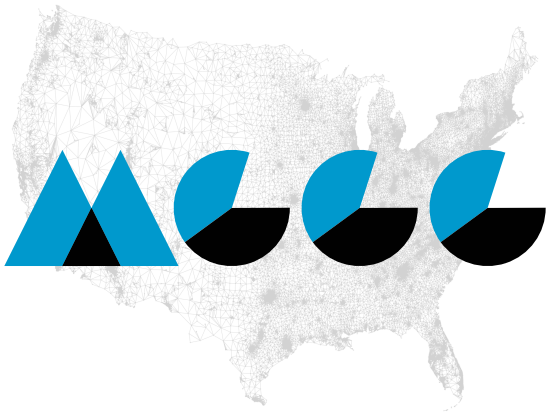
Analysis of Election Systems for the Pierce County, WA Council



MGGG Redistricting Lab

Contents

Contributors

Amy Becker, 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

Pierce County, Washington had 795,225 residents as of the 2010 Census. Table 1 shows the demographic breakdown of the county by total population, Voting Age Population (VAP) and Citizen Voting Age Population (CVAP).

Pierce County does not have a sizable single minority group, but the non-White share of total population is 29.69%. 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). The POC share of CVAP is 25.98% and the POC share of VAP is 25.83%. The distribution of POC residents across the county is shown in Figure 1.

Pierce County is divided into 7 districts, each of which is represented by one member of the County Council (see Figure 1). Council members serve 4 year terms and must live in the district they represent. Voters only vote for the council representative for the district in which they live. Such districted election systems often allow for more reliable minority representation than councils that are elected at-large by the entire county. This is because white voters from across the county considerably outnumber POC voters, meaning POC-preferred candidates can be "fenced out": if voting is racially polarized then White-preferred candidates can win all 7 council seats. However POC voters currently have sub-proportional representation on the council (Figure 2 shows the current members of the Pierce County Council).

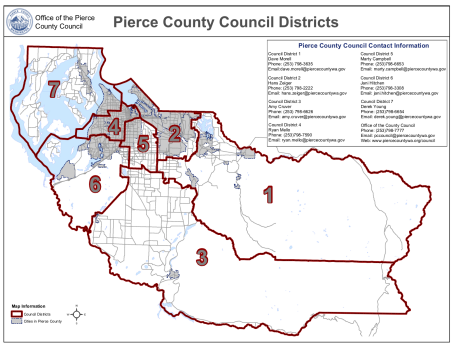
We emphasize that Council members who are themselves people of color may not necessarily have been the candidates preferred by POC voters. POC candidates of choice can come from any racial or ethnic group. In the absence of accurate voter preference data, we use the Council's racial makeup as an imperfect 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.

Race	Share of Total Population	Share of VAP	Share of CVAP
White	70.31%	74.17%	74.02%
Latino	9.16%	7.23%	6.72%
Asian	5.85%	6.2%	5.4%
Black	6.47%	6.36%	6.68%
Other	8.21%	6.04%	7.18%
Total People	**795,225**	**597,098**	**621,560**

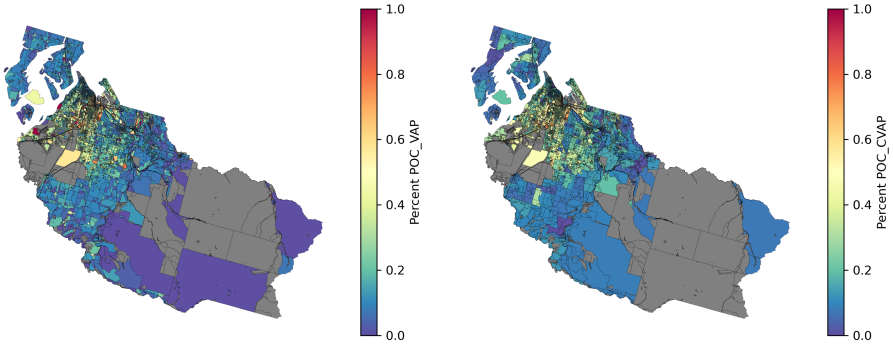
Table 1. Total population, Voting Age Population (VAP) and Citizen Voting Age Population (CVAP) by race in the Pierce County, Washington. Total population and VAP data is from the 2010 Census, and CVAP data is from the 2018 ACS 5-year rolling average.

One way to provide more minority opportunity on the County Council would be to continue to use a traditional districted system in which voting is restricted only to residents of that district, but to redraw the district boundaries so as to ensure more reliable opportunity for POC-preferred candidates. 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) districted elections with new district



Current Council Districts



POC-VAP POC-CVAP

Figure 1. Current Council districts as well as POC-VAP and POC-CVAP by block in the Pierce County Council. 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.

(a) Dave Morell
District 1

(b) Hans Zeiger
District 2

(c) Amy Cruver
District 3

(d) Ryan Mello
District 4

(e) Marty Campbell
District 5

(f) Jani Hitchen
District 6

(g) Derek Young
District 7

Figure 2. The Pierce County Council as of February 2021. Each council member represents one of seven districts shown in Figure 1.

boundaries (with 7 or 9 districts), and (2) ranked choice voting (for a 7 or 9-member council). We note that some of the alternatives we consider expand the size of the County Council.

2 District Analysis

First, we consider districted elections for the County Council. Though the Council's current system uses districts, these enacted districts might not stand in particular relation to the distribution of POC population. That is, as the districts now stand, it may be unlikely that a candidate of choice for POC voters would have a good chance of winning any District, in the presence of racially polarized voting.

In this section we evaluate 7 and 9-member councils elected by a districted system. For each council size we generated a large collection of alternative districting plans with the goal of identifying maps with high-percentage-minority districts. To do this, we ran 100,000-step ReCom[1] Markov chains, which take into account only contiguity, compactness, and population deviation. We allowed districts to deviate by no more than 5% from the ideal population, in accordance with legal standards for local districts.

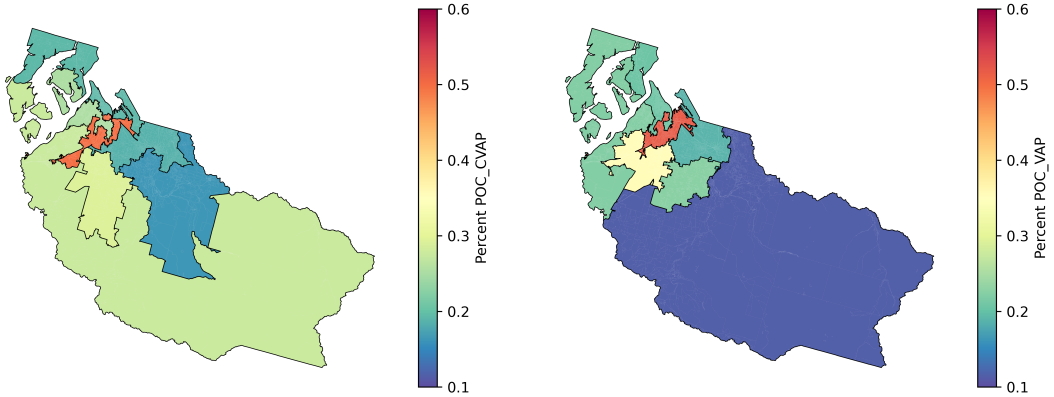
Proposed plans that satisfied these basic constraints were probabilistically accepted for inclusion in our *ensemble*, or collection of alternative plans, with a probability depending on their largest minority district (the district with the highest POC share of total CVAP): If a newly proposed plan's biggest minority district had a higher POC share than that of its predecessor plan's, it had a very *high* probability of being included, but if its biggest POC district 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 districts. 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 3 shows the best plans found by these techniques. For a 7-district plan, the highest percentage POC-CVAP district found was 49.87% and the highest percentage POC-VAP district found was 51.89%. Such a district would likely need relatively high POC voter turnout and a significant rate of White *crossover voting* (i.e. White voters' support for POC-preferred candidates) in order to consistently elect POC-preferred candidates.

The 9-district plans do slightly better, as our methods were able to identify plans with district POC-CVAP as high as 52.34% and with POC-VAP as high as 54.16%. Such districts are likely to perform for POC voters–even without high levels of crossover voting–provided POC voters have adequate turnout and vote cohesion.

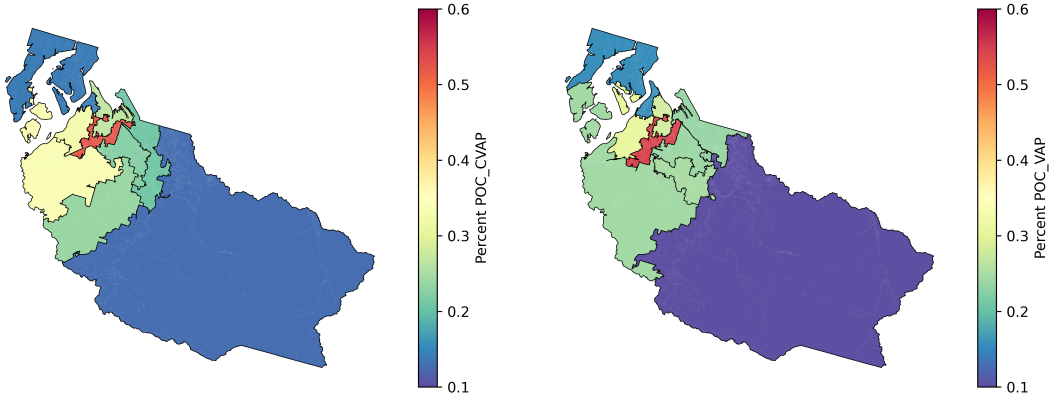
Importantly, even if the lines are carefully drawn to capture population patterns at one moment in time, movement of population over the course of a decennial Census cycle makes the performance less secure in the future. Ultimately, continuing to use a traditional districted system but with newly-drawn district lines could *possibly* establish one seat for a POC-preferred candidate on a 7-member council and would *likely* secure one seat for a POC-preferred candidate on a 9-member council.

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



(a) 7 Districts
Highest identified district POC-CVAP:
49.87%

(b) 7 Districts
Highest identified district POC-VAP:
51.89%



(c) 9 Districts
Highest identified district POC-CVAP:
52.34%

(d) 9 Districts
Highest identified district POC-VAP:
54.16%

Figure 3. Example plans with 7 and 9 districts. These plans had the highest single-district POC-CVAP and POC-VAP identified by our optimization techniques.

3 Ranked Choice Voting (RCV) Analysis

As an alternative to a districted system, we consider the prospects for ranked choice voting (RCV) to elect the Pierce County Council. 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 County Council, 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 25.98% of CVAP (25.83% 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.

In this section we evaluate 7 and 9-member councils elected by RCV.

3.1 Models and voting scenarios

We use four different models to estimate minority representation under ranked choice voting for POC voters in Pierce County. 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.

[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/).

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

- **Balanced Pools:**
  - **7-member council:** 7 POC candidates and 7 White candidates run for office
  - **9-member council:** 9 POC candidates and 9 White candidates run for office
- **Unbalanced Pools:**
  - **7-member council:** 3 POC candidates and 7 White candidates run for office
  - **9-member council:** 3 POC candidates and 9 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 25.98%. 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 Tables 2 and 3 below.

For both the 7 and 9-member councils, across all model scenarios, polarization categories and candidate pools, POC-preferred candidates are shut out in only three cases: Scenario C with the Cambridge Sampler (CS) and balanced candidate pools, under polarization Categories 1, 2, and 3. Recall these cases represent little or modest support for POC candidates from White crossover voters, 7-9 POC candidates running, and no consensus on which of these candidates are the strongest[3].

In all other cases, RCV model predictions are more promising: we typically expect 2-3 POC-preferred candidates to be elected to a 7-member council and 2-4 POC-preferred candidates to be elected to a 9-member council. A higher number of POC winners are predicted in Category 4 Polar-

[3]We see 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.

ization cases due to higher support from White voters. Note that several of these outcomes would be supra-proportional for Pierce County's POC population.

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

Category 1 Polarization (POC: 95.0%, W: 5.0%)	7 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.2	2.4	1.9	1.9	2.0
	BT	2.3	2.2	2.0	2.0	2.0
	AC	2.0	2.0	2.0	2.0	2.0
	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	2.1	2.2	2.0	1.9	2.0
	BT	2.2	2.1	2.0	1.9	2.0
	AC	2.0	2.0	2.0	2.0	2.0
	CS	2.6	3.0	2.1	1.4	2.3

Category 2 Polarization (POC: 90.0%, W: 20.0%)	7 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	3.2	3.2	2.5	2.4	2.8
	BT	3.1	3.0	2.2	2.1	2.6
	AC	2.0	3.0	2.0	2.0	2.2
	CS	2.9	3.0	0.1	1.3	1.9
	7 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.3	2.6	2.8	2.5	2.6
	BT	2.5	2.6	2.4	2.4	2.5
	AC	2.0	3.0	3.0	2.0	2.5
	CS	2.8	3.0	3.0	2.0	2.7

Category 3 Polarization (POC: 75.0%, W: 20.0%)	7 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	3.0	3.0	2.0	2.0	2.5
	BT	2.9	2.8	2.0	1.9	2.5
	AC	2.0	2.7	1.5	1.0	1.8
	CS	3.0	3.0	0.0	1.0	1.8
	7 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.4	2.6	2.4	2.2	2.4
	BT	2.4	2.5	2.4	2.2	2.4
	AC	2.0	2.9	2.0	2.0	2.2
	CS	2.8	3.0	3.0	2.0	2.7

Category 4 Polarization (POC: 60.0%, W: 40.0%)	7 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	3.5	3.5	3.1	3.0	3.1
	BT	3.4	3.3	3.1	3.0	3.2
	AC	3.0	3.0	2.0	1.2	2.3
	CS	3.0	3.0	1.3	1.9	2.3
	7 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.5	2.7	2.9	2.7	2.7
	BT	2.5	2.6	2.9	2.7	2.8
	AC	2.7	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 County Council.

Category 1 Polarization (POC: 95.0%, W: 5.0%)						
	9 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.9	3.1	2.2	2.0	2.4
	BT	2.6	2.8	2.0	2.0	2.1
	AC	2.0	2.0	2.0	2.0	2.0
	CS	3.8	4.1	0.0	1.8	2.4
	9 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.5	2.7	2.4	2.1	2.5
	BT	2.6	2.5	2.0	2.0	2.3
	AC	2.0	2.0	2.0	2.0	2.0
	CS	2.8	3.0	3.0	2.0	2.7

Category 2 Polarization (POC: 90.0%, W: 20.0%)						
	9 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	4.0	4.1	3.3	3.0	3.6
	BT	3.9	4.0	2.8	2.5	3.4
	AC	3.0	3.0	2.6	2.0	2.7
	CS	3.8	4.0	0.4	2.0	2.6
	9 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.8	2.9	3.0	2.8	2.9
	BT	2.9	3.0	2.9	2.7	2.9
	AC	3.0	3.0	3.0	3.0	3.0
	CS	3.0	3.0	3.0	3.0	3.0

Category 3 Polarization (POC: 75.0%, W: 20.0%)						
	9 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	3.7	3.9	2.8	2.5	3.2
	BT	3.9	3.8	2.5	2.5	3.3
	AC	3.0	3.0	2.0	2.0	2.5
	CS	3.8	4.0	0.1	1.9	2.4
	9 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.7	2.8	2.9	2.7	2.8
	BT	2.6	2.8	2.8	2.6	2.8
	AC	3.0	3.0	3.0	2.7	2.9
	CS	3.0	3.0	3.0	3.0	3.0

Category 4 Polarization (POC: 60.0%, W: 40.0%)						
	9 At-Large RCV; Balanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	4.3	4.6	4.0	4.0	4.1
	BT	4.4	4.3	4.0	4.0	4.3
	AC	4.0	4.2	2.3	2.0	3.1
	CS	3.9	4.0	1.7	2.0	2.9
	9 At-Large RCV; Unbalanced Pool					
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	PL	2.8	2.9	3.0	2.9	2.8
	BT	2.8	2.9	3.0	2.9	2.8
	AC	3.0	3.0	3.0	3.0	3.0
	CS	3.0	3.0	3.0	3.0	3.0

Table 3. Using POC CVAP, this table shows the expected number of POC-preferred candidates elected under ranked choice to fill 9 seats on the County Council.

4 Conclusion

In this report we've evaluated four alternative systems to elect the Pierce County Council, whose 7 members are currently elected by their district's residents. We looked at 7 and 9-member councils elected by districts (with new district boundaries) as well as at-large RCV systems. Both re-districted and RCV alternatives show a high likelihood of more sustained POC-representation if the council size is increased.

Our results are summarized in Figure 4. This summary compares the predicted number of seats that POC-preferred candidates could reasonably secure under each voting system. For reference, Figure 4 also shows the number of current seats held by Council members who are themselves people of color, as an imperfect proxy for POC voter representation on the Council.

We considered traditional districted systems with 7 and 9 seats, in which voting is restricted to residents within the candidate's district and district boundaries are drawn to support reliable POC voter opportunity. We were able to find districting plans with district POC-CVAP as high as 49.87% for a 7-member council and 52.34% for a 9-member. Such plans could possibly provide opportunity for POC representation on a 7-member council with some support from White crossover voters, and would likely provide a seat for a POC-preferred candidate on a 9-member council without having to rely on support from White voters. We were only able to identify 7 and 9-member council plans with at most *one* such POC-opportunity district.

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 Pierce County to elect 2-3 candidates of choice to a 7-member council and 2-4 candidates of choice to a 9-member council. In fact, the POC share of overall population is 29.69%, so the proportional shares of the council would be 2.1 seats on a 7-member council and 2.7 seats on a 9-member council. Under most models and scenarios considered here, ranked choice would secure an expectation that approaches or even exceeds this proportion.

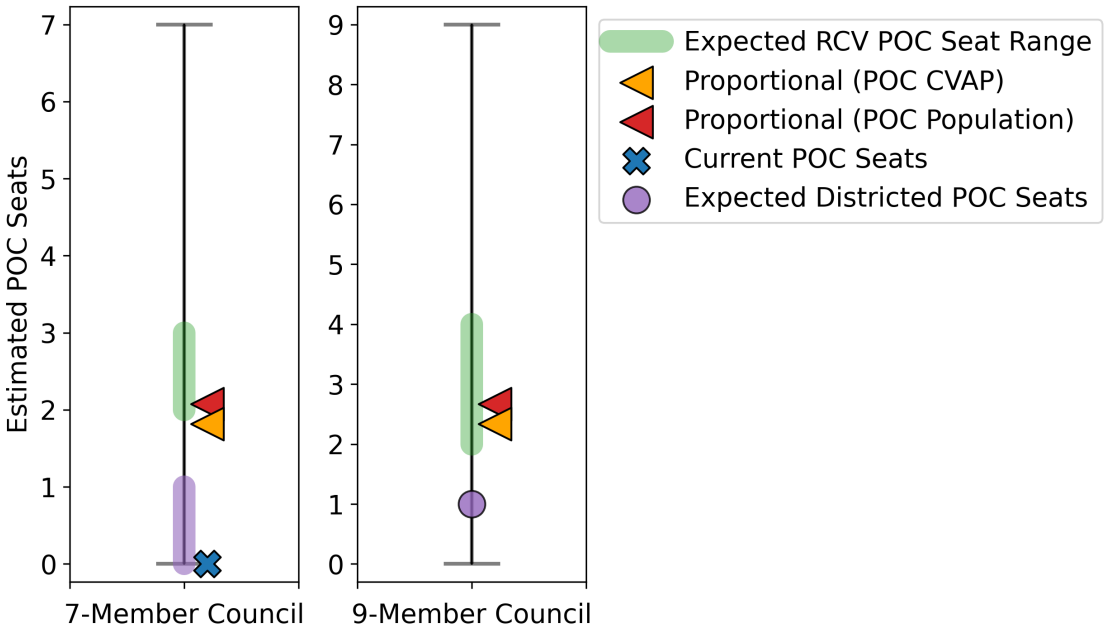


Figure 4. Summary of expected POC seat shares for alternative voting systems.