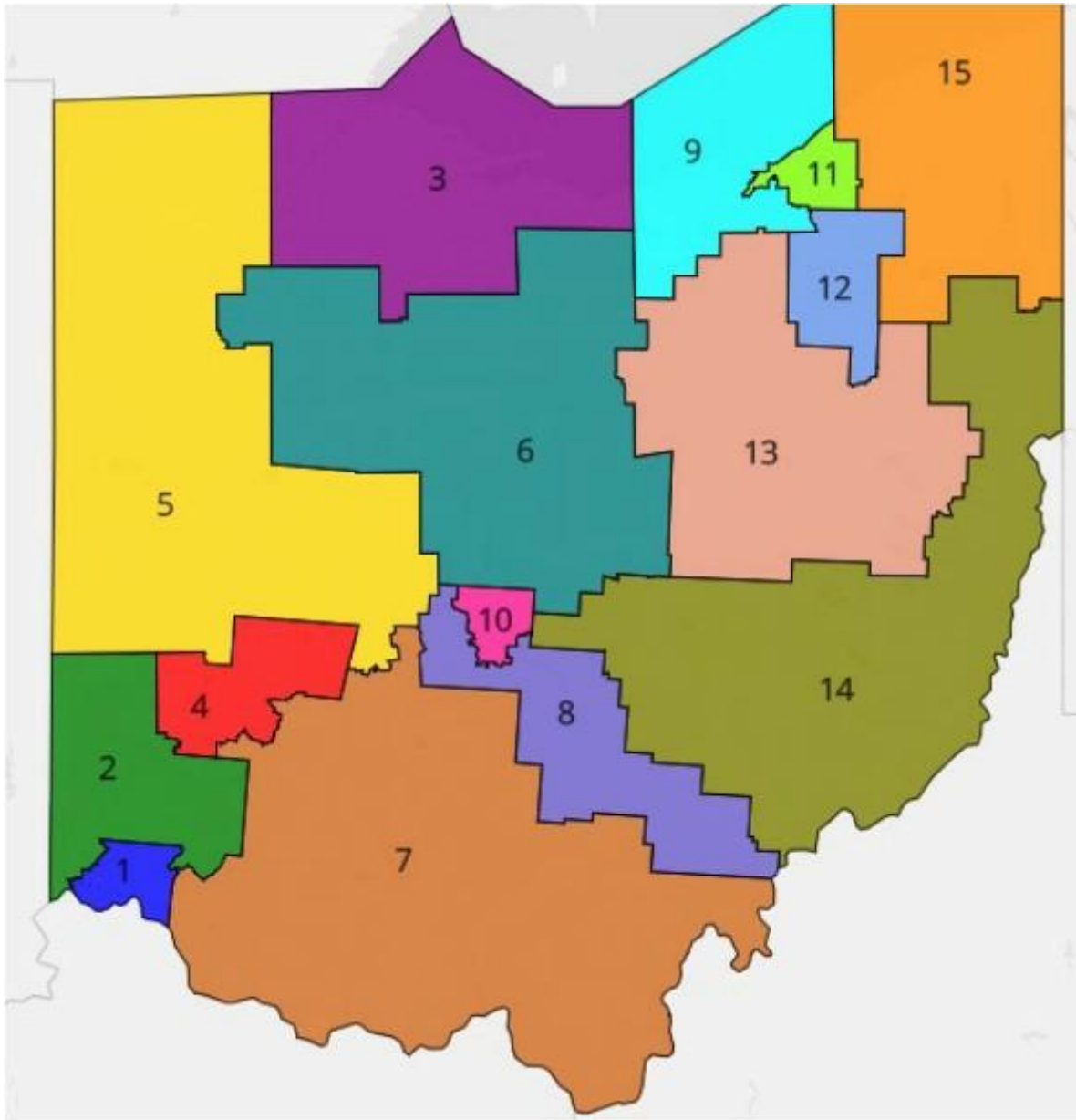


REVISED OHIO CONGRESSIONAL PLAN
Tim Clarke
October 14, 2021



INTRODUCTION

Around September 15, I submitted a proposed Ohio congressional map through the Ohio Redistricting Commission portal. As it appears that authority for the congressional map is passing to the Commission. I am supplementing my proposal with an outline demonstrating its compliance with each substantive provision of Article XIX of the Ohio Constitution as well as its desirability in other areas.

It should be noted that this proposal is slightly changed from the original proposal, correcting a few flaws that were discovered during this analysis.

COMPLIANCE

Most of the mandatory rules for Congressional districts are found in Article XIX, Section 2(B), which contains nine separate rules contained in eight subsections. Each rule will be discussed in turn.

Section 2(B)(1)

Subsection 1 requires that the adopted plan comply with all federal and Ohio constitutional and statutory law. There are too many provisions that could impact a Congressional districting plan to address each in detail. However, there are two provisions that merit discussion.

Federal constitutional law provides that all districts should be substantially equal in population. How strictly this provision must be applied has not been definitively determined. It has been suggested that a variance of no more than 0.75% would be constitutionally permissible.

In the recent past, Ohio has followed a stricter interpretation, with all districts having the ideal population to the extent mathematically possible, with any other district varying by one person.

In order to ensure compliance with equal population, this proposal follows the stricter interpretation. All districts have a population of 786,630, except for Districts 3 and 5, which have 786,629.

It should be noted that this does come with a cost. Most notably, in order to achieve precise population, District 8 includes a very small portion of Perry County. This portion of Perry County includes only 50 people and, if preferred, could probably be included with the remainder of Perry County in District 14 without incurring a constitutional violation.

The other provision worth discussing regards minority rights. My proposal includes two districts with significant minority populations. District 11 is a majority-minority district, with a minority voting age population of 56.3%. The district's black voting age population is 44.9%. District 10 has a minority voting age population of 40.6% and a black voting age population of 27.0%. Both districts offer minority voters a significant opportunity to elect a representative of their choice and should be sufficient to satisfy minority rights considerations.

Section 2(B)(2)

Subsection 2 requires that each district be compact.

Subsection 2 does not define "compact". A review of my map (available on page 1) shows that the least compact district in my proposal is District 8. District 8 includes western and southern Franklin County, then runs generally southeast through Fairfield, Hocking, and Athens Counties, including (as

noted above) a very small part of Perry County. By comparison, District 8 is unquestionably more compact than 7 of the current 16 congressional districts. If this is the worst district in my proposal, and in light of its relationship with District 10 and Section 2(B)(4)(a), I am comfortable with each district being sufficiently compact to satisfy this provision.

Section 2(B)(3)

Subsection 3 requires that each district be contiguous and have a single non-intersecting line border. A quick review of my map demonstrates compliance with this basic provision.

Section 2(B)(4)(a)

Subsection 4 deals with the treatment of Ohio's largest cities and is broken into two parts with two different rules. The only city subject to Subsection 4(a) rules is the Franklin County portion of Columbus.

Under Subsection 4(a), a "significant portion" of Columbus should be included in a single district. Also, the district can include other Franklin County municipalities and townships whose residents have "similar interests" to the residents of Columbus.

As to the first rule, the Columbus population in District 10 is 615,427. This is 69.9% of the entire population of the Franklin County portion of Columbus (880,167), and is 78.2% of the population of District 10. This does not include the completely surrounded municipalities of Whitehall and Bexley which are in District 10, as well various small pieces of townships entirely surrounded by Columbus. By any reasonable definition, District 10 includes a significant portion of Columbus.

The remainder of District 10 includes the northeastern suburbs of Columbus (Worthington, Westerville, Minerva Park, New Albany, and Gahanna), along with the townships in the same area (Sharon, Blendon, Plain, and Jefferson).

"Similar interests" is a vague term. What it surely cannot mean is politically homogenous, as this would be the very definition of packing. This would be antithetical to purpose of the redistricting reform which created this provision.

In analyzing the term "similar interests", I refer to my home county of Lorain. In Lorain County, we have two mid-sized urban areas and several suburbs. Some of those suburbs are more closely tied to Cleveland, while others are more closely tied with Lorain. The county also has a college town and part of a port city. The southern half of Lorain County is rural, mainly farmland. This is a diversity of interests. By comparison, the differences between Columbus and its immediate suburbs are minor. I have no problem including these suburbs in District 10 while complying with Section 2(B)(4)(a).

Section 2(B)(4)(b)

The other portion of Subsection 4 deals only with the cities of Cleveland and Cincinnati. This provision requires that these two cities be placed in a single district. In my proposal, the entirety of the city of Cleveland is in District 11, while the entirety of the city of Cincinnati is in District 1.

Subsections 5 to 8 deal with the counties assigned to each district. As such, below is a list of all counties and parts of counties in each district in my proposal.

DISTRICT	WHOLE COUNTIES	PARTIAL COUNTIES
1	entirely in Hamilton	
2	Butler, Preble, Warren	Clermont (7), Hamilton (1), Montgomery (4)
3	Erie, Lucas, Ottawa, Sandusky, Wood	Seneca (6)
4	Clark	Greene (7), Montgomery (2)
5	Allen, Auglaize, Champaign, Darke, Defiance, Fulton, Henry, Logan, Mercer, Miami, Paulding, Shelby, Union, Van Wert, Williams	Madison (7), Putman (6)
6	Crawford, Delaware, Hancock, Hardin, Huron, Knox, Marion, Morrow, Richland, Wyandot	Ashland (13), Licking (14), Putnam (5), Seneca (3)
7	Adams, Brown, Clinton, Fayette, Gallia, Highland, Jackson, Lawrence, Meigs, Pickaway, Pike, Ross, Scioto, Vinton	Clermont (2), Greene (4), Madison (5)
8	Athens, Fairfield, Hocking	Franklin (10), Perry (14)
9	Lorain	Cuyahoga (11, 13)
10	entirely in Franklin	
11	entirely in Cuyahoga	
12	Summit	Portage (15), Stark (13)
13	Carroll, Coshocton, Holmes, Medina, Tuscarawas, Wayne	Ashland (6), Cuyahoga (9, 11), Harrison (14), Stark (12)
14	Belmont, Columbiana, Guernsey, Jefferson, Monroe, Morgan, Muskingum, Noble, Washington	Harrison (13), Licking (6), Mahoning (15), Perry (8)
15	Ashtabula, Lake, Geauga, Trumbull	Mahoning (14), Portage (12)

The number(s) after each county listed under partial counties are the other districts within that county. Districts entirely within a single county are listed separately because they are exempt from Subsection 8, exempt by implication from Subsection 7 (they must be in a county with a population in excess of 400,000), and any violation of Subsection 6 would also be a violation of Subsection 3. The table can still be used to demonstrate compliance with Subsection 5.

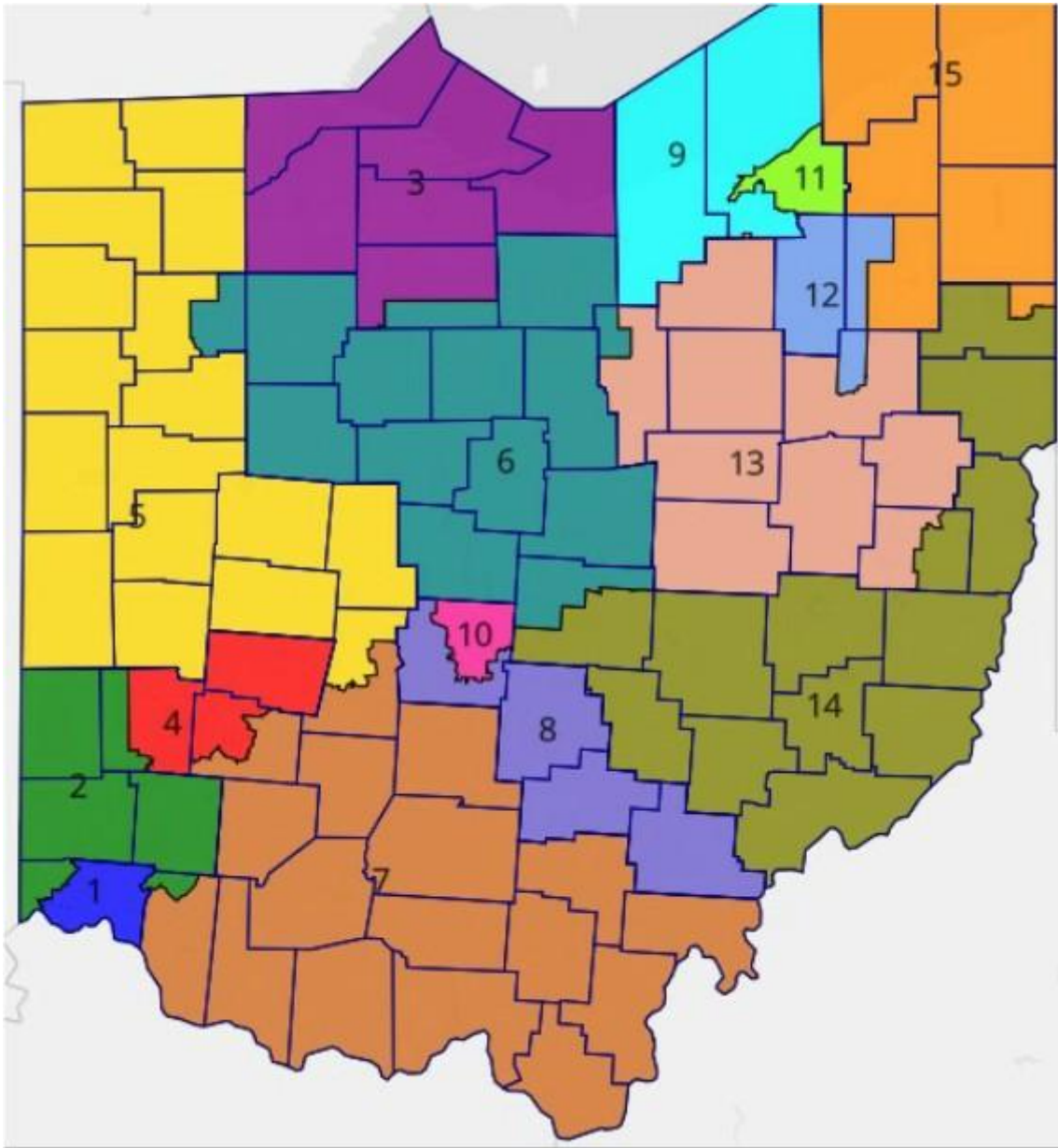
Section 2(A)(5)

Subsection 5 limits the number of county splits in a congressional plan. A plan must include 65 counties entirely within one district. Of the remaining 23 counties, no more than five may be split more than once, and no county may be split more than twice.

A review of the table above shows that in my proposal 72 counties are entirely within a single district, 15 counties are split once, and only one county is split twice.

Section 2(A)(6)

Subsection 6 requires that if a county is split, that each district's territory within that county must be contiguous. In order to demonstrate compliance with this provision, on the next page is my map with county borders included. The portions of Perry County in District 8 and Cuyahoga County in District 13 are small and hard to see, but they are contiguous.



Section 2(A)(7)

Subsection 7 requires that no two districts can share territory in more than one county, excluding counties with a population greater than 400,000. That is, if a county is split between two districts, the same two districts cannot both be in any other county unless one of the counties has a population greater than 400,000.

The table above lists, for each partial county in each district, all other districts within that county. While some districts may be a part of as many as four county splits, in no case does any district share multiple counties with the same district, regardless of the county's population.

Section 3(A)(8)

Subsection 8 provides that each district should contain at least one whole county, except for districts entirely contained within a single county. The table above includes a column for whole counties within each district, showing that each of the 12 districts not entirely within a single county do have at least one complete county.

POLITICAL BALANCE

Article XIX Section 1(C)(3)(a) provides that no plan shall favor or disfavor a political party or its incumbents. This section is only applicable if both the General Assembly and the Commission fail to adopt a plan by their respective deadlines and the General Assembly, on its second attempt, passes a plan without sufficient support from the minority party.

Nevertheless, it is quite clear that one of the main purposes in passing redistricting reform in 2018 was to create circumstances where the will of Ohio voters would be accurately reflected in Ohio's Congressional delegation, either through minority party support or express mandate.

This section explores the various ways in which this objective can be measured and how my proposal achieves these objectives.

Here is the composite Democratic two-party vote share for each district, calculated by Dave's Redistricting utilizing various statewide races from 2016 to 2020. The statewide Democratic vote share is 46.38%.

DISTRICT	DVPI
1	56.33%
2	31.97%
3	51.83%
4	47.06%
5	26.07%
6	33.40%
7	28.99%
8	50.26%
9	51.87%
10	69.47%
11	77.90%
12	53.10%
13	35.32%
14	35.82%
15	46.37%

Proportionality

Arguably the simplest method of measuring political balance is proportionality. This is the method specifically mandated by the Ohio Constitution for state legislative districts. (Section 1(C)(3)(a) does not specify any method for measuring political balance even when this provision is applicable.)

This method compares the proportional number of districts a party would be expected to win statewide with the number of districts a party would be favored to win based on recent election results. The proportional number of districts is calculated by multiplying a party's statewide two-party vote share by the total number of districts. A party is favored to win a particular district if its two-party vote share in that district exceeds 50%. If the races are chosen appropriately, it can be concluded that a party receiving greater than 50% of the two-party vote on average would be more likely than not to win a race in that district in a random election.

The proportional number of Ohio's 15 Congressional districts based on the Democrats' 46.38% vote share is 6.96, a number very close to 7. Thus, the most proportionate that an Ohio Congressional plan can be would have seven districts where the Democrats are favored. My proposal has precisely that, with Democrats favored in 7 districts and Republicans favored in 8 districts.

Expected Seats and the Efficiency Gap

Of course, being favored in a race does not mean a party will win that race, and the higher a party's partisan voter index, the more likely a party is to win an election. In general, a partisan voter index above 55% is relatively safe for that party, while a partisan voter index above 60% is considered very safe.

More sophisticated analyses of partisan voter index and election results have been conducted. Probably the most widely accepted calculation involves applying the cumulative normal distribution function with mean 0.5 and variance 0.04 to a party's partisan voter index in a given district to provide the likelihood that party would win that district in a random election. (This formula is presented in John Nagle's article "What criteria should be used for redistricting reform?", though he may not have created it. This article also provides a related formula for competitiveness, termed "responsiveness" in the article, which is used below.) Adding the party's probabilities across all districts provides an expected value for the total number of seats won in a random election.

Separate from this is the efficiency gap. Developed by Nicholas Stephanopoulos and Eric McGhee, it can be used to analyze the fairness of an individual election result. This measure treats all votes above what is needed to win an election along with all votes for a losing candidate as wasted. Both parties wasted votes are added together across all districts and compared. The closer the parties' cumulative wasted votes, the fairer the result.

This analysis can be extended to future elections by using partisan voter indexes. A party expected to receive over 50% of the two-party vote in a given district in a neutral election would be treated as wasting all of its votes above 50%, while a party expected to receive less than 50% of the vote in a neutral election would be deemed to waste all of its votes. Thus, if a particular district has a two-party partisan breakdown of 58%-42%, the majority party in this district would be deemed to have a wasted votes total for this district of .08, and the minority party's wasted votes for this district would be .42. The wasted vote scores are added for each party across all districts, and the difference divided by the total number of districts (in order to express the result as a percentage) to arrive at an efficiency gap score.

In its purest theoretical form, the efficiency gap has several interesting characteristics:

- 1) The efficiency gap defines an ideal number of districts for each party, without regard to the margin of victory (or advantage) in any individual district;
- 2) The ideal number of seats a party should receive starts at half of the seats where the statewide vote share is even and increases by 1 seat for each increase of the party's two-party vote share (or estimated vote share) of half the percentage each seat is to the total number of districts. For example, in a state where there are 50 seats in the legislature (so each seat is 2% of the total), each party would be entitled to an additional seat for each increase of 1% in its two-party vote share. If a party receives (or expects to receive) 56% of the statewide two-party vote, the efficiency gap is minimized when that party receives 62% of the seats;
- 3) This relationship is linear, making it possible to interpolate an ideal number of seats for each party even if that ideal is not a whole number.

Because an ideal number of districts a party should receive under an efficiency gap analysis need not be a whole number, it lends itself well to an expected seats analysis which, itself, is rarely a whole number. The efficiency gap is zero if the expected number of seats a party receives matches the efficiency gap ideal number of seats. Dividing the difference between these two figures by the total number of districts provides a plan's efficiency gap on a percentage basis.

The efficiency gap should not be the only measure of a plan's political bias, as it could lead to rather disproportional results. As stated earlier, a party receiving 56% of the statewide vote would be entitled to 62% of the seats, which is clearly not the fairest result. Rather, it should be used in conjunction with proportionality and bias analyses to determine if the plan as a whole is balanced.

The efficiency gap analysis has the advantage of considering the likelihood that each party will win a given district, rather than simply assigning the district to a party that may have the barest of majorities. Even where a proportionality analysis shows a plan to be balanced, where balance is achieved by creating districts where the minority party has a small advantage (as is often the case), an efficiency gap analysis can determine whether the additional seats the majority party receives when the minority party does not do as well statewide is excessive.

My proposal does include several slim Democratic margins to reach proportionality. The consequence is that the expected number of Democratic seats in my proposal is 6.02. As noted earlier, the statewide Democratic two-party vote is 46.38%, resulting in an efficiency gap ideal seat share of 42.76%. This works out to 6.41 of Ohio's 15 Congressional seats. The expected seats is short of this ideal by 0.39 which, when divided by 15, gives an efficiency gap of 2.62%, favoring Republicans.

It would be better if that efficiency gap could be eliminated, but this number is not too large. While it may be possible to reduce this somewhat, doing so could damage the plan's proportionality and/or bias. On the whole, in light of the plan's well-balanced proportionality and bias ratings, the mildly Republican efficiency gap is tolerable.

Bias

A third measure of political balance is bias. While proportionality and the efficiency gap measure fairness if election results are close to expected, bias measures what happens if the results are close to even.

It is axiomatic that in a democracy, if a party receives the majority of votes, they should receive the majority of seats. In a state legislative context, it means that the party that a majority of voters have selected to govern them should be allowed to govern.

Thus, while the actual seat numbers do matter and a substantially disproportionate seat share can be highly inequitable even when the majority of seats are won by the party receiving the most votes, it is also an important goal to limit the likelihood that the majority of seats would be won without a plurality of votes.

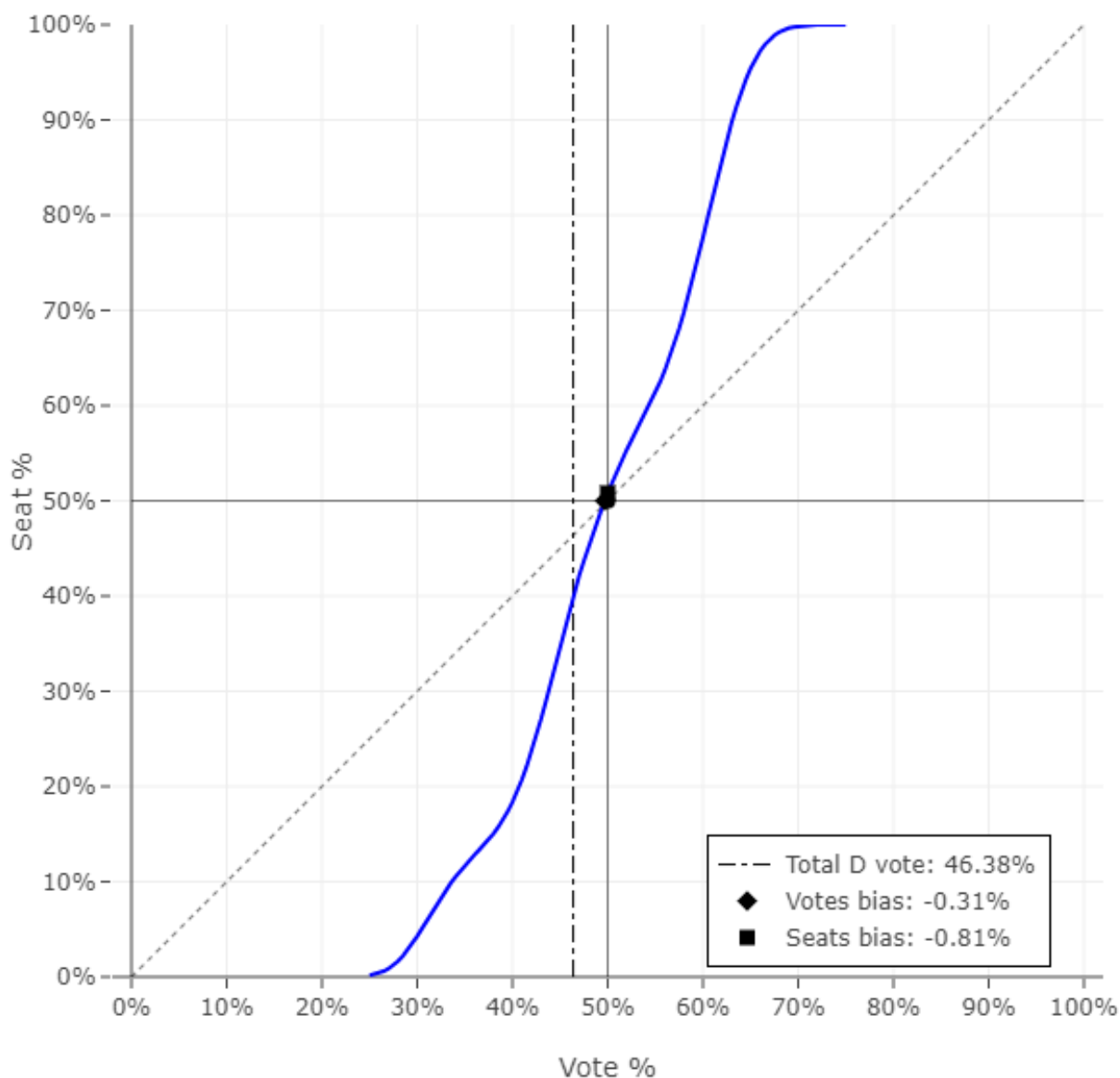
This is less critical in a Congressional setting, as Ohio's delegation will not, by itself, determine control of the House of Representatives. Nevertheless, it is still important that Ohio's delegation actually reflect the will of Ohio voters.

Bias is measured by looking at the percentage of seats a party is likely to win given numerous statewide vote share results, then creating a smooth curve which connects these likely results as closely as possible.

This provides two key bias estimates. Seats bias estimates the percentage of seats a party would receive if the statewide vote share was even. Votes bias estimates the statewide two-party vote share that would be necessary for each party to receive 50% of the seats.

Bias computation is very complicated – certainly beyond my capabilities. Fortunately, computers can do the work for us. Per Dave's, here is the seats-votes curve for my proposal:

Seats-Votes Curve: 15 OH 20



The votes bias and the seats bias figures are shown in the graph. The votes bias figure estimates that Democrats would receive 50.81% of the seats if the statewide vote was even. Note that this is a

probabilistic figure; Democrats cannot actually win 7.62 seats in an election, though they may be slightly more likely to win 8 seats than 7.

The seats bias figures estimates that Democrats would need to receive 49.69% of the statewide two-party vote to receive half of the seats. Again, winning exactly half of 15 seats is impossible, but this becomes the point where Democrats become more likely to win a majority of the seats.

While, of course, the ideal bias would be zero, these figures are actually reasonable. Generally speaking, a seats bias figure under 1% and a votes bias figure under 0.5% is a fairly low bias.

Overall, my proposal achieves proportionality as closely as possible. A small Democratic bias is offset by a mild Republican advantage in expected seats. This plan should ensure that Ohio's Congressional delegation reflects the will of Ohio voters, both now and in the decade to come.

OTHER CONSIDERATIONS

Competition

While never mentioned as a constitutional requirement, it is generally accepted that creating competitive districts that can be won by either party is desirable.

John Nagle's article cited above provides a formula for measuring how competitive each district is. This formula scores a perfectly even district as 1, with the rating tailing off quickly as the district becomes less balanced. A district where the majority party's two-party vote share is 55% receives a score of 0.378, while a district where the majority party's two-party vote share is 60% receives a score of 0.025.

While the goal of political balance is clear, achieving neutrality, there is no apparent ideal level of competition. My philosophy is to ensure that any plan receives a minimum average competitiveness score of 0.181 per district. The reason for this specific figure is based on an efficiency gap analysis but is otherwise too detailed to explain briefly. Beyond that, the competitiveness score should be maximized to the extent that it does not upset the political balance or violate any mandatory requirements.

With six districts falling within the competitive range of 45-55%, my proposal has an average competitive score of 0.330. A higher score is possible, but a significant increase is not advisable as it would disturb the political balance described above.

Division of Municipalities and Townships

Finally, Section 1(C)(3)(b) provides that a plan should not unduly split governmental units, with priority given to keeping counties, then townships, then municipal corporations whole. This provision is only applicable if the General Assembly passes a plan on its second attempt without sufficient minority party support. While I doubt that a balanced plan such as this would fail to receive minority party support, I will address this provision.

Division of counties has been discussed previously. Achieving precise population in each district requires that municipalities and townships be divided. Even small townships have populations that are too large to be that precise.

There are 17 borders between distinct districts which do not follow county borders. One of these 17 borders did not require a municipal or township division. In 11 of the remaining cases, a single

township or municipal corporation was divided. For the remaining five, it was deemed advisable to divide two political subdivisions. The primary consideration in all cases was because the population and location of the various census blocks did not allow for precise population while splitting only one of the political subdivisions. Other considerations were taken into account. For example, in Greene County, a single census block in Spring Valley Township was placed in District 4. Besides equalizing population, this smoothed the border between Districts 4 and 7, increasing compactness.

DISTRICTS		COUNTY	LOCAL UNIT(S) DIVIDED
1	2	Hamilton	Miami Twp
2	4	Montgomery	Miami Twp, Miamisburg
2	7	Clermont	Miami Twp
3	6	Seneca	Big Spring Twp
4	7	Greene	Sugar Creek Twp, Spring Valley Twp
5	6	Putnam	Pleasant Twp
5	7	Madison	Union Twp
6	13	Ashland	Orange Twp
6	14	Licking	Newton Twp, Perry Twp
8	10	Franklin	Columbus, Madison Twp*
8	14	Perry	Thorn Twp
9	11	Cuyahoga	Independence, Seven Hills
9	13	Cuyahoga	Strongsville
12	13	Stark	Canton**
12	15	Portage	none
13	14	Harrison	Rumley Twp
14	15	Mahoning	Boardman

*NOTE: Some non-contiguous portions of Franklin County townships are in both districts.

**NOTE: Non-contiguous portions of Canton Twp in Stark County are in both districts.

CONCLUSION

The Ohio Constitution provides certain minimum requirements that a Congressional plan must meet. My proposal meets those requirements. However, meeting the minimum requirements does not, by itself, make for a good plan. A good plan should be proportional, politically balanced, and competitive so that Ohio voters have a genuine choice who will represent them in Washington and that those representatives will genuinely reflect the wishes of the people of Ohio.

For too long, the redistricting process has merely been a tool for the party in power to consolidate its power. Ohio voters overwhelmingly rejected this approach both in 2015 and in 2018. The majority of the Commission chose to ignore this mandate with respect to General Assembly districts, but now they have another chance.

My proposal respects not only the Constitution, but the people of the State of Ohio. For this reason, I urge the Commission to adopt this proposal as Ohio's Congressional map for the next ten years.