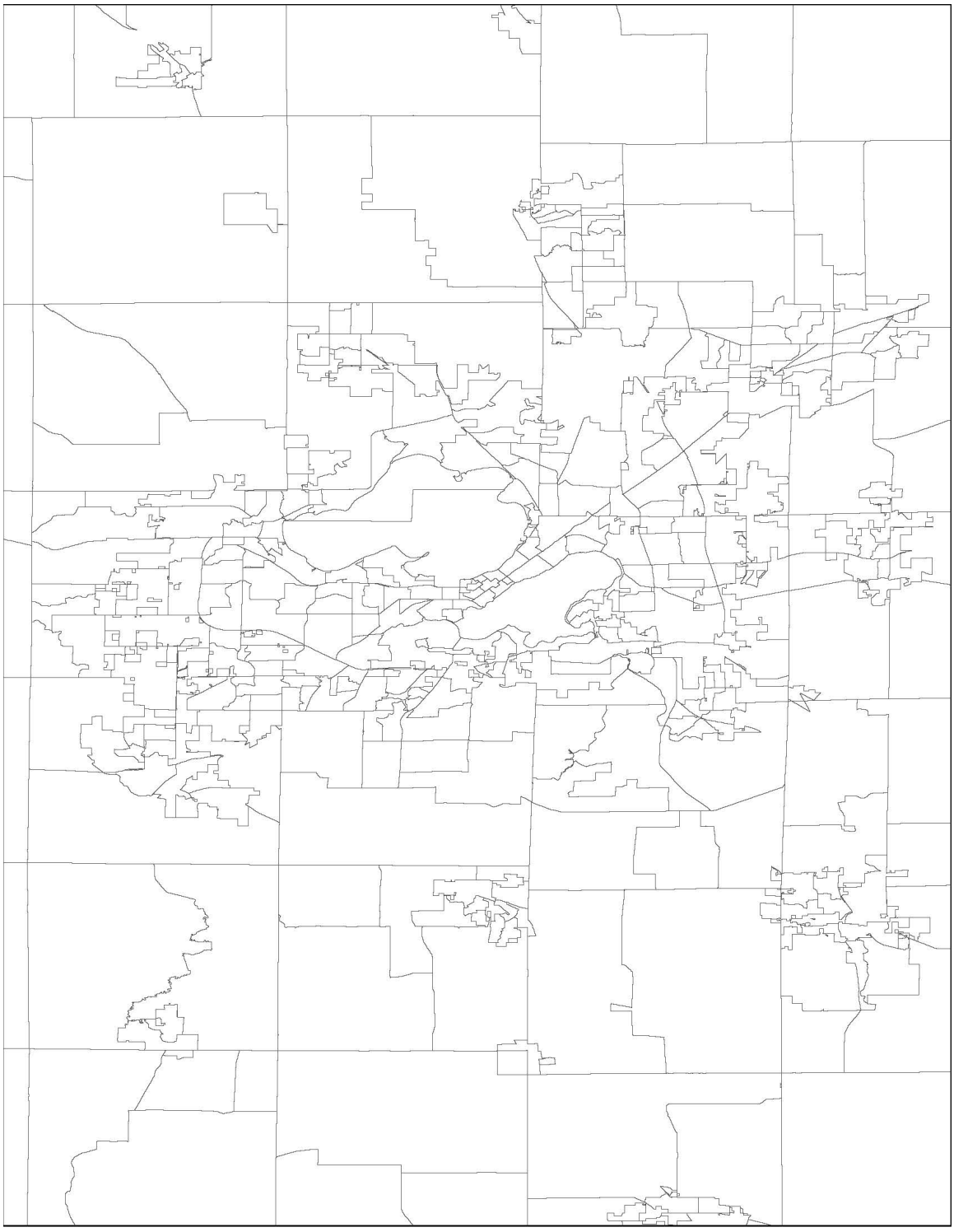

Figure 28. Wards used by the parties to make maps (Madison area zoom-in).

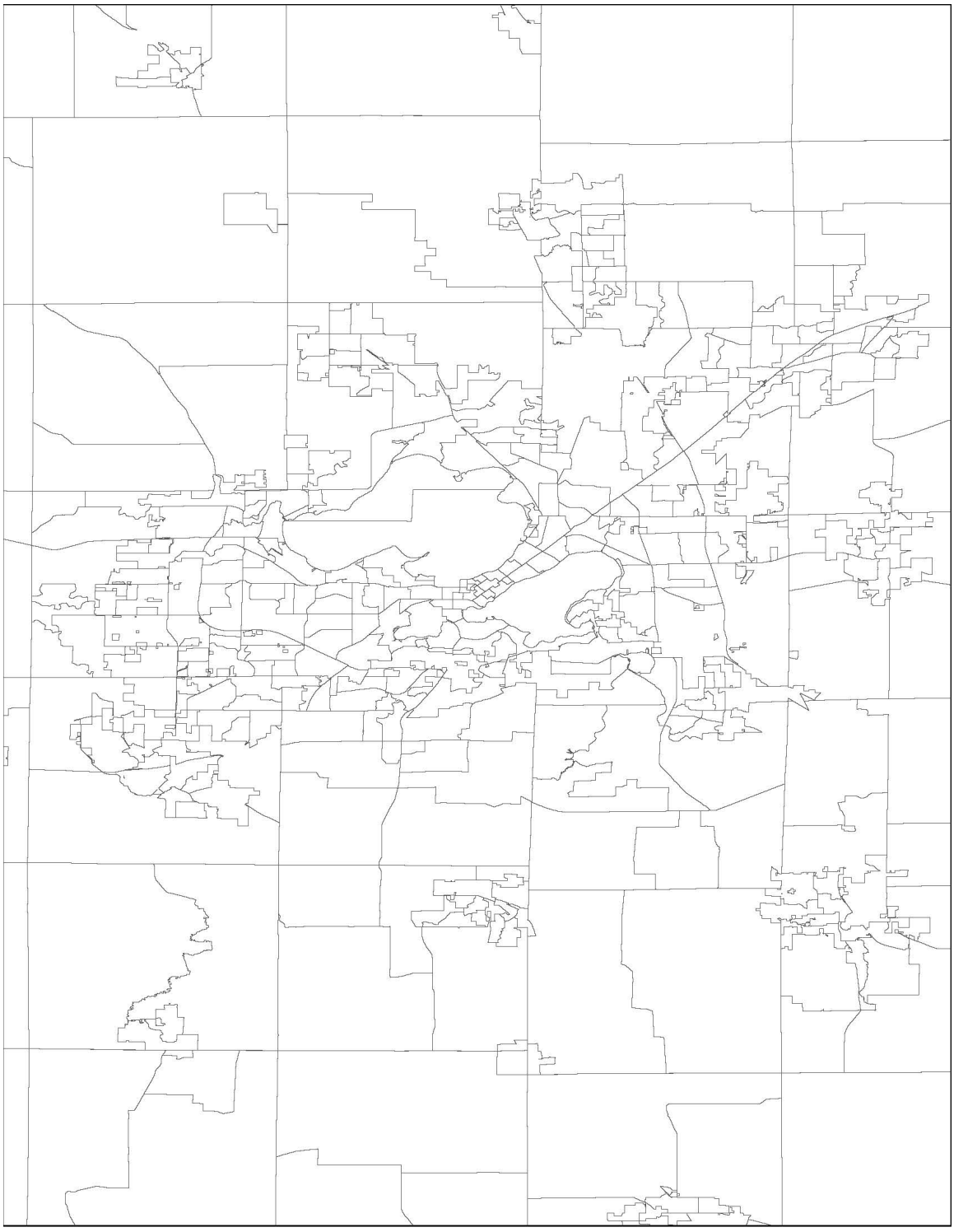

Figure 29. Wisconsin wards as of July 2023 (Madison area zoom-in).

I. Discussion of the Voting Rights Act

It is worthwhile to note which of the majority-minority VRA districts in each proposal, if any, are identical to their counterparts in SB621. Table 12 shows this information. Among the six proposals, only two keep the VRA districts identical to SB621. Among the other four, one—the Democratic Senators' proposal—makes substantial changes to the VRA districts and three—Johnson, Governor Evers, and Clarke—make minor changes.

Table 12. List of VRA districts in the proposals before the Court that are identical to those in SB621. Proposal *173#008* is included for comparison.

District	Persons in SB621	Wisconsin Legislature	Johnson	Governor Evers	Democratic Senators	Clarke	Wright	*173#008* FastMap Algorithm
Asm 7	59603	Y					Y	Y
Asm 8	59362	Y	Y	Y	Y	Y	Y	Y
Asm 9	59571	Y		Y			Y	Y
Asm 10	59503	Y	Y	Y		Y	Y	Y
Asm 11	59565	Y	Y	Y		Y	Y	Y
Asm 12	59351	Y		Y		Y	Y	Y
Asm 16	59714	Y	Y	Y		Y	Y	Y
Asm 17	59435	Y		Y		Y	Y	Y
Asm 18	59346	Y		Y		Y	Y	Y
Sen 3	178536	Y					Y	Y
Sen 4	178419	Y		Y		Y	Y	Y
Sen 6	178495	Y		Y		Y	Y	Y

III. The Wright Proposal Is The Best Of The Six Proposals Before The Court. However, Since No Proposal Before The Court Achieves Political Neutrality, And None Has Districts In As Compact Form As Practicable, The Court-Appointed Consultants Should Craft Their Own Remedy That Does So.

Petering attached a single numerical score to each proposal using the method described in his amicus brief. This method uses well-defined *penalty metrics* for each redistricting criterion and a *weighting scheme* that specifies how penalty metrics for individual criteria are aggregated

into a single number that is the *total penalty score* of a proposal. The proposal with the lowest total penalty score is the best.

Table 13 shows the criteria used to identify the best proposal and the metrics used to measure them.

Table 13. Explanation of criteria for determining the overall best map proposal before the Court.

Criterion	Chamber	Category	Penalty Metric
5A-1	Assembly	Political Neutrality	No. fractional seats away from perfect proportionality
5A-2	Assembly	Political Neutrality	No. noncompetitive districts outside the 45%-55% range
6A	Assembly	Compactness	1 – (average district Reock score)
7A	Assembly	County Splitting	No. splits of counties
8A	Assembly	Munipality Splitting	No. municipalities whose population is *not* kept in 1 district
5S-1	Senate	Political Neutrality	No. fractional seats away from perfect proportionality
5S-2	Senate	Political Neutrality	No. noncompetitive districts outside the 45%-55% range
6S	Senate	Compactness	1 – (average district Reock score)
7S	Senate	County Splitting	No. splits of counties
8S	Senate	Munipality Splitting	No. municipalities whose population is *not* kept in 1 district

Table 14 shows each proposal's total penalty score. The subjective weights assigned to each criterion are shown in the second column. Figure 30 shows the penalty scores arranged along a number scale. According to this analysis, the Wright proposal is the best among the proposals before the Court.

Table 14. Detailed scoring of the proposals before the Court according to the methodology in Petering's Nov. 8 amicus brief. Proposals are ordered from worst to best. The Wright proposal is the best before the court because it has the lowest total penalty score: 2484.6. Proposal *173#008* is included for comparison.

		Wisconsin Legislature		Johnson		Governor Evers	
Criterion	Weight	Penalty Score	Weighted Penalty Score	Penalty Score	Weighted Penalty Score	Penalty Score	Weighted Penalty Score
5A-1	50	10.41	520.5	6.17	308.5	2.00	100
5A-2	5	85	425	76	380	85	425
6A	1000	0.6388	638.8	0.5872	587.2	0.6081	608.1
7A	1	156	156	131	131	146	146
8A	1	81	81	35	35	55	55
5S-1	150	4.38	657	3.37	505.5	0.92	138
5S-2	15	24	360	23	345	23	345
6S	1000	0.6313	631.3	0.6123	612.3	0.6231	623.1
7S	1	71	71	60	60	67	67
8S	1	44	44	23	23	33	33
		Total Penalty = 3584.6		**Total Penalty = 2987.5**		**Total Penalty = 2540.2**	

		Democratic Senators		Clarke		Wright	
Criterion	Weight	Penalty Score	Weighted Penalty Score	Penalty Score	Weighted Penalty Score	Penalty Score	Weighted Penalty Score
5A-1	50	2.83	141.5	1.33	66.5	1.37	68.5
5A-2	5	83	415	84	420	76	380
6A	1000	0.6068	606.8	0.6133	613.3	0.6131	613.1
7A	1	151	151	149	149	153	153
8A	1	69	69	44	44	52	52
5S-1	150	0.11	16.5	0.75	112.5	0.77	115.5
5S-2	15	24	360	26	390	25	375
6S	1000	0.6423	642.3	0.6148	614.8	0.6195	619.5
7S	1	74	74	70	70	74	74
8S	1	47	47	29	29	34	34
		Total Penalty = 2523.1		**Total Penalty = 2509.1**		**Total Penalty = 2484.6**	

		173#008 FastMap Algorithm	
Criterion	Weight	Penalty Score	Weighted Penalty Score
5A-1	50	0.08	4
5A-2	5	70	350
6A	1000	0.5557	555.7
7A	1	134	134
8A	1	56	56
5S-1	150	0.10	15
5S-2	15	23	345
6S	1000	0.6133	613.3
7S	1	61	61
8S	1	39	39
		Total Penalty = 2173	

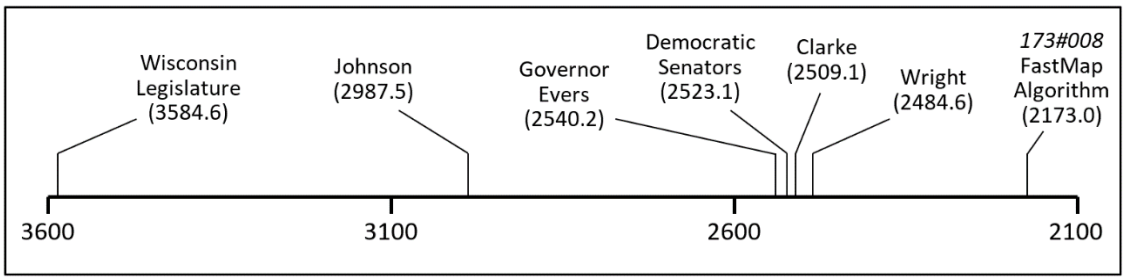

Figure 30. Total penalty scores of the proposals before the Court (smaller is better). Proposal *173#008* is included for comparison.

CONCLUSION

In Petering's analysis, no proposal before the Court reaches partisan neutrality as required by the Court, and none has districts that are "as compact as practicable." Also, no proposal has a decent number of competitive districts. Petering recommends that none of the submitted map proposals be accepted. Instead, the consultants should make maps for the Court that are politically neutral, highly compact, and competitive. According to this analysis, they already have an exceptional starting point for such maps.

Dated: January 22, 2024

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FORM AND LENGTH CERTIFICATION

I certify that the foregoing brief conforms to the rules contained in Wis. Stat. § (Rule) 809.19(8)(b) and (c)3 (as modified by the Court's December 22, 2023 Order) for a brief produced with a proportional serif font. The length of the brief, exclusive of the caption, Table of Contents, Table of Authorities, and Interest of Amicus, is 3,109 words.

Dated: January 22, 2024

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