

## **Carol Kuniholm, Fair Districts PA Chair, Testimony to the Legislative Reapportionment Commission regarding LRC Preliminary Maps, January 6, 2022**

Happy New Year and thank you, Commissioners, staff, and all who are invested in the hard work of getting district maps right for the people of Pennsylvania. Thank you for doing all you can to make this work accessible - providing easy virtual participation during this strange pandemic season, and providing an accessible, informative website with such an easy to use comment portal. You have logged far more hours in public hearings than we envisioned in our reform legislation and have fielded far more public comment than we would have imagined.

I know you are in the final weeks of this very challenging, complicated process. I know there's been lots of attention on the proposed maps. Some people don't understand that redistricting is required by law. Some don't understand that population shifts demand changes in district boundaries. Many of the comments you receive are contradictory and confusing: current districts work great for people in some areas. For far more Pennsylvanians, the current maps have not served us well, which is why so many passionate volunteers and supporters have joined our efforts for reform.

I'd like to share some overview thoughts about both preliminary maps, but first I want to address some questions of metrics. There are many ways to evaluate maps. Some have the force of law and legal precedent behind them. By metrics with the force of law behind them, both proposed maps are better than current maps.

I've seen discussion about the Princeton Gerrymandering Project grades and ask that you set those completely aside. Our FDPA team has appreciated the work of that project in a number of ways, but we do not find their grades helpful. They focus on just a handful of criteria, including a grade for competitiveness, which is not a value embedded in PA or federal law or legal precedent. They mention minority representation, but do not include that in the final grade, a glaring oversight. And the algorithms used in determining grades do not adequately take into account the challenges of Pennsylvania geography, demography and the outsize number of House districts, all of which call into question the usefulness of their grades.

By our FDPA assessments, the House map is by far the better of the two proposed maps. It adds several majority-minority districts, undoes several decades of extremely distorted districts, and goes a long way toward balancing partisan bias. It has less split counties & municipalities than the current map, is more compact, and still manages to keep most incumbents in their current districts.

I've been concerned to hear legislators speak of the proposed map as a Democratic gerrymander. (SLIDE ONE) Chairman Nordenberg shared one PlanScore metric when the map was introduced, the same one I used when we submitted our People's Maps.

(SLIDE TWO) I'd like to share a different metric that might be easier to understand, also from the Campaign Legal Center's PlanScore project. Their partisan bias score shows how many extra seats one party might win in a hypothetical, perfectly even election: assuming 50% of the votes are cast for both Republicans and Democrats. In 1972, the first year of LRC redistricting, the plan contained a slight Republican bias, an extra seat in that hypothetical election.

(SLIDE THREE) The same was the case in 1982

(SLIDE FOUR) and again in 1992.

(SLIDE FIVE) In 2002 the LRC delivered a map with a clear Republican gerrymander: 4 extra seats in that hypothetical election.

(SLIDE SIX) In 2012, the gerrymander became more pronounced: 7.5 or 8 extra seats. That's been the case throughout this past decade, with a clear locked in advantage, and persistent majority, even when Democrats vote in larger numbers.

(SLIDE SEVEN) The map proposed by this commission would correct that, not all the way back to the 1 extra seat advantage of the 70s, 80s, and 90s, but closer to even, with a 2.5 extra seat advantage for Republicans.

Fair Districts PA is a non-partisan organization, with members from all parties. We would love to see that partisan bias number at zero. That would level the playing field completely, so the party with the best record, the best solutions, the best candidates would have a chance of winning the chamber. We will gladly take 2.5%, especially if that's balanced by other essential values.

(SLIDE EIGHT) The values we see embedded in law include compactness, minimized splits to counties and municipalities, minority representation, and free and equal elections. Dave's Redistricting App combines well-established metrics for those to create normalized scores from zero to 100. We were proud of the metrics on our People's House proposal, and very impressed that the LRC preliminary House map matched or exceeded those metrics.

(SLIDE NINE) You can see how the current House map compares. The current map is one of the worst in the country: non-compact, deeply biased, and in some places not even contiguous. The proposed map is a huge improvement.

(SLIDE NINE) We have a team of volunteers who have been counting split counties, municipalities, and also school districts, since we believe those are in many places a good stand-in for communities of interest. Here's some of their work. By their analysis, the proposed map splits less counties, less municipalities, and less school districts, a 12 to 15% improvement in each area.

(SLIDE TEN) I've heard the outcry from incumbents who find themselves facing other incumbents in the same district. Given the distorted districts of the past two decades and the shifts in population reflected in the census numbers, it would be impossible to avoid most of those pairings. For instance: there are currently five representatives living in Mercer and Lawrence Counties, which by numbers should have exactly 3 districts. That means 2 of those 3 districts will have incumbents facing each other in the primary. It's simple math. There are several other places where incumbents live in the same school district, or in closely adjoining municipalities. To keep them in their own districts would mean making that the top priority over all other concerns. The PA constitution and legal precedent do not allow that.

(SLIDE ELEVEN) It's important that voters know that there are mathematical constraints to the drawing of lines: some municipalities and counties will need to be split. Some district lines will not look smooth or compact. Pennsylvania's towns and counties often have strange lines, and much of our geography consists of large areas with low population, punctuated by densely packed towns and cities. Keeping those towns and cities intact can sometimes cause strange lines. Dividing them, as has been done so often in the past, can skew representation in an entire region. The best approach should involve listening to voters and finding a way to provide the

most accurate representation to the largest group in the area. That solution may not always be clear.

When commissioners, legislators or others raise concerns about aspects of ANY map, it would be helpful for citizens to see proposed alternatives and hear some clarification of required tradeoffs. This district - HD 84- has been described as a Democratic gerrymander. The district and every district surrounding it has a Republican majority. The challenge is to balance population without dividing Williamsport. The current district looks oddly shaped. The proposed one even more so,

(SLIDE TWELVE) On our People's Map, we proposed a much neater solution, but that was drawn without reference to incumbents. (SLIDE THIRTEEN) That solution would put two nearby incumbents in the same district. I'd be interested to see Representative Benninghoff's alternative. It's clear that HD 84 was drawn strangely to address population loss and to protect Republican incumbents. That configuration provides no benefit to any Democrats. The trade-offs in areas losing population are inescapable; oddly shaped districts, or incumbents facing each other in the same district.

I'm including in my written testimony my own proposed revisions to the House map. I believe the House map, as is, is a far more fair, more representative map than Pennsylvania has seen in at least two decades. Even so, it could be strengthened by attention to some local concerns not immediately evident to mappers, who can't possibly know the challenges, history and terrain of every PA locality. I've had the honor of talking about district maps with Pennsylvanians across the commonwealth, and also have the benefit of the many community mapping conversations Fair Districts PA held in preparation of our People's Maps. Even so, there are areas I don't know well enough to be certain of the best approach. And there are also areas where I've heard arguments in a variety of directions and could support a mix of solutions.

My proposed revision map is not an FDPA endorsed product, but my own attempt to work my way through the preliminary map, using what I've learned over the past six years. I must say I am impressed with much of what I see in the proposed map, appreciative of new minority districts created in places I would not have seen. I was pleased to see use in some places of the PA Voice unity districts, and other aspects of our FDPA People's Map.

With some adjustments to keep more school districts intact, and to fine-tune minority communities, I was able to create 29 majority-minority districts but I don't have the benefit of legal expertise or the kind of fine-tuned mapping tools that might verify those districts. My map addresses some areas of concern in testimony submitted so far and lowers the population deviation by a point.

The commission has promised revisions following the January 18 deadline. I hope my draft revision might be helpful in that. I've encouraged other of our FDPA mappers to submit their own proposals, along with explanatory notes. We are not providing FDPA endorsed proposals in part because there's no way to ensure the principles we stand for while also protecting incumbents, and in part because there has not been time for the kind of extensive community review we employed in creating our People's Maps.

(SLIDE 15) Turning to the Senate, while the metrics for the preliminary map are better than for the map currently in use, they are not as impressive as the improvements in the House map. The current plan gives a partisan bias of 8.5 to 9 extra Republican seats. The proposed map brings that down to 3.5,

(SLIDE 16) Comparing the Senate proposal to the current senate, and to proposed House map

and People's Maps, it seems clear there is plenty of room for improvement. The map is a step forward in three of four metrics, but fall short of what is easily possible.

(SLIDE 17) An obvious area of concern is the Lehigh Valley. Current SD 18 has a Latino population voting age population of about 29%. (SLIDE 18) The proposed new Senate District 14 has about the same. It does not expand opportunities for Latino representation. Rather, it fractures the Latino community self-identified as running from Easton to Bethlehem to Allentown to Reading. It also splits two cities. While there is not total consensus about whether or not to divide Bethlehem along county lines, there is very strong consensus that Allentown should not be divided to create a safe seat for one senator.

(SLIDE 18) The primary purpose in redistricting is to ensure that representation aligns with population shifts. In Northeastern PA, some areas grew in population while others lost population, with a net gain of about 10,000 in the overall region. It's easy to draw that region keeping current districts in place, without putting any incumbents in opposition.

(CLICK) Lehigh Valley districts are about 26,000 over ideal population.

(CLICK) Southeast PA districts, together, are about 180,000 over.

(CLICK) Population loss in the southwest region was mostly offset by growth in Allegheny County.

(CLICK) Districts in the Northwest and North Central regions combined are about 150,000 under population.

(CLICK) Looking at population numbers it seems clear that if some districts are to remain relatively in the same locations, an entire district should be moved from somewhere in the North West and North Central regions to Philadelphia or its collar counties.

(CLICK) Moving Senate District 34 from Center County to Cumberland does not address the larger population shift, and in fact makes it more difficult to adjust as needed from the southwest corner of the state toward the growing south-central area.

(CLICK) And there's no clear reason to move SD 14 from Luzerne to the Lehigh Valley.

(CLICK) Our People's Map proposed a new majority-minority district in the heart of Philadelphia with a substantial Latino population. The preliminary map divides that community into four existing districts. We would argue - strongly - for creation of a new district, without incumbent, in the Kensington/Hunting Park area of Philadelphia, with current senate districts adjusted around it.

Despite growth in the PA minority population, and repeated testimony on that issue, it's troubling to see nothing in the preliminary map that addresses that or creates more opportunity for minority representation. Rearrangement in the Lehigh Valley and an additional minority district in Philadelphia, keeping the Latino community intact, would be a good corrective.

(SLIDE 19) Looking at population deviations in the proposed map, it appears that most districts in Allegheny County and other southwest counties are well below the ideal population, often at the very edge of allowable deviation, while districts in Philadelphia and other Southeast PA counties show average deviations above that ideal number. In effect, the map as drawn dilutes the voting power of our fastest growing region, maintains voting power in regions that have lost population, and amplifies voting power in Southeastern PA..

(SLIDE 20) One final issue of concern involves another potential pattern in population deviation. Despite this commission's passage of a resolution providing for reallocation of prison data, most districts that contain prisons now have population deviations - that is, populations below the ideal senate size - even greater than their prison populations. The amplification of votes in those districts continues. The vote dilution in other areas also continues. (END SLIDES)

Adjusting those patterns will take more than small tweaks. As our FDPA mappers have attempted to devise revisions, it's become clear that at least one or two pairs of incumbents will need to land in the same district to avoid the kinds of distorted districts we've seen in past decades. That pairing seems most likely along the southern edge of the state, where several districts are already stretching in odd ways across multiple counties.

I've submitted my own proposed revision of the senate map. It includes 7 majority-minority districts, one pairing of incumbents of the same party, and multiple smaller rearrangements to address population deviation patterns and bring the overall deviation down to 8.02. Again, this is not an FDPA endorsed revision, and others of our mapping team will be submitting their own proposals. There will likely be some common themes as our team shares ideas and revisions.

We have learned a great deal throughout this process and hope to translate what we've learned into legislation to safeguard future redistricting. We appreciate the hard work of this commission and commission staff and believe our commonwealth owes a significant debt to Commissioner Nordenberg and his team for their integrity and commitment to keeping a very partisan process as non--partisan as possible. We look forward to maps we can all celebrate. I am happy to answer any questions now, or at any time as the final process unfolds.

**Carol Kuniholm, Fair Districts PA Chair,  
Addendum to Testimony regarding LRC Preliminary Maps, January 6, 2022**

These notes accompany submission of proposed revisions to both LRC preliminary maps. The revisions are not endorsed by Fair Districts PA and do not reflect a finished product. They are my own responses to the preliminary maps, with suggestions and adjustments reflecting prior mapping work, many conversations across PA, ideas and revisions by the FDPA mapping team, and consideration of testimony and emails and correspondence sent to me during both the People's Map process and LRC map review.

The attached notes are an attempt to document the rationale for proposed changes. LACRA, the Legislative and Congressional Redistricting Act, would require documentation of certain mapping decisions. I appreciate the LRCs efforts to put a more transparent process in place and offer these notes as a partial attempt to model what documentation might look like. The notes, like the map, are not a fully-finished product.

Asterisks mark the revisions I recommend most highly, in that I have a high degree of confidence they would make a significant difference to those communities without adverse impact on other communities or criteria and have not heard any compelling reason to avoid making those changes.

Many revisions requested in comments on the LRC portal are not reflected in this draft. In some cases, that's because suggestions are not feasible or reflect a lack of understanding of the

process and legal criteria. In other cases, I lack enough understanding of the issue to support a proposed solution or ran out of time to put revisions into place.

Small revisions have been made to both preliminary LRC maps to address three concerns:

1. Overly large population deviations. Although there is legal precedent for deviations of up to +/- 5% (with a total range under 10%) for both senate and house maps, given district populations and our FDPA experience in mapping, it seems possible and appropriate to bring deviations down to around +/- 4% (for a total range under 8%).
  
2. Unnecessary splits to municipalities and school districts. Although school district divisions and Legislative and Congressional Redistrict Act (LACRA) county protections are not in PA law, they make a large difference in how voters experience district maps. In all but our most urban areas, school districts serve as de facto communities of interest. Families organize around the school calendar, meet at school sporting events, and hold and publicize candidate events within their school networks. In the current maps, some school districts, even fairly small ones, are divided multiple times. While it's not possible to keep all school districts intact, ideally, none except the largest urban districts should be split more than once.
  
3. Counties split more times than LACRA provisions (mathematically necessary plus one for Senate, plus two for House. There were two of these in the Senate map: Luzerne and Montgomery County). Historically, some counties have borne the burden of excessive division, while other counties remain whole in every map. LACRA provisions are intended to prevent that.

### House Map Submission:

By all metrics the LRC preliminary map is far more compact, with far less county and municipal splits than the current House map. The proposed map still has a slight bias toward the Republican party, but by different measures about a third the level of bias as the current map.

		Higher is better				Lower is better	
	Population Deviation	# VRA districts (* by Voting Age Population, not Citizen VAP)	# Districts with Race Specific Minority VAP > 50%	DRA Compactness Rating	DRA Splitting Rating	Vote Bias (excess votes required for half the seats)	Seat Bias (half the difference in seats at 50% vote share)
<a href="#">Current House</a>		22	16	45	53	3.93	8.29
<a href="#">LRC Version</a>	9.29	25	12	58	85	1.22	2.2
<a href="#">People's House</a>	8.04	*29	14	64	76	1.8	3.64

<a href="#">Carol Kuniholm submission</a>	7.74	*29	8	62	78	1.45	2.86
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While public response to the House map has been in most areas very positive, there are areas where addressing local concerns could make the map even stronger. It should be possible to make small improvements without significant impact on the overall metrics. The proposed revision offers some adjustments for consideration or inclusion.

### Philadelphia:

Districts crossing the Schuylkill River are a topic of concern in areas where there is no public transportation, little opportunity for foot traffic and no shared communities of interest. General agreement among every Philadelphia group we talked with: districts that cross the river between University and Center City make sense. Many people work, live and study on both sides, with easy transportation and foot traffic across. North of that, there are few bridges, and either Fairmount Park or steep cliffs along the river edges. South of that, the river widens and is edged by refineries on both sides.

\*Proposed HD 185 crosses the river in an area where there are highways across but only two local roads, neither friendly to foot traffic. Major development projects in the Navy Yard area of South Philadelphia provide specific areas of concern and attention, and are attracting a diverse, highly educated, mostly young, population, with resultant concerns about gentrification and change in the surrounding neighborhoods. The airport/ Darby Creek area is very different, with its own unique concerns. That area shares much more in common with the adjoining areas of Delaware County. Since that district already crosses the line into Delaware County, it makes sense to move it to the west side of the river, straddling the county line more evenly.

\*Proposed HD 190 crosses the river where there are no bridges and combines three very distinct communities: the Wynnefield area of West Philadelphia, the more affluent community of East Falls, and half of the area proposed in the PA Voice Unity Map as a distinct majority-minority district. This revision proposes shifting the entire district to the west side of the river.

\*Public comment has called attention to the common interests of East Falls and the Roxborough area, both along the east side of the Shuylkill. Comments have also questioned the rationale of a district that combines Manayunk and Roxborough with Chestnut Hill and Mount Airy. The Wissahickon Gorge separates the area, with few roads, no public transportation and very distinct demographics and communities of interest. This revision proposes restoring the Wissahickon as a divider between HD 194 and 200, and incorporating as much of the proposed unity district in the Strawberry Mansion/Brewerytown area (Wards 28 and 32) as possible.

\*The People's Map proposed three Latino majority-minority districts. The LRC map provides two with well-established incumbents ( (180, 197). With small rearrangements, a third (203), **without incumbent**, could be added northeast of those two in an area of the city where the Latino community continues to grow quickly.

Those changes require additional changes throughout the city and into Delaware County. Those revisions have been suggested with attention to incumbents, existing neighborhoods and potential for adding and clarifying majority-minority neighborhoods.

## **Montgomery**

\*The LRC proposed division of Horsham prompted dozens of comments calling attention to the challenges surrounding the partially-decommissioned Air Force Base, which include toxic wastes contaminating that land and surrounding water, cancer clusters and ongoing efforts to leverage state and national resources to remedy and redevelop the area. [As one comment on the LRC site explained](#): “Horsham is unique due to the extensive involvement of the state Department of Environmental Protection, Department of Health, Department of Transportation and the state-run remediation and infrastructure authority, and needs one, unified voice in the Pennsylvania House of Representatives.” The growing Korean community in the area has also expressed concern about having their vote diluted by the proposed division of Horsham and request to have Horsham and Montgomery Township kept in one district. The proposed revision keeps all incumbents in their own districts and divides five municipalities in the county, one less than the LRC proposal.

## **Chester and Delaware Counties**

Both counties have large school districts that straddle county lines and include multiple municipalities. Proposed revisions reflect concerns for the most challenged districts in these counties: Coatesville, in Chester County, and Chester-Upland, William Penn and Southeast Delco, in Delaware County, with attention to other school districts as possible.

## **Dauphin/Lebanon/Cumberland**

Many comments objected to HD 103 crossing from Dauphin to Cumberland, objected to the split in Harrisburg, asked that Hummelston be connected with communities surrounding it, rather than drawn as an odd appendage to HD 104. There were also some requests from the southwest corner of Lebanon County to be connected to the Hershey area of Dauphin County, where many work or shop, rather than the more rural area of northwest Lancaster County. The reworking of that area reflects those concerns, including requests from residents of Mount Gretna to be part of HD 101 rather than 104.

Those changes prompt changes in northern Lancaster County, spreading into the southwest corner of Berks.

### **Berks:**

Two questions have been raised about the Reading area: Why split Reading into 3 districts? Why does only one of them reach the 50% majority-minority level?

Some rearrangement of HB 126, 127 and 129 leaves incumbents in place, removes one split in the city of Reading, and creates an additional majority Latino district with no incumbent. The proposed 50% district is left as proposed. Districts around it are adjusted.

Other revisions in the area are prompted by changes in Lancaster and the Lehigh Valley.

## **Lehigh and Northampton Counties**

Multiple comments asked that the McCungies be kept together. Others asked that Hellertown be kept in HB 136, (including [resolution from township supervisors](#)) and still more called attention to too many districts straddling county lines, or stretching through regions that have little similarity. The proposed revisions address those while keeping the urban districts mostly

unchanged. It separates two R incumbents in proposed HD 187 and instead *combines Reps Freeman (D) and Milou Mackenzi (R) in HD 136.*

## **Lackawanna, Luzerne and Neighboring Counties**

The proposed revision reduces splits in Scranton from four to two. It also reunites some school districts in the overall region. The entire region would benefit from further work, with attention to requests from the [West Side COG](#).

## **North Central Region surrounding Lycoming County and House District 84**

As Representative Benninghoff has made very clear, HD 84 is not a compact district. It appears to have been drawn to protect incumbents in the region while reflecting loss of population. The best way to correct this is to put two incumbents in Lycoming or a neighboring county in the same district. There are multiple options for this. The one I propose seems to reflect the local communities the best.

## **Mifflin, Juniata, and neighboring counties**

Many comments from this region are confusing, contradictory, and in some cases impossible. It is not possible to keep Mifflin, Juniata and Perry together. It is also not possible to unite Mifflin and Juniata completely and at the same time not have the two incumbents in the same district. It would be inappropriate to leave either HD 82 or HD 86 as they are, given the long appendages stretching into other counties, leaving residents at the far ends of those appendages many miles from a district office. The proposed revision separates the districts in a way that keeps incumbents in their districts and also may lower the number of split municipalities in the area.

## **Centre**

\*As many commenters have made clear, Happy Valley, home of State College, is a valley, in many ways cut off from the surrounding region, with population almost equal to two PA representative districts. Historically it has been cut into multiple districts to dilute the voting power of the State College area. Cutting it into more than two districts is not appropriate or supported by any residents of the region. The proposed revision divides the valley in two, rather than three. One challenge in mapping State College is a very large precinct, with a population of over 13,000, and precinct lines that split through campus and senior housing. This revision attempts to avoid splintering those, as has been done too often in the past. (Sample comments: [re not splitting the valley more than once](#); [re splitting State College & school district in 2, but not 3](#))

## **Cumberland County**

Cumberland residents asked not to be drawn into districts crossing into Dauphin unless absolutely necessary. They also asked to have districts stay within the county if possible. This revision accomplishes both while keeping incumbents in their own districts. That change required small changes in surrounding counties. A case can also be made for keeping this area as seen in the LRC map. An ideal public process would allow ranked choice voting on several options, since public opinion here seems divided.

## **Cambria**

[One local testimony](#) called attention to the current revitalization of Johnstown and concerns that the city remain in HD 71. Area residents second this concern. In community conversations, residents of the area have also suggested that if part of Cambria is to spill over into Somerset County, it makes most sense to have that in the area just south of Johnstown, since the city serves as a hub for northwest Somerset County. This is another area that would benefit from further community input.

## **Erie and Crawford**

Changes in Erie reflect an effort to maximize the influence of the minority community in the city of Erie. Many Crawford County residents have complained of having their county cut into multiple districts in past maps. This reduces that by one.

## **Allegheny County**

Rearrangements around the outer edges of the county attempt to reduce the number of split municipalities and school districts - not very successfully.

## **Washington, Greene and Fayette**

Adjustments to remove some split municipalities and school districts *remove Rep. Ortity and Puskaric from the same district* in Washington. In Fayette, *Reps. Snyder and Warner are in adjoining municipalities* in the same school district. It would not be possible to separate them without badly distorted districts.

## **Senate Map Submission:**

Proposed revision to the Senate map is far more extensive than to the House, since an appropriate readjustment of population deviations requires rethinking what districts should be moved and where they should be placed. These notes suggest major changes, which then create many smaller adjustments across the commonwealth.

The most appropriate revision would be to start over, moving an entire district from North West and Central PA to the Southeast. This revision attempted to incorporate work already done, but even population deviations. The result was to keep SD 34 centered on Centre County, keeping the State College region whole and instead moving a district from the area of the state most difficult to make population adjustments along the south central border.

To allow Bucks County to be mapped closer to the North/Central/South Bucks approach most favored by Bucks County residents, open the door to a district centered on the 1200 acre Horsham/Willow Grove Air Force and decommissioned Naval Base [Superfund site](#).

That also makes room in the region for 2 new majority-minority districts without incumbents: a Latino opportunity district in the Kensington/Hunting Park area of Philadelphia (SD 35), and a district along the edge of Philadelphia in Delaware County (SD 24), for a total of 7 majority-minority districts in the Philadelphia region. These may not be VRA compliant districts, but would in any case extend the opportunity for communities of color to elect candidates of their choice.

The map also attempts to maximize Latino influence in Allentown, keeping that city intact and drawing in appropriate close suburbs in a way that reflects that growing community far better than the LRC proposed SD 14. Population numbers suggest that district would be best left in it's current location, with current incumbents intact.

The map also attempts to provide Latino opportunity districts in Reading and Lancaster, and to create minority-coalition districts in the far Northeast of Philadelphia and south Philadelphia, and to keep Asian communities together in places like Horsham and Chester County.

Cumberland County is exactly the right size for a senate district; SD 34 is moved to that location.

Other revision options have been suggested by FDPA mappers Michael Waxenberg and Ruth Yeiser. There are some commonalities. All reflect work needed to adjust population deviations and ensure representation more evenly across the commonwealth. All may provide creative solutions in specific areas.

	Population Deviation	Higher is better				Lower is better	
		# VRA districts (* by Voting Age Population, not Citizen VAP)	# Districts with Race Specific Minority VAP > 50%	DRA Compactness Rating	DRA Splitting Rating	Vote Bias (excess votes required for half the seats)	Seat Bias (half the difference in seats at 50% vote share)
<a href="#">Current Senate</a>		5	4	41	54	3.09	8.79
<a href="#">LRC Map</a>	9.59	5	4	53	63	2.13	4.57
<a href="#">People's Senate</a>	4.98	5	3	62	77	1.21	3.57
<a href="#">Carol Kuniholm submission</a>	8.02	7	2	60	57	1.33	3.68
<a href="#">Michael Waxenberg submission</a>	3.99	5	4	65	66	1.43	4.06
<a href="#">Ruth Yeiser submission</a>	6.45	7	1	64	69	1.44	3.92
<a href="#">Integrated RY/MW submitted by Michael Waxenberg</a>	5.20	5	4	71	64	1.32	3.74

## SENATE DISTRICTS COMPARISON

### OVERPOPULATION VS. UNDERPOPULATION BY REGION

REGION	Overpopulated Districts		Underpopulated Districts		TOTAL	
	Number	Percentage	Number	Percentage	Number	Percentage
EAST	18	67%	9	33%	27	100%
CENTRAL	7	70%	3	30%	10	100%
WEST	3	23%	10	77%	13	100%
TOTALS	28		22		50	

**District Geographic Assignment:**

East: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 22, 24, 26, 27, 29, 40, 44, and 48

Central: 15, 23, 25, 28, 30, 31, 33, 34, 35, 36,

West: 21, 32, 37, 38, 39, 41, 42, 43, 45, 46, 47, 49, and 50

**Notable Findings:**

- 77 percent of western senate districts are underpopulated compared to only 33 and 30 percent in the east and central districts, respectively.
- 67 and 70 percent of the overpopulated districts are in the east and central regions, respectively.
- 64 percent of overpopulated districts are in the east.
- Residents of western districts benefit disproportionately from the preliminary Senate map.

### SENATE DISTRICT POPULATION VARIANCES:

#### TEN MOST OVERPOPULATED DISTRICTS VS. TEN MOST UNDERPOPULATED DISTRICTS

(Target Population: 260,054)

TEN MOST OVERPOPULATED DISTRICTS			TEN MOST UNDERPOPULATED DISTRICTS		
District	Variance	Density	District	Variance	Density
40	12,265	Rural	29	-12,663	Rural
19	12,102	Suburban	32	-12,395	Rural
44	11,811	Suburban	26	-12,068	Suburban
2	10,887	Urban	37	-11,402	Suburban
49	10,303	Suburban	27	-12,068	Rural
24	10,150	Suburban	21	-11,144	Rural
10	9,871	Suburban	3	-11,139	Urban
6	9,645	Suburban	45	-10,393	Suburban
22	9,051	Suburban	30	-10,211	Rural
17	8,423	Suburban	46	-9,588	Rural

**Notable findings:**

- 90 percent of the most overpopulated districts are in suburban or urban areas.
- 60 percent of the most underpopulated districts are in rural areas.