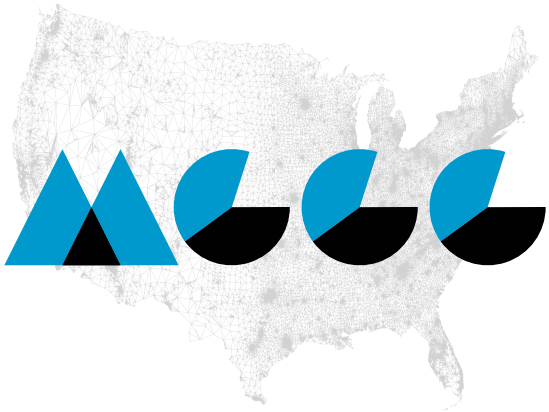
Analysis of Election Systems for the Beaverton, OR School District



MGGG Redistricting Lab

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Contributors

Amy Becker, Moon Duchin, Dara Gold and Thomas Weighill contributed to the data collection and preparation, data analysis, and writing of this report.

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1 Introduction

Beaverton School District 48J (hereafter, the School District) had 255,082 residents as of the 2010 Census. Table 1 shows the demographic breakdown of the district by total population, Voting Age Population (VAP), Citizen Voting Age Population (CVAP), and Students enrolled in Beaverton School District. The district has two sizable minority groups: Latino residents (who constitute 10.7% of VAP and 7.95% of CVAP) and Asian residents (who constitute 11.7% of VAP and 10.02% of CVAP). We use the term POC (people of color) to refer to residents who are Hispanic or have selected a non-White race in the Census (or both). In total the POC share of CVAP is 24.24%. The distribution of POC residents across the School District is shown in Figure 1.

The School District is divided into 7 zones, each of which is represented by one member of the School Board. School Board members serve 4 year terms and must live in the zone they represent. However voters from the entire district can vote in all zone elections. This means that even if a zone is majority POC, they could be unable to elect their candidate of choice in their zone if voting district-wide is highly racially polarized. This is because white voters from *across the district* would still outnumber POC voters. Figure 3 shows the current members of the Board, which includes one member of color.

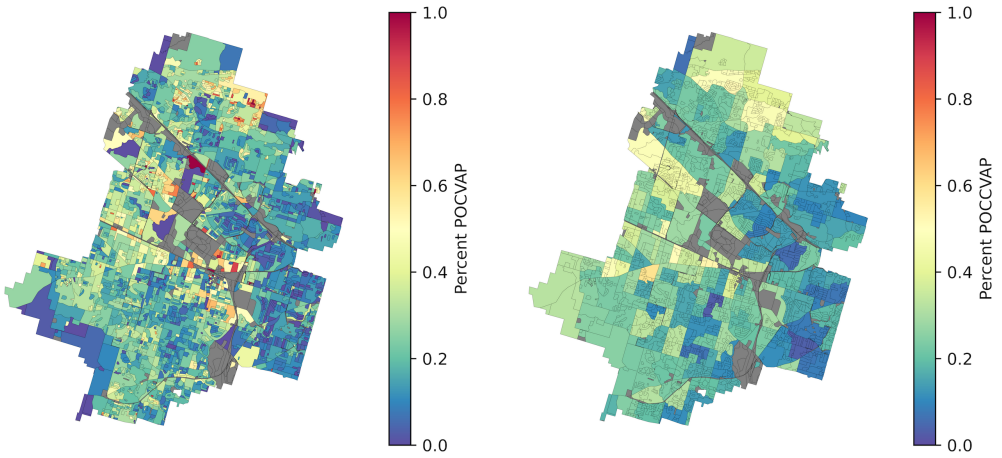
We emphasize that board members who are themselves people of color may not necessarily have been the candidates preferred by POC voters. POC candidates of choice can come from any racial or ethnic group. In the absence of accurate voter preference data, we use the School Board's racial makeup as an imperfect proxy for representation. Furthermore, we know that no community votes as a monolith, and we take care to consider a range of candidate support and voting polarization levels in this report.

One way to provide more minority opportunity on the School Board would be to use a traditional districted system, or one in which board members still represent one zone, but voting is restricted only to residents of that zone. Alternatively, a switch to district-wide Ranked Choice Voting (RCV), in which multiple candidates are ranked on each ballot, can promote more proportional representation for minority voters given adequate turnout and candidate availability.

In this report we consider two alternative options: (1) zoned (instead of district-wide) elections with new zone boundaries, and (2) ranked choice voting.

Race	Share of Total Population	Share of VAP	Share of CVAP	Share of Students
White	68.4%	72.47%	75.76%	47.0%
Latino	13.14%	10.72%	7.95%	25.0%
Asian	11.8%	11.69%	10.02%	16.3%
Black	2.07%	1.92%	2.36%	3.0%
Other	4.59%	3.20%	3.91%	8.7%
Total People	**255,082**	**191,464**	**188,197**	**41,070**

Table 1. Total population, Voting Age Population (VAP) and Citizen Voting Age Population (CVAP) by race in the Beaverton School District. Total population and VAP data is from the 2010 Census, and CVAP data is from the 2018 ACS 5-year rolling average. Student demographics are from the US News and World Report school district profiles: https://www.usnews.com/education/k12/oregon/districts/beaverton-sd-48j-100370



POC-VAP POC-CVAP

Figure 1. POC-VAP and POC-CVAP by block in the Beaverton School District. Note that CVAP by race is disaggregated to blocks from the block group level (the smallest unit for which this data is available). This process requires assumptions to be made about how the CVAP is distributed across the block group that likely differ from the true, unknown, geographic distribution of CVAP.

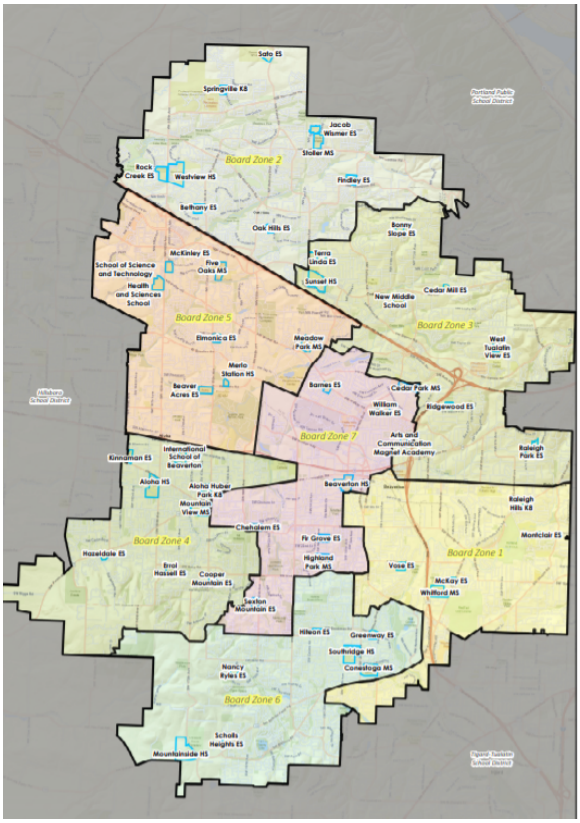


Figure 2. Beaverton School Board Zones as of October 2018

(a) Susan Greenberg, Zone 1 **(b)** Anne Bryan, Zone 2 **(c)** Eric Simpson, Zone 3

(d) Donna Tyner, Zone 4 **(e)** LeeAnn Larson, Zone 5 **(f)** Becky Tymchuk, Zone 6

(g) Tom Colett, Zone 7

Figure 3. The Beaverton School Board as of September 2020. Each board member represents one of seven zones, but are elected district-wide.

2 Districted Analysis

First, we consider traditional districted elections for the School Board. That is, replacing the current system by re-drawing zone boundaries and limiting the vote for each zone to its own residents. While a cohesive minority group may be too small to elect a candidate of choice in a school-district-wide, at-large election, they may be geographically distributed in such a way as to make up a large share of a local zone, allowing them to elect their candidate of choice.

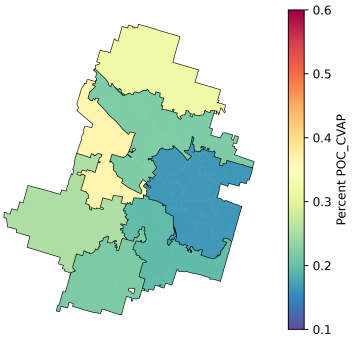
In this section we evaluate 7-member boards (i.e. the current board size) elected instead by a districted system. We generated a large collection of districting plans with the goal of identifying maps with high-percentage-minority zones. To do this, we ran 100,000 steps of a ReCom[1] Markov chain, which takes into account only contiguity, compactness, and population deviation. We allowed zones to deviate by no more than 5% from the ideal population, in accordance with legal standards for local zones. Proposed plans that satisfied these basic constraints were probabilistically accepted for inclusion in our *ensemble*, or collection of alternative plans, with a probability depending on their largest minority zone (the zone with the highest POC share of total CVAP): If a newly proposed plan's highest-proportion minority zone had a higher POC share than that of its predecessor plan's, it had a very *high* probability of being included, but if its highest-proportion POC zone had a lower POC-share, it had a very *low* probability of being included. This probabilistic inclusion created a *guided* chain run that targeted plans with concentrated POC zones. These heuristic optimization techniques are quite successful in identifying strong plans, but are not guaranteed to identify the *best possible* plans (finding such a *global optimum* is often computationally intractable).

Figure 4 shows the best plans found by these techniques. The highest percentage POC-CVAP zone found was 36.72%. When instead targeting plans with high POC-VAP (rather than high POC-CVAP), we were able to find plans that came much closer to—but that ultimately still fell short of—the 50% mark. We identified a plan with a reasonably compact zone that had 46.79% POC-VAP, and when compactness was relaxed the highest zone POC-VAP found was 48.30% (see Figure 4).

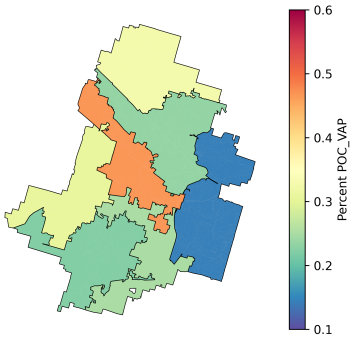
Because CVAP better captures actual eligible voting populations, it is unlikely that a plan can be drawn with even close to a majority POC-voter zone. That is, even with a high degree of POC turnout and voter cohesion none of the plans we identified would be likely to perform for POC voters without high levels of White *crossover voting* (i.e. White voters' support for POC-preferred candidates).

Moreover, even if the lines are carefully drawn to capture population patterns at one moment in time, movement of population over the course of a decennial Census cycle makes the performance less secure in the future. Ultimately, switching to a traditional districted system is unlikely to be reliable way of ensuring POC-representation on the School Board.

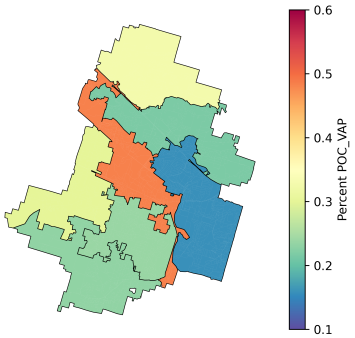
[1] https://mggg.org/uploads/ReCom.pdf



(a) Map with highest zone POC-CVAP identified: **36.72%**



(b) Map identified with reasonably compact zone with high POC-VAP: **46.79%**



(c) Map with highest zone POC-VAP identified: **48.3%**

Figure 4. Results of techniques targeting identification of zones with high POC-CVAP and POC-VAP. While these techniques can identify zones that are nearly 50% POC-VAP, they were unable to identify zones even close to a 50% POC-CVAP.

3 Ranked Choice Voting (RCV) Analysis

As an alternative to re-zoning, we consider the prospects for ranked choice voting (RCV) to elect the Beaverton School Board. If a standard single-transferable vote system with $m = 7$ seats were implemented, then the threshold for election would be $\frac{1}{m+1} = \frac{1}{8} = 12.5\%$ of the votes. In other words, in this RCV system, any candidate who is the first choice of 12.5% of the voting population would be immediately elected to the school board, and someone can easily be elected with just 8-10% of the first-place votes if they are frequently ranked second or third by enough voters. Since 24.24% of CVAP (27.53% of VAP) consists of people of color, RCV is likely to provide a more secure opportunity to elect candidates of choice for POC communities.

Because RCV is not currently used for many elections in the Pacific Northwest[2], we are not able to estimate RCV outcomes using ranking data from past elections. Instead, our analysis must use models of ranked choice voting behavior to simulate how RCV *could* perform in various scenarios.

3.1 Models and voting scenarios

We use four different models to estimate minority representation under ranked choice voting for POC voters in the School District. All four models take a simple input consisting of three values: (1) the support from POC voters for POC candidates, (2) the support from White voters for POC candidates and (3) POC share of total CVAP. The Plackett-Luce (PL) and Bradley-Terry (BT) models rely on classical probabilistic forms of ranking, using what is called a Dirichlet distribution to allocate support to candidates within each group. The Alternating Crossover (AC) and Cambridge Sampler (CS) models are newly designed for this analysis. For these, we use estimated probabilities for whether voters will rank a White or POC candidate first, then rely on specific assumptions on how the rest of the ballot will be completed. The AC model assumes that voters are either bloc voters or alternate in their support. For instance, a POC voter may vote CCCWWW, ranking all candidates of color above all White candidates, or else WCWCWC. The CS model uses ballot data from a decade's worth of ranked choice city council ballots in Cambridge, MA. Each voter's first choice is filled in with support estimates, and then their subsequent ballot is drawn at random from the observed ballot types in Cambridge.

We also consider five scenarios of how voters divide their support among White and POC candidates.

- **Scenario A: Unanimous Order.** All voters agree on who are the strongest candidates in each group.
- **Scenario B: POC vary POC.** POC voters vary preferences among POC candidates.
- **Scenario C: All Vary Order.** No agreement on strongest candidates.
- **Scenario D: White Vary Order.** White voters don't agree on strongest candidates.
- **Scenario E: Generic.** All levels of agreement equally likely.

Finally, we consider the effect of candidate availability by comparing two different candidate pools.

[2]To date, the only known election to use RCV in the Pacific Northwest was the November 2020 County Commissioner race in Benton County, Oregon (https://www.oregonrcv.org/rcv-in-oregon/benton-county/).

- **Balanced Pool:** 7 POC candidates and 7 White candidates run for office
- **Unbalanced Pool:** 3 POC candidates and 7 White candidates run for office

These RCV models require estimates for the rate at which POC and White voters support POC candidates. Typically, we would want to use local single-winner elections to estimate these levels of support. However, precise estimates (with a high degree of confidence) are not always available—especially for jurisdictions with low turnout and a small number of precincts. We consider four hypothetical levels of polarization: **Category 1 Polarization**, where the support from POC and White voters for POC candidates is 95% and 5% respectively, **Category 2 Polarization**, where the support from POC and White voters for POC candidates is 90% and 20% respectively, **Category 3 Polarization**, where the support from POC and White voters for POC candidates is 75% and 20% respectively, and **Category 4 Polarization**, where the support from POC and White voters for POC candidates is 60% and 40% respectively.

Finally, the RCV models require estimates for the proportions of POC and White voters. We use CVAP for these values. That is, we assume that the proportion of POC voters is roughly equivalent to the proportion of POC citizens of voting age, namely 24.24%. These estimates make the implicit assumption that voter turnout is comparable for White and POC voters, which might not reflect actual voting behaviors. We note that substantially different turnout rates for White and POC voters may affect the following model results.

3.2 Results

For every combination of model, scenario, and candidate pool, we simulate 100 ranked choice elections, count how many POC candidates are elected in each trial, and compute the average across elections. The results are reported in Table 2 below.

Across all model scenarios, polarization categories and candidate pools, POC-preferred candidates are shut out in only three cases: Scenario C in the balanced candidate pool for the Cambridge Sampler (CS) under polarization Categories 1, 2, and 3. Recall these cases represent little or modest support for POC candidates from White crossover voters, 7 POC candidates running, and no consensus on which of these candidates are the strongest[3].

Otherwise results across the board are promising: we typically expect 1-3 POC candidates to be elected. A higher number of POC winners are predicted in Category 4 Polarization cases due to higher support from White voters.

However, we emphasize that the support estimates used here are hypothetical values that are an imperfect reflection of local voting behavior in the school district.

[3]We can observe that the Cambridge sampler has the greatest variability over the voter behavior scenarios. This is because it is drawn from actual votes, and they display a high frequency of “bullet voting," in which the voter selects only one candidate and leaves the rest of the ballot blank. Bullet voting can nullify the proportionality effects of ranked choice because the ballot is quickly exhausted, with nowhere to transfer the vote.

Category 1 Polarization (POC: 95%, W: 5%)	7 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.2	2.3	1.7	1.5	1.9
	BT	2.0	2.0	1.2	1.1	1.4
	AC	2.0	2.0	1.1	1.0	1.5
	CS	2.9	3.0	0.0	1.0	1.7
	7 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.2	2.1	1.9	1.8	1.9
	BT	1.9	2.1	1.5	1.4	1.6
	AC	2.0	2.0	2.0	1.8	2.0
	CS	2.7	3.0	1.9	1.0	2.1

Category 2 Polarization (POC: 90%, W: 20%)	7 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	3.1	3.1	2.5	2.2	2.7
	BT	3.0	2.9	2.0	1.9	2.5
	AC	2.0	2.6	2.0	1.9	2.1
	CS	3.0	3.0	0.1	1.1	1.8
	7 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.5	2.6	2.7	2.5	2.6
	BT	2.4	2.5	2.3	2.3	2.5
	AC	2.0	2.6	2.2	2.0	2.2
	CS	2.8	3.0	3.0	2.0	2.7

Category 3 Polarization (POC: 75%, W: 20%)	7 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	3.0	2.9	2.1	1.9	2.5
	BT	2.8	2.9	2.0	1.7	2.4
	AC	2.0	2.0	1.0	1.0	1.5
	CS	2.9	3.0	0.0	1.0	1.7
	7 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.4	2.5	2.3	2.2	2.4
	BT	2.4	2.5	2.3	2.1	2.5
	AC	2.0	2.0	2.0	2.0	2.0
	CS	2.7	3.0	3.0	2.0	2.7

Category 4 Polarization (POC: 60%, W: 40%)	7 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	3.2	3.3	3.0	3.1	3.1
	BT	3.4	3.3	3.0	3.1	3.2
	AC	3.0	3.0	1.9	1.0	2.2
	CS	3.0	3.0	1.2	1.7	2.2
	7 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.6	2.6	2.9	2.7	2.7
	BT	2.6	2.7	2.9	2.8	2.7
	AC	2.6	3.0	3.0	3.0	2.9
	CS	3.0	3.0	3.0	3.0	3.0

Table 2. Using POC CVAP, this table shows the expected number of POC-preferred candidates elected under ranked choice to fill 7 seats on the school board.

4 Conclusion

In this report, we estimated the opportunity for POC voters to elect candidates of choice under two different voting systems: districted and RCV. These results are summarized in Figure 5. For reference, Figure 5 also shows the number of current seats held by board members who are themselves people of color, as an imperfect proxy for POC voter representation on the School Board.

We considered a districted system that still has 7 zones, but in which voting is restricted to each zone. If the zone boundaries are re-drawn we are able to find zones with up to to 36.72% POC-CVAP. Even with using POC-VAP and relaxing compactness criteria, we were only able to find zones with 48.3% POC-VAP. As we can't find a safely majority POC district using either CVAP or VAP, we conclude that a districted system would be unlikely to guarantee POC electoral opportunity without a high degree of White crossover voting.

On the other hand, our ranked choice analysis suggests that, whether voting is highly polarized or follows more moderate patterns, an RCV election system could enable POC voters in the Beaverton School District to elect 1-3 candidates of choice to the school board. In fact, the POC share of overall population is 31.6%, so the proportional share of a seven-member school board is roughly 2.2 seats. Under most models and scenarios considered here, ranked choice would secure an expectation that approaches or even exceeds this proportion.

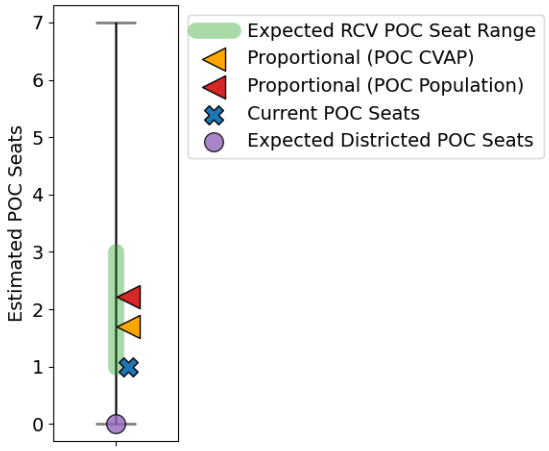


Figure 5. Summary of expected POC seat shares for alternative voting systems.