EXHIBIT

1

Corrected Expert Report

John R. Logan, Ph.D.

League of United Latin American Citizens (LULAC), et al. v. Greg Abbott, et al.

United States District Court for the Western District of Texas, El Paso Division

Civil Action No. 3:21-cv-299

I. Introduction

1. I have been retained as an expert by counsel for the United States in the above captioned litigation. I have prepared this report pursuant to Federal Rule of Civil Procedure 26(a)(2)(B). I have been asked to analyze the population composition of Congressional and State House Districts in several areas of Texas and suggest possible revisions in several instances. In order to accomplish this task, I refined and implemented a method for estimating citizen voting-age population in electoral districts in Texas using data from the American Community Survey and Census 2020. I have also been asked to evaluate the extent of socioeconomic disparities between racial and ethnic groups in areas of Texas.

II. Professional Qualifications

2. I earned my BA degree in Social Science from the University of California, Berkeley in 1968, MA in Sociology from Columbia University in 1969, and PhD in Sociology from the University of California, Berkeley in 1974. I am a sociologist, specializing in urban sociology, political sociology, and social demography. Urban sociology includes research on the spatial structure of urban areas (including patterns of segregation by race, ethnicity, and social class); disparities across neighborhoods along such dimensions as schools, policing, health, and

political influence; local politics and public policy that influence how local areas develop and change over time; and the social connections and networks among residents. Political sociology deals with patterns of power, influence, and political participation both within the U.S. and across the globe, often linking political processes to socioeconomic cleavages within communities and nations. Social demography deals with a wide range of population processes, and I have worked mainly in the areas of race and ethnicity, migration and immigration, and population distribution.

3. I have taught undergraduate and graduate courses in all of these areas since 1972. I have also developed competence and taught courses in quantitative research methods and spatial analysis. At the University at Albany (1980-2004), I was jointly appointed as a tenured professor in the Departments of Sociology and Public Administration and Policy, and I was appointed as a SUNY-wide Distinguished Professor in 2000. At Brown University (2004-present), I am Professor of Sociology with tenure, and until 2016 I served as the founding director of the research initiative on Spatial Structures in the Social Sciences.

4. I have served as Vice President of the American Sociological Association ("ASA"), as Chair of the Community and Urban Sociology Section of the ASA, and as President of the Research Committee on Urban and Regional Development of the International Sociological Association. I have been honored with three book awards from the ASA: the Robert E. Park Award (1988), the Award for a Distinguished Scholarly Publication (1990), and the William J. Goode Award (1997). I also received the Robert and Helen Lynd Lifetime Achievement Award (2008).

5. I am recognized as a leading international scholar on topics that are relevant to this case, including residential segregation and neighborhood disparities that affect racial and ethnic

minorities and immigrants, measuring disparities in socioeconomic characteristics of group members, estimating area characteristics using published census data, applying Geographic Information Systems (GIS) methods to the analysis of spatial data, and evaluating demographic and public policy factors that affect minority political participation and representation. My scholarly publications have been cited by other researchers more than 36,000 times, and my reports based on analyses of census data have been the basis of many articles in major U.S. news media. I was the director of a multidisciplinary project funded by the Russell Sage Foundation to examine social, economic, and political changes in American society revealed by the 2010 Census. I direct projects at Brown University that provide estimates of census tract population data from 1970 through 2020 within constant 2010 census tract boundaries (downloaded more than 10,000 times by a wide variety of researchers, public agencies, and non-profit organizations), as well as measures of residential segregation from 1980 through 2020 for metropolitan areas and cities that are also widely used.

6. Exhibit 1 to this report is a curriculum vitae setting forth my professional background, which includes a list of all publications that I have authored. These include two books, seven edited books and special issues of professional journals, and over 220 peer-reviewed journal articles and book chapters. My research on dealing with changing census administrative boundaries and varying sample sizes in census data over time prepares me for the estimation approaches that I use in this report. Relevant recent articles were published in *The Professional Geographer* (2014), *Annals of the American Association of Geographers* (2016), *American Journal of Sociology* (2018), *Geographical Analysis* (2020), *Demography* (2020), and *Applied Geography* (2021). My articles on the relationship between socioeconomic characteristics of persons in different racial/ethnic groups and their voter registration and

turnout are especially relevant to my analysis of socioeconomic disparities. These include *Journal of Ethnic and Migration Studies* (2009), *Journal of Ethnic and Migration Studies* (2012), *Social Forces* (2012), and *Sociological Perspectives* (2021).

III. Compensation

7. I am being compensated $300 per hour for my work in connection with this litigation. My compensation is unaffected by the opinion and conclusions that I reach.

IV. Other Expert Testimony Given in Last 10 Years

8. I have mainly served as an expert in legal cases involving disparate impacts of public policy decisions, particularly related to housing and community development. In one earlier case (*Wallace v. Blanco*, No. 05-cv-5519, Eastern District of Louisiana), I provided an expert report and testimony on the demographic characteristics of persons who were displaced by Hurricane Katrina, which could be an obstacle to their participation in local elections in 2006. In a more recent federal voting rights case in 2019, I provided an expert report and testimony on the extent to which members of the Latino community in Islip, New York, bear the effects of discrimination in areas such as education, employment, and health, which hinder their ability to participate effectively in the political process (*Flores* v. *Town of Islip,* No. 2:18-cv-3549 *,* Eastern District of New York*).*

9. I provided an expert report and deposition in *Fair Housing in Huntington Committee v. Town of Huntington*, No. 11-cv-1298, Eastern District of New York. I provided an expert report in *United States ex rel. Lockey v. City of Dallas*, No. 3:11-cv-3554, Northern District of Texas. I provided an expert report in an Administrative Complaint to the U.S. Department of Housing and Urban Development in *BNI, Inc. v. Baltimore County*, 2013.

V. Materials Relied on and Methodology

10. For the purpose of evaluating the composition of enacted and alternative illustrative districts, I relied on several resources. As described in more detail in Appendix A, I estimated the number of voting-age citizens in every census block in Texas using 1) the PL-94 block-level counts of population by race and Hispanic origin from Census 2020 and 2) the group-specific census tract estimates of the number of voting-age persons (VAP) and voting-age citizens (CVAP) from the five-year American Community Survey (ACS) for 2016-2020. For final estimates of CVAP percentage, I applied standard racial/ethnic categories: Hispanic (any race), non-Hispanic white (referred to in this report as "white"), and non-Hispanic black (black alone or in combination with any other race, referred to in this report as "black"). For each group, I applied the ACS tract-level estimates of the share of citizens among the voting age population to the actual counts of voting-age persons in every block that lies within that tract (HCVAP or BCVAP percentage).

11. In some cases my analysis is based on the current enacted plans or prior plans for Congressional and State House Districts. For reference, these maps are reproduced below. In three cases I propose an alternative set of boundaries to demonstrate the feasibility of providing minority voters with an opportunity to elect a candidate of their choice in Congressional Districts (the case of the Houston and San Antonio/El Paso Congressional Districts) and in State House Districts (the case of El Paso/West Texas State House Districts). Illustrative maps for these plans are also provided below.

12. In developing illustrative plans, I used GIS maps – including 2020 block, tract, precinct, and county boundaries, and location of major roads – downloadable from the Census Bureau or the national Historical GIS Project (https://www.nhgis.org/gis-files). I geocoded

addresses of Congressional and State House incumbents provided by Department of Justice staff. I also used prior, current enacted, and alternative districting plans available from the Texas State Capitol Data Portal. I used open source GIS software (QGIS) and a related open source redistricting program (Statto Software Redistricter, available at https://plugins.qgis.org/plugins/qgis3redistricter-master/) to keep track of the assignment of blocks to districts, and I used the commercial ArcMap program from ESRI to create the final versions of the illustrative maps.

13. I followed what I understand to be traditional redistricting principles:

a) I deferred as much as possible to the current enacted plans, presuming that they take into account a local understanding of communities of interest based on such dimensions as urban/rural, coastal/interior, inner city/suburb, and important political and administrative areas. I limited my attention insofar as possible to the specific areas of interest in this case, and I did not recommend changes in adjacent outlying areas.

b) Insofar as possible I defined Congressional Districts (CDs) based on whole precincts and State House Districts based on whole counties and (in West Texas) whole Voting Tabulation Districts (VTDs). Precincts are defined by county governments. VTDs are mostly based on precincts, but are defined by the Census Bureau to be aligned with census administrative areas. In some cases where a precinct is divided by a major road, I used the road instead of the precinct boundary to define the boundary of the district. In order to equalize populations, in CDs, it was also sometimes necessary to divide precincts along the CD boundaries based on where blocks with the requisite populations could be found.

c) I equalized populations in Congressional Districts, which required dividing some precincts into different CDs. I maintained a deviation within 5% of equal population sizes for State House Districts.

d) I sought to avoid narrow bridges connecting different portions of districts, keeping in mind the criterion of compactness.

e) Where possible I made use of major roadways as boundaries. In a small number of cases I split precincts that are divided by a major highway into different districts.

f) Outside of major city centers the population tends to be clustered in smaller suburbs and towns. I gave preference to keeping these communities wholly within the same district, because they often represent separate political units and communities of interest. When I divided them I sought to use a major highway or other topographical feature as a dividing line.

g) I took into account the racial/ethnic composition of the citizen voting-age population as I made choices about districting. I did this for two reasons: 1) African Americans and Hispanics are highly clustered in both urban and rural areas, and these clusters constitute important and longstanding communities of interest based on shared racial/ethnic identities and to a large extent also on common socioeconomic position, and 2) effective minority political representation is enhanced in districts where groups have a larger presence in the pool of eligible voters.

h) I was attentive to the home addresses of incumbents, and I sought to avoid including two incumbents in the same CD. In the Houston area this is difficult because several Congressional Representatives reside within a fairly narrow zone of the City of Houston. The current enacted Plan C2193 places Representatives Lee and Crenshaw in the same CD. My illustrative plan places Representatives Fletcher and Crenshaw in the same CD. In El Paso, the current enacted Plan H2316 places State Representatives Ordaz Perez and Ortega in the same district. In the

illustrative plan, Representatives Ordaz Perez and Fierro are in the same district, though I note that Representative Fierro lost in the March 2022 primary to Representative Ordaz Perez.

i) I did not analyze political party registration or partisan voting patterns in creating districts.

14. For the purpose of assessing socioeconomic disparities between whites, blacks, and Hispanics, I relied mainly on the 2015-2019 ACS Public Use Microdata Sample ("PUMS"). These microdata include a 5% sample of the population cumulated over a five-year period. I do not rely on the more recent 2016-2020 ACS microdata. Analyzing ACS microdata requires using person weights that the Census Bureau describes for 2020 as "experimental," and it recommends not comparing results from ACS 2020 microdata with results from prior years. In contrast, the Census Bureau considers that 2016-2020 tabulations for block groups and larger geographies to be suited for public and government use. These tabulations merge data from all five years using a confidential system to make the 2020 areal tabulations consistent with those from prior years. I use these more recent 2016-2020 ACS tabulations in the estimation of CVAP because it better reflects trends in citizenship for minority groups.

15. The ACS microdata include a variety of standard socioeconomic characteristics including median household income, poverty, unemployment, education level, coverage by health insurance, and English-language ability. The microdata allow me to use the same racial/ethnic categories as in the analysis of CVAP: Hispanic (any race), non-Hispanic white (referred to in this report as "white"), and non-Hispanic black (black alone or in combination with any other race, referred to in this report as "black"). The microdata identify people's location within the state only in terms of Public Use Microdata Areas (PUMAs), which average 100,000 population. As explained in more detail in Appendix B, I linked PUMAs as closely as

possible to the geographic areas of interest (i.e., counties and legislative districts) for the analyses of socioeconomic disparities.

16. For the analysis of disparities within the counties that are included in HD31, it was not possible to rely on the PUMS microdata because these small counties are not uniquely identifiable with the PUMA geography. For these counties I relied instead on the county-level tables published from ACS 2015-2019. Because HD31 is entirely comprised of whole counties, these data correspond exactly to its boundaries. Because of the small population size of these counties, there is considerable sampling error in the reported data. The black population sample size is especially small, and the tabulations either do not include any reported counts for some variables (e.g., black income and poverty data are omitted except for Wilson County), or the estimated margin of error is very large (e.g., black income per capita is reported as $7,328 while its margin of error is estimated to be $8,762). For this reason I only compare the data for non-Hispanic whites and Hispanics in HD31, and I interpret the size and consistent direction of differences between them as evidence of a pattern of disparities rather than as precise estimates.

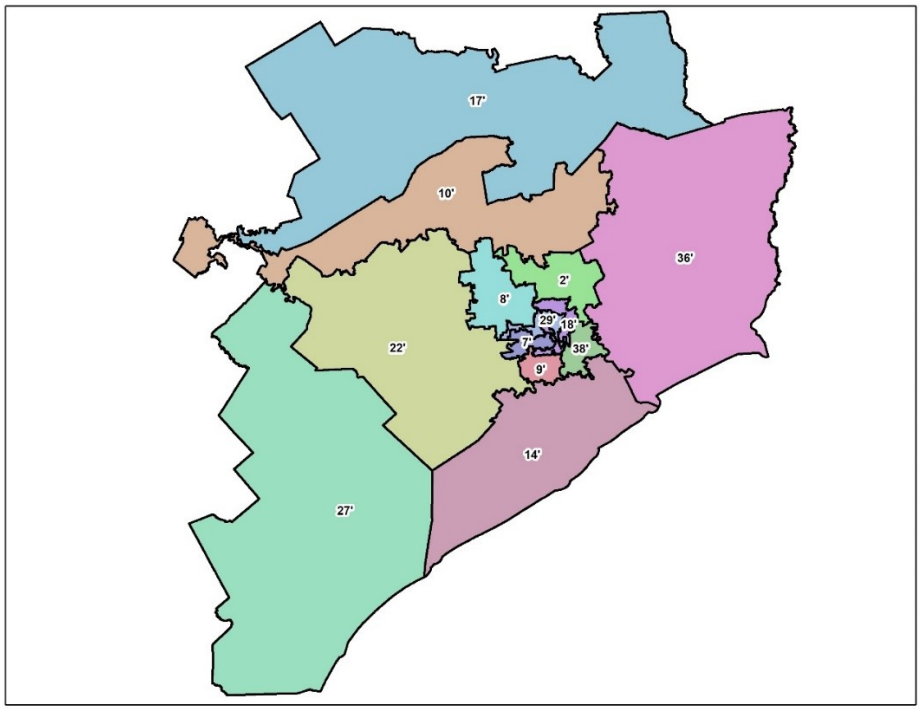
VI. Analysis of Enacted and Alternative District Maps

17. I have been asked to develop illustrative district maps in three areas: Congressional Districts in the Houston area, Congressional Districts in West Texas including the area that is currently CDs 16, 20, and 23, and State House Districts in West Texas in an area including El Paso, Odessa, and Eagle Pass. In the illustrative maps and tables for these areas, I have assigned a district number that corresponds approximately to the district number in the current enacted plan. On illustrative maps the illustrative district numbers include an apostrophe (‘) to clarify that they do not refer to the current district numbers. I have also been asked to provide information on the composition of the citizen voting-age population (CVAP) in three other areas

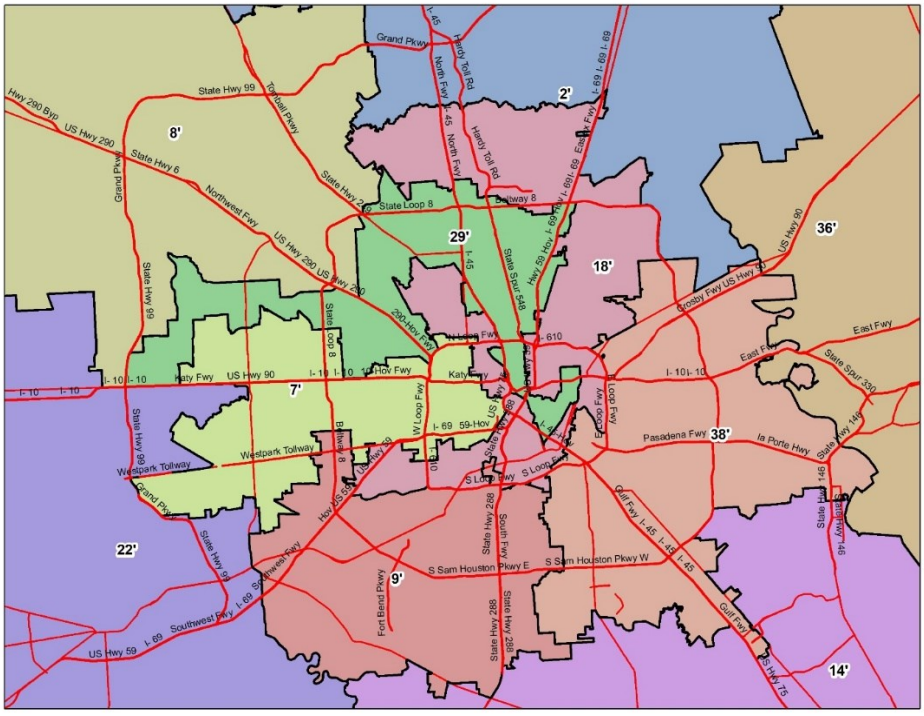
based on prior and current enacted maps and with some potential modifications. One of these is in Dallas-Fort Worth, where I have been asked to analyze 1) the composition of two components of CD6, the small area that reaches into Dallas and Tarrant Counties and the remaining area, and 2) CD24 in the previous and current enacted plans, identifying the composition of areas that were reallocated between these two plans. Another is current HD31 in South Texas, where I have been asked to describe the composition of the district as enacted and as it might be modified by replacing two currently included counties with two different adjacent counties. The third is in Bexar County, where I have been asked to compare the composition of HD118 in plan H2176 (the "committee plan") and in Plan H2316 (the current enacted plan). This involves describing the composition of areas that were removed from HD118 by the current enacted plan and areas that were added to HD118 in that plan.

Houston Area Congressional Districts

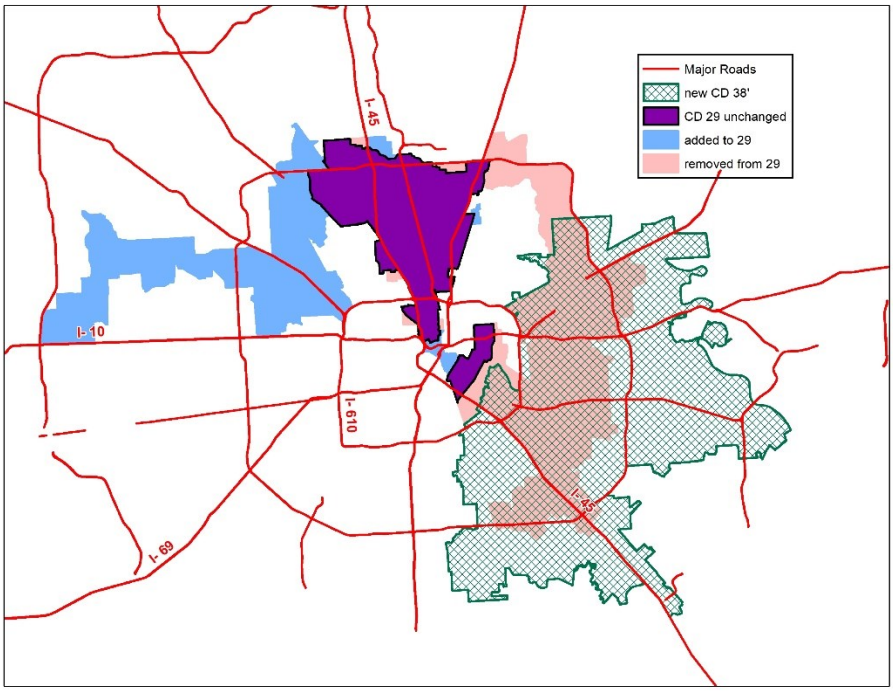
18. I developed an illustrative plan for Congressional Districts in the Houston area. The illustrative plan includes 13 districts that together encompass the same geographic area as districts in the enacted plan. CD17 and CD27 are unchanged from the current enacted plan. Map 1A illustrates all of the illustrative Congressional districts in the Houston area, including the portion of illustrative CD10' that extends to the western suburbs of Austin and is also part of current enacted CD10. Map 1B is a close-up of the same map showing the boundaries of districts in the central urban area of Houston. Map 1C shows the relationship of illustrative districts 29' and 38' to the current enacted CD29.



Map 1A. Illustrative Congressional Districts in the Houston area



Map 1B. Close-up of illustrative Congressional Districts in the Houston area showing major roads



Map 1C. Relationship of the current enacted CD29 to the illustrative CD29' and CD38'

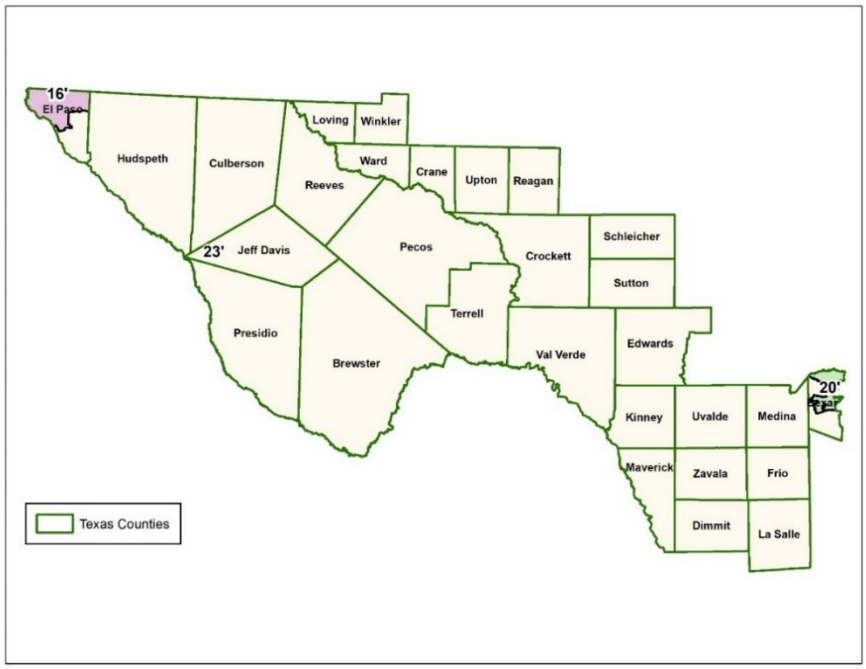
19. Table 1 provides population and CVAP estimates for the current enacted and illustrative Houston districts. The current enacted plan has one Hispanic majority district (CD29). I was asked if it were possible to draw an illustrative plan with two Hispanic majority districts that meet traditional redistricting criteria. The table shows two illustrative districts, CD29' and CD38', that meet these criteria, with HCVAP percentages of 50.7% and 50.8% respectively. These estimates are based on the procedures described in Appendix A, applying citizen shares at the census tract level as reported in the American Community Survey (ACS) 2016-2020 to the racial/ethnic counts of voting-age persons in census blocks as reported in the 2020 Census.

Table 1. Estimated CVAP composition of current enacted and illustrative Houston-area Congressional Districts								
	Total population 2020	Total CVAP	Hispanic CVAP	Black CVAP	White CVAP	Hispanic CVAP percentage	Black CVAP percentage	White CVAP percentage
Current enacted								
2	766,987	494,906	110,619	63,713	290,010	22.4%	12.9%	58.6%
7	766,987	449,393	96,092	93,324	167,489	21.4%	20.8%	37.3%
8	766,987	493,264	117,495	65,819	272,249	23.8%	13.3%	55.2%
9	766,987	439,371	117,291	203,293	74,003	26.7%	46.3%	16.8%
10	766,987	536,551	98,125	56,305	347,577	18.3%	10.5%	64.8%
14	766,987	540,459	99,180	91,295	325,032	18.4%	16.9%	60.1%
17	766,987	541,989	98,646	88,622	331,421	18.2%	16.4%	61.1%
18	766,987	463,934	136,259	189,115	108,129	29.4%	40.8%	23.3%
22	766,987	482,878	113,636	61,406	243,624	23.5%	12.7%	50.5%
27	766,987	543,410	260,632	25,983	240,909	48.0%	4.8%	44.3%
29	766,987	386,195	244,049	74,199	53,789	63.2%	19.2%	13.9%
36	766,987	521,232	117,022	69,733	303,592	22.5%	13.4%	58.2%
38	766,987	502,805	97,141	54,335	295,541	19.3%	10.8%	58.8%
Illustrative								
2'	766,987	496,458	104,362	57,206	304,355	21.0%	11.5%	61.3%
7'	766,987	486,182	102,150	85,463	226,540	21.0%	17.6%	46.6%
8'	766,987	497,529	109,426	68,323	265,621	22.0%	13.7%	53.4%
9'	766,987	450,649	101,330	187,224	92,320	22.5%	41.5%	20.5%
10'	766,987	535,740	90,469	45,284	363,508	16.9%	8.5%	67.9%
14'	766,987	537,507	119,509	62,382	323,795	22.2%	11.6%	60.2%
17'	766,987	541,989	98,646	88,622	331,421	18.2%	16.4%	61.1%
18'	766,987	460,641	118,658	187,898	120,392	25.8%	40.8%	26.1%
22'	766,987	487,173	102,649	68,286	256,719	21.1%	14.0%	52.7%
27'	766,987	543,410	260,632	25,983	240,909	48.0%	4.8%	44.3%
29'	766,987	398,255	201,721	84,446	82,923	50.7%	21.2%	20.8%
36'	766,987	531,035	78,471	106,784	325,827	14.8%	20.1%	61.4%
38'	766,987	429,817	218,166	69,239	119,034	50.8%	16.1%	27.7%

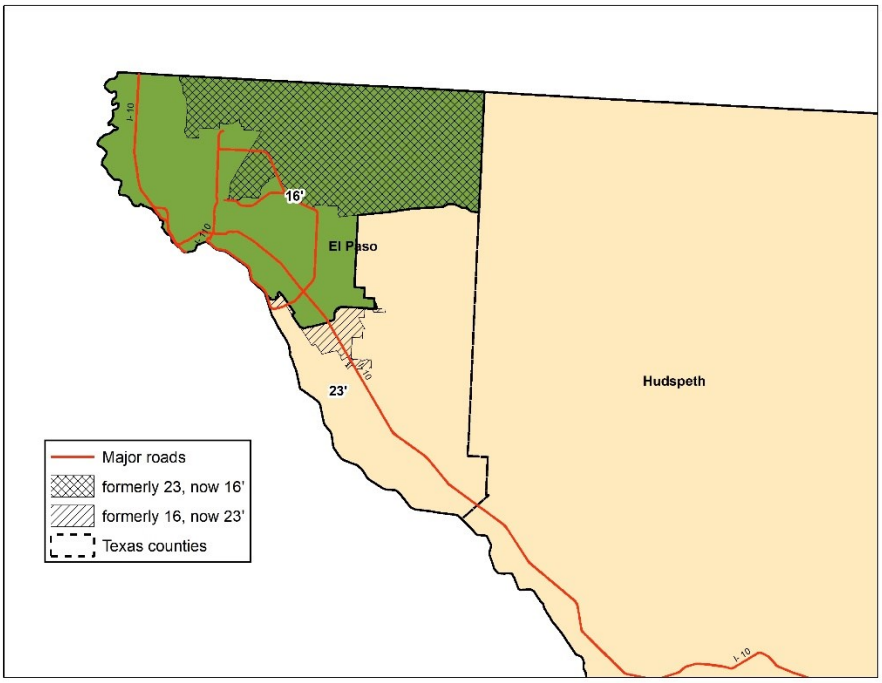
20. I also created alternative CVAP estimates in which I applied the estimation procedures that were used by the Texas Legislative Commission (TLC). As described in more detail in Appendix A, TLC relied solely on block group estimates of CVAP as reported in ACS 2015-2019 or 2016-2020, which introduces some error for block groups that are divided between districts. I applied the TLC procedure to the more recent data at the block group level in ACS 2016-2020. Following this procedure yields the same Hispanic CVAP percentages (50.7% and 50.8%) in districts 29' and 38'.

Congressional Districts 16, 20, and 23

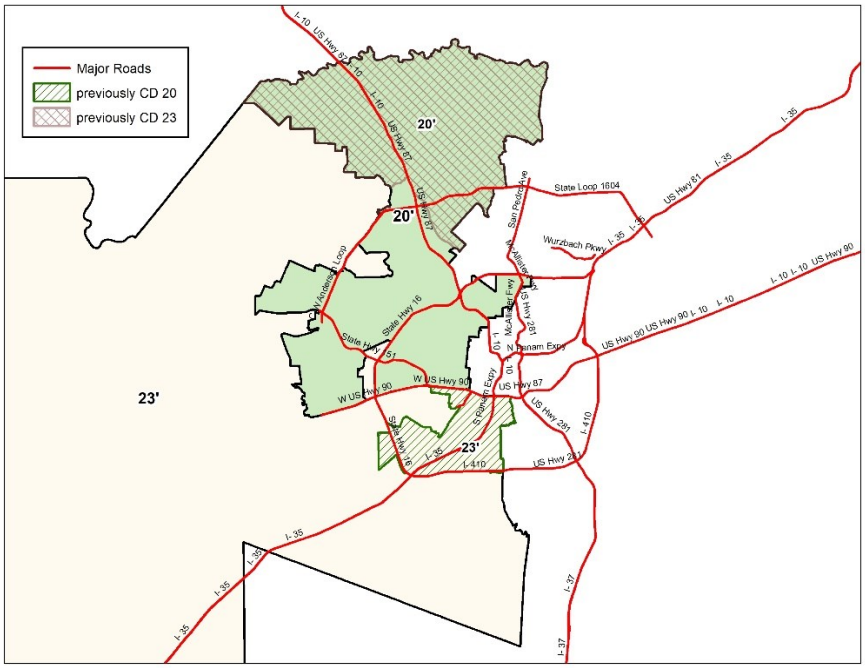
21. I developed an illustrative plan for Congressional Districts in West Texas. Map 2A shows the boundaries of illustrative CD16' in the El Paso area, illustrative CD20' in the San Antonio area, and illustrative CD23', which covers the territory between the two districts. Map 2B of the El Paso area provides a close-up view of the boundary between illustrative CD23' and illustrative CD16' along with major roads. The crosshatched area has been moved from current enacted CD23 into illustrative CD16', and the area with diagonal lines has been moved from current enacted CD16 into illustrative CD23'. Map 2C provides a close-up view of the boundary between illustrative CD23' and illustrative CD20' along with major roads. The cross-hatched area has been moved from current enacted CD23 into illustrative CD20'. The area with diagonal lines has been moved from current enacted CD20 to illustrative CD23'.



Map 2A. Illustrative Congressional Districts in the area of current enacted CDs 16, 20 and 23 showing county names



Map 2B. Illustrative CD16' and CD23' showing major roads and changes from the boundaries of the current enacted CDs



Map 2C. Illustrative CD23' and CD20' showing major roads and changes from the boundaries of the current enacted CDs

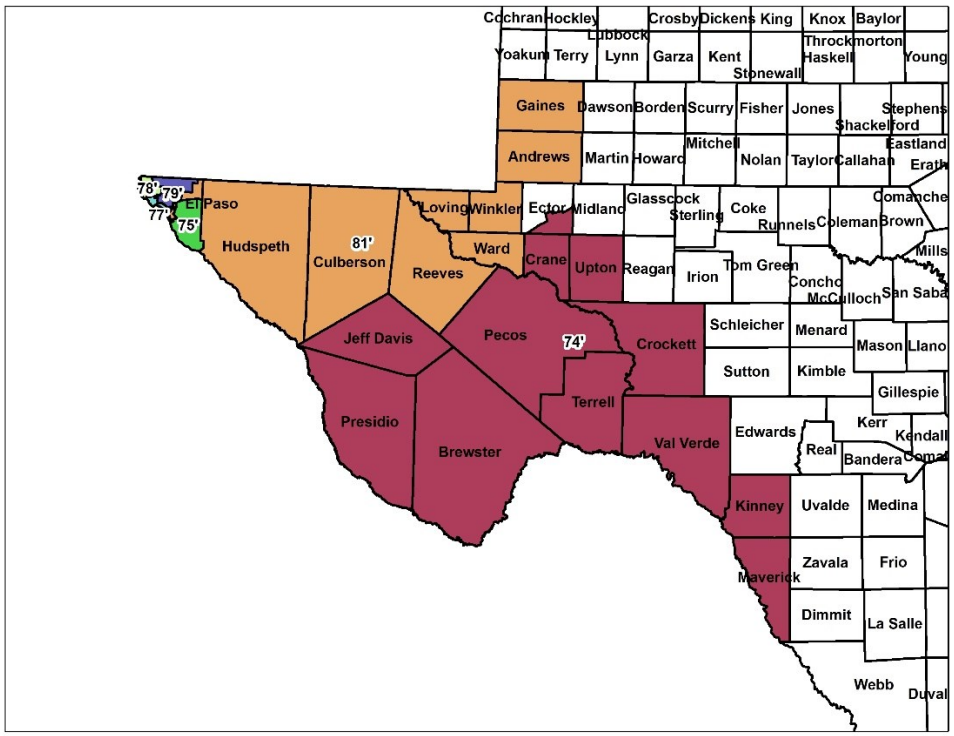
22. Table 2 presents estimates of CVAP composition for these illustrative Congressional Districts. In the illustrative plan all three districts remain majority Hispanic.

Table 2. Estimated CVAP composition of current enacted and illustrative West Texas Congressional Districts

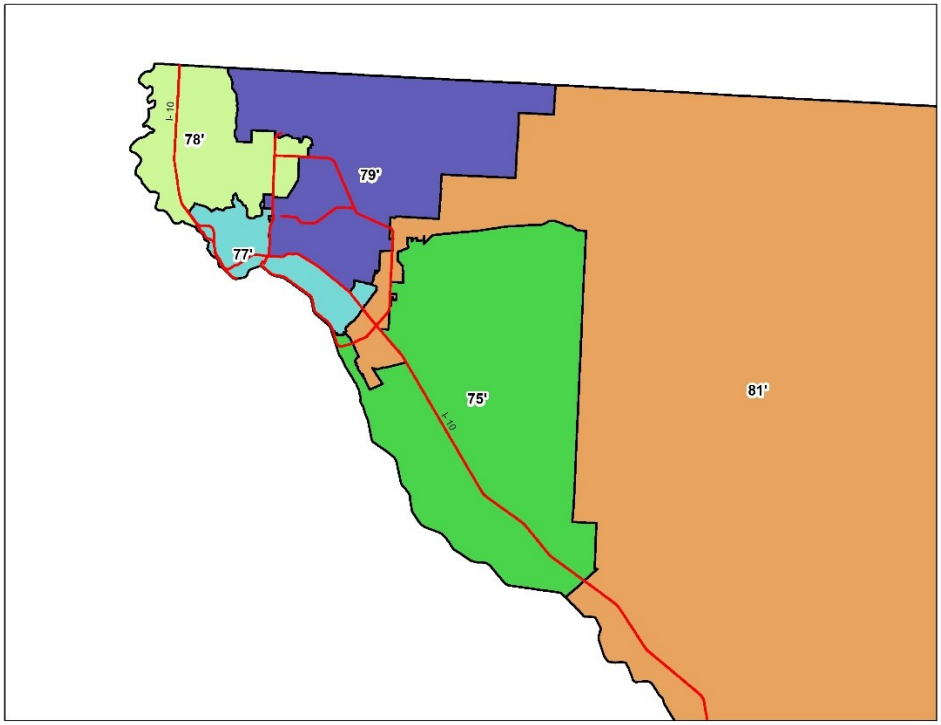
	Total population 2020	Total CVAP	Hispanic CVAP	Black CVAP	White CVAP	Hispanic CVAP percentage	Black CVAP percentage	White CVAP percentage
Enacted								
16	766,986	487,663	385,766	17,896	72,818	79.1%	3.7%	14.9%
20	766,987	508,183	343,361	34,119	110,114	67.6%	6.7%	21.7%
23	766,987	503,156	285,373	21,590	175,708	56.7%	4.3%	34.9%
Illustrative								
16'	766,987	490,927	381,608	19,446	77,576	77.7%	4.0%	15.8%
20'	766,986	521,403	296,979	36,686	159,909	57.0%	7.0%	30.7%
23'	766,987	486,672	335,913	17,474	121,156	69.0%	3.6%	24.9%

Texas House Districts in El Paso / West Texas

23. I developed an alternative illustrative plan for State House Districts in the El Paso/West Texas area. I was asked to evaluate if districts could be drawn to bring the population of districts in El Paso County closer to the ideal size. In consultation with attorneys for the United States, who had analyzed election data that I have not used, I also made changes that unpacked the concentration of Latino voters in HDs 74, 75, 77, 78, and 79, as compared to HD 81, and avoided pairing Representative Ordaz Perez with returning incumbents in illustrative HD75' or illustrative HD77'. Map 3A shows the boundaries of six illustrative districts in the resulting illustrative plan. Map 3B is a close-up of the districts in the El Paso area that also includes major roads.



Map 3A. Illustrative State House Districts in West Texas



Map 3B. Close-up of illustrative State House Districts in El Paso showing major roads

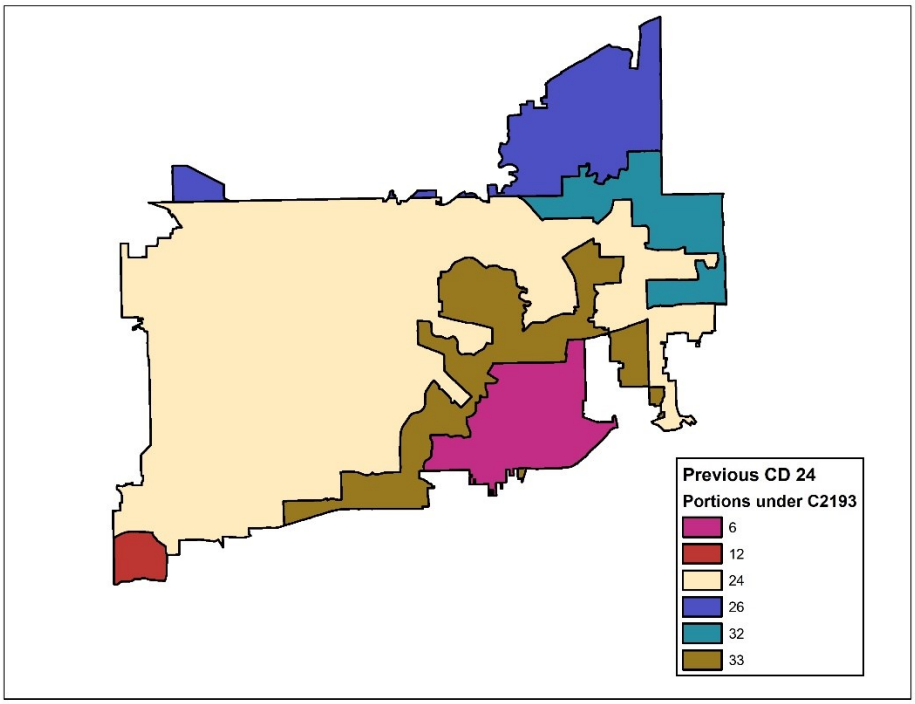
24. Table 3 presents estimates of district composition in West Texas for the illustrative plan and for currently enacted State House Districts that most closely coincide with the illustrative districts. The table shows that there are 6 majority-Hispanic districts in both plans. Five of the districts in the enacted plan have populations over 200,000, with an average size of 199,583. All districts in the illustrative plan are under 200,000, and the average size is 190,194.

Table 3. Estimated CVAP composition of current enacted and illustrative West Texas State House Districts

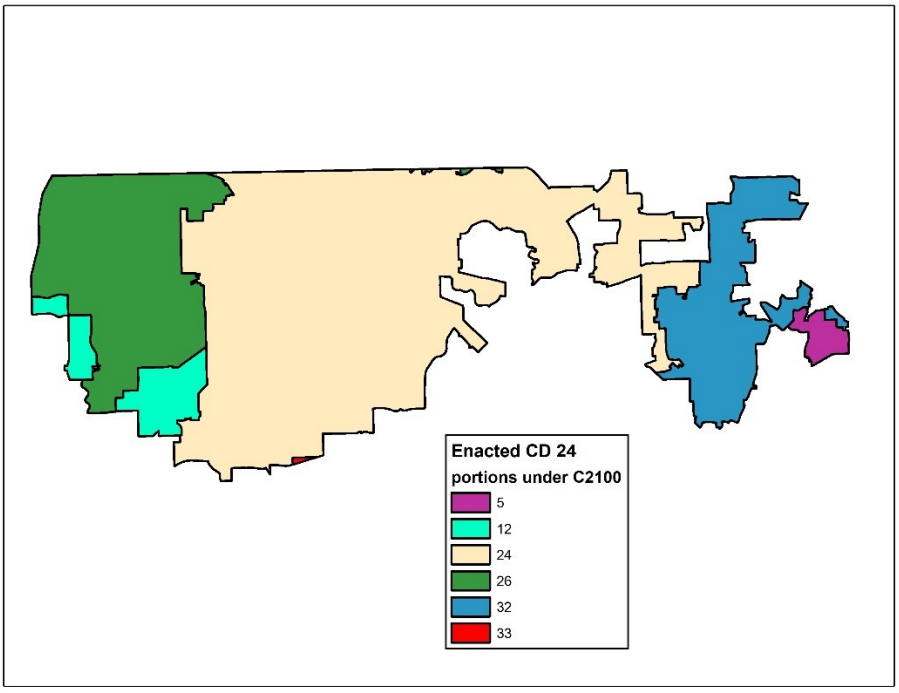
	Total population 2020	Total CVAP	Hispanic CVAP	Black CVAP	White CVAP	Hispanic CVAP percentage	Black CVAP percentage	White CVAP percentage
Enacted								
74	203,239	122,671	93,339	2,670	24,130	76.1%	2.2%	19.7%
75	200,505	109,708	96,997	3,032	8,064	88.4%	2.8%	7.4%
77	203,921	126,624	108,933	2,698	13,080	86.0%	2.1%	10.3%
78	203,786	134,287	91,652	6,365	31,595	68.3%	4.7%	23.5%
79	201,379	136,877	106,329	5,897	21,227	77.7%	4.3%	15.5%
81	184,670	116,947	61,874	5,597	10,525	65.8%	5.4%	27.5%
Illustrative								
74'	195,659	118,298	86,911	26,633	3,034	73.5%	2.6%	22.5%
75'	187,769	102,232	88,992	8,269	3,264	87.0%	3.2%	8.1%
77'	187,776	118,184	102,302	12,004	2,282	86.6%	1.9%	10.2%
78'	187,062	122,544	85,954	28,203	4,583	70.1%	3.7%	23.0%
79'	185,604	125,956	88,643	25,153	7,623	70.4%	6.1%	20.0%
81'	197,291	121,428	89,944	26,597	2,942	74.1%	2.4%	21.9%

Dallas-Fort Worth Area Congressional districts

25. Maps 4A and 4B illustrate the relationship between CD24 in Dallas-Fort Worth as it was defined in the former Plan C2100 and in the current enacted Plan C2193. Map 4A illustrates the whole area of the previous CD24, and identifies specific areas that were removed under the current enacted plan. These areas include parts of the current CD6, CD12, CD24, CD26, CD32, and CD33. Map 4B, conversely, illustrates the whole area of the previous CD24, and it identifies portions of former CDs that are now in CD24. These areas include parts of the current CD5, CD12, CD24, CD26, and CD32.



Map 4A. The area of CD24 in the former plan, showing areas now moved to other CDs

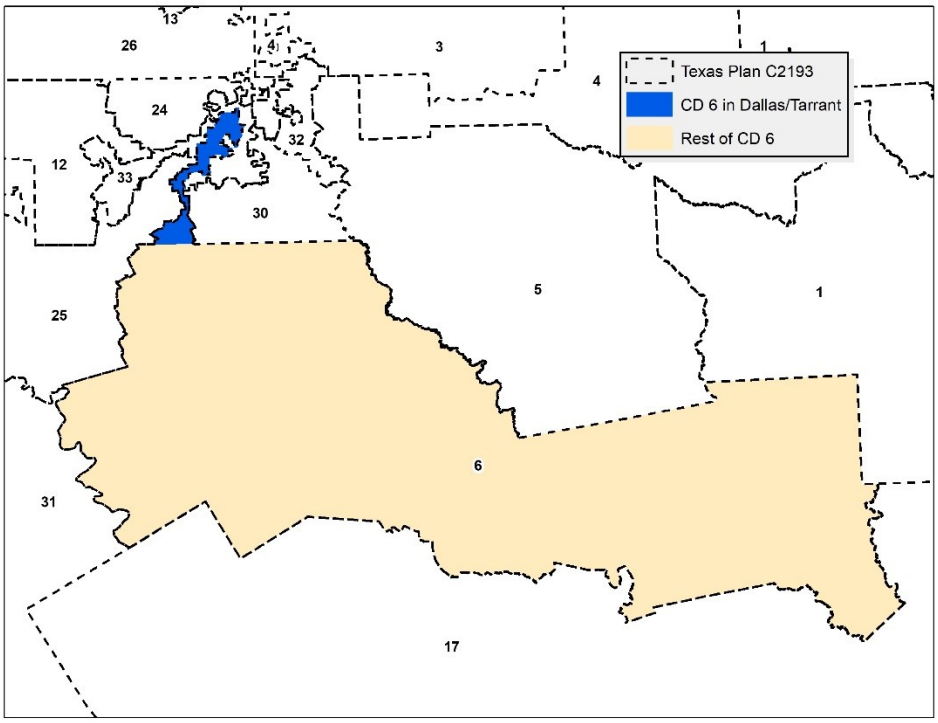


Map 4B. The area of CD24 in the current enacted plan, showing areas that were moved into it from other CDs

26. Table 4 shows that the current enacted plan reduced CD24's Hispanic and black CVAP percentages in comparison to the former plan. These two groups combined declined from 29.7% to 19.1% of the total CVAP, while the white CVAP percentage increased from 55.6% to 70.3%. The table also compares the composition of areas that were removed or added to CD24 between the prior plan (C2100) and the current enacted plan (C2193). The table distinguishes three kinds of areas: those that were placed in CD24 in both plans, those that were in CD24 under the prior plan and were removed, and those that were not in CD24 under the prior plan and were added. The table also reports the other CDs to which these areas were added or from which they were taken. The area of CD24 that is common to both plans has modest Hispanic CVAP percentage (13.3%) and black CVAP percentage (7.3%). CD24 under the prior plan had larger Hispanic and black CVAP percentages, as the area removed under the enacted plan is 19.9% Hispanic and 18.5% black. In comparison, the total area added to CD24 from other CDs in the prior plan total only 11.9% Hispanic CVAP percentage and 5.7% black CVAP percentage. The result is to make the district less Hispanic and black and more white.

Table 4. Components of change in the composition of CD24 between the former and current enacted plans								
		Total CVAP	Hispanic CVAP	Black CVAP	White CVAP	Hispanic CVAP percentage	Black CVAP percentage	White CVAP percentage
Area common to both plans		255,042	33,831	18,606	171,057	13.3%	7.3%	67.1%
Removed from CD24 and added to:								
	6	37,084	9,926	5,187	17,433	26.8%	14.0%	47.0%
	12	6,221	1,071	921	3,210	17.2%	14.8%	51.6%
	26	68,642	8,624	7,259	38,078	12.6%	10.6%	55.5%
	32	75,639	14,888	18,292	33,403	19.7%	24.2%	44.2%
	33	80,792	18,787	18,100	27,624	23.3%	22.4%	34.2%
	Total removed	268,378	53,298	49,759	119,748	19.9%	18.5%	44.6%
Added to CD24 from:								
	5	13,319	1,284	1,248	10,194	9.6%	9.4%	76.5%
	12	45,507	7,377	3,860	29,606	16.2%	8.5%	65.1%
	26	120,951	17,371	7,062	83,883	14.4%	5.8%	69.4%
	32	95,111	6,695	3,474	77,919	7.0%	3.7%	81.9%
	33	20	4	9	0	20.1%	46.9%	0.0%
	Total added	274,908	32,731	15,653	201,602	11.9%	5.7%	73.3%
Total former CD24		523,420	87,129	68,365	290,805	16.6%	13.1%	55.6%
Total enacted CD24		529,950	66,562	34,259	372,659	12.6%	6.5%	70.3%

27. Map 4C shows Congressional Districts in the Dallas-Fort Worth area under the current enacted Plan C2193. It highlights in yellow the main portion of CD6, and it shows in blue an additional component of CD6 that extends into Dallas and Tarrant Counties.



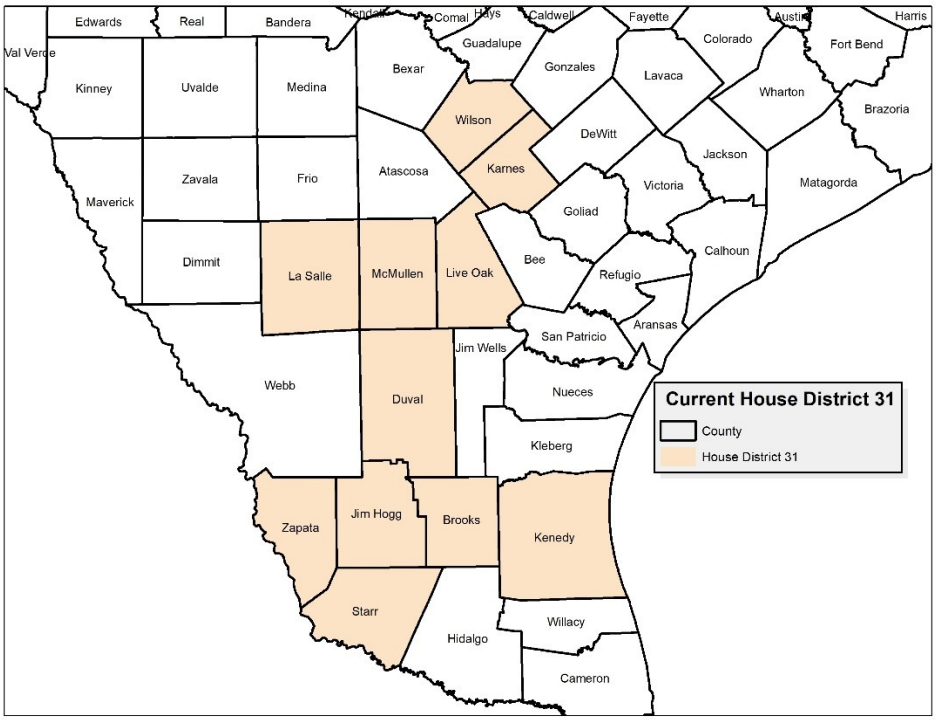
Map 4C. Boundaries of Congressional District 6, showing in blue the portion that extends into Dallas and Tarrant Counties.

28. Table 5 provides data about the composition of CD6, distinguishing the portion that extends into Dallas and Tarrant Counties from the remainder of the CD. For reference it also includes the other Congressional Districts in the current enacted plan. CD6 has an estimated 22.2% Hispanic CVAP percentage, which is considerably higher in the Dallas/Tarrant County portion of the district (29.9%) than in the remainder of the district (17.9%). There is also a higher black CVAP percentage in the Dallas/Tarrant County component (19.3%) than in the remainder of the district (13.7%). As a result, current enacted CD6 combines portions of urban Dallas and Tarrant Counties that are nearly 50% Hispanic and black CVAP with a rural area that is nearly two-thirds white CVAP, creating a congressional district that is approximately 38% Hispanic and black CVAP.

Table 5. Composition of CVAP population of components of CD6 and other CDs in Dallas-Fort Worth								
	Total population	Total CVAP	Hispanic CVAP	Black CVAP	White CVAP	Hispanic CVAP percentage	Black CVAP percentage	White CVAP percentage
Dallas/Tarrant portion	317,266	175,696	52,477	33,966	72,520	29.9%	19.3%	41.3%
Remainder of CD6	449,721	313,557	56,025	42,864	204,604	17.9%	13.7%	65.3%
CD6 total	766,987	489,252	108,502	76,830	277,124	22.2%	15.7%	56.6%
Other CDs in Dallas-Forth Worth								
5	766,987	504,023	95,120	76,503	297,764	18.9%	15.2%	59.1%
6	766,987	489,253	108,502	76,830	277,122	22.2%	15.7%	56.6%
12	766,987	532,559	96,278	64,239	338,439	18.1%	12.1%	63.5%
24	766,987	529,950	66,562	37,908	372,659	12.6%	7.2%	70.3%
25	766,987	543,982	86,006	65,536	361,400	15.8%	12.0%	66.4%
26	766,987	511,449	71,540	50,319	336,817	14.0%	9.8%	65.9%
30	766,987	493,704	114,773	234,458	120,537	23.2%	47.5%	24.4%
32	766,987	462,781	102,119	105,829	208,920	22.1%	22.9%	45.1%
33	766,987	383,227	167,525	103,512	85,497	43.7%	27.0%	22.3%

Texas House District 31 (South Texas)

29. Map 5 shows the composition of the current enacted House District 31, which is comprised of ten counties. The map identifies Karnes and Wilson Counties in the far north of HD31. It also shows the location of two counties that are adjacent to HD31 to the east of Duval County: Jim Wells and Kleberg Counties.



Map 5. Composition of HD31 under current enacted plan H2361, and location of adjacent counties

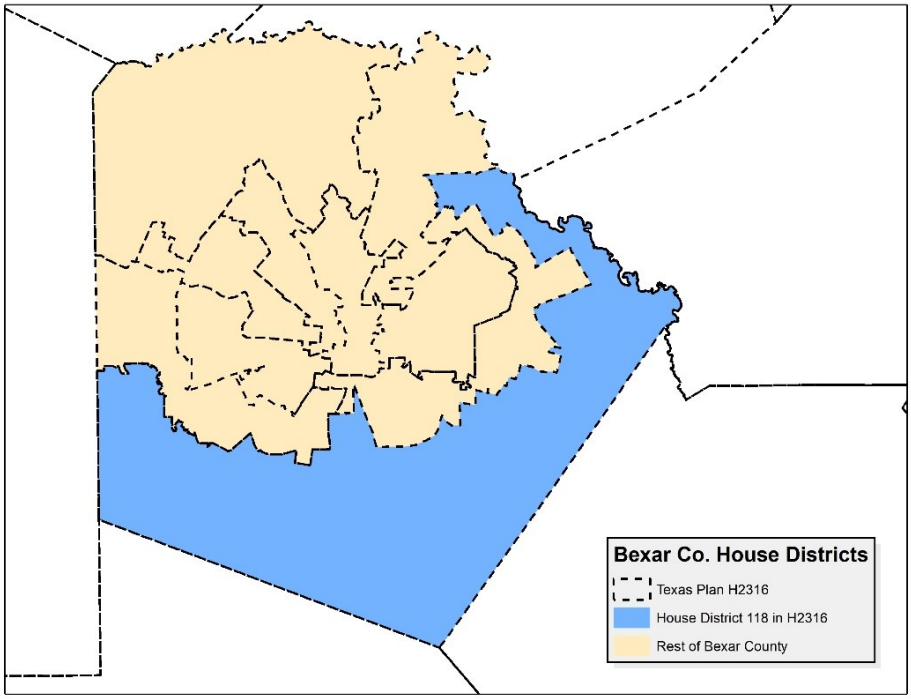
30. Table 6 describes how the composition of HD31 would change if Karnes and Wilson Counties were replaced by Jim Wells and Kleberg Counties, which would make HD31 more compact. Table 6 shows that the current enacted district has a total population of 184,966, while the illustrative version has a population of 190,434 (closer to the ideal population size of 194,303). In both versions the black CVAP percentage is no more than 2%. However the Hispanic CVAP percentage is substantially higher in the illustrative plan (79.7%) than in the current enacted plan (65.1%).

Table 6. HD 31 composition as curently enacted and with two counties replaced

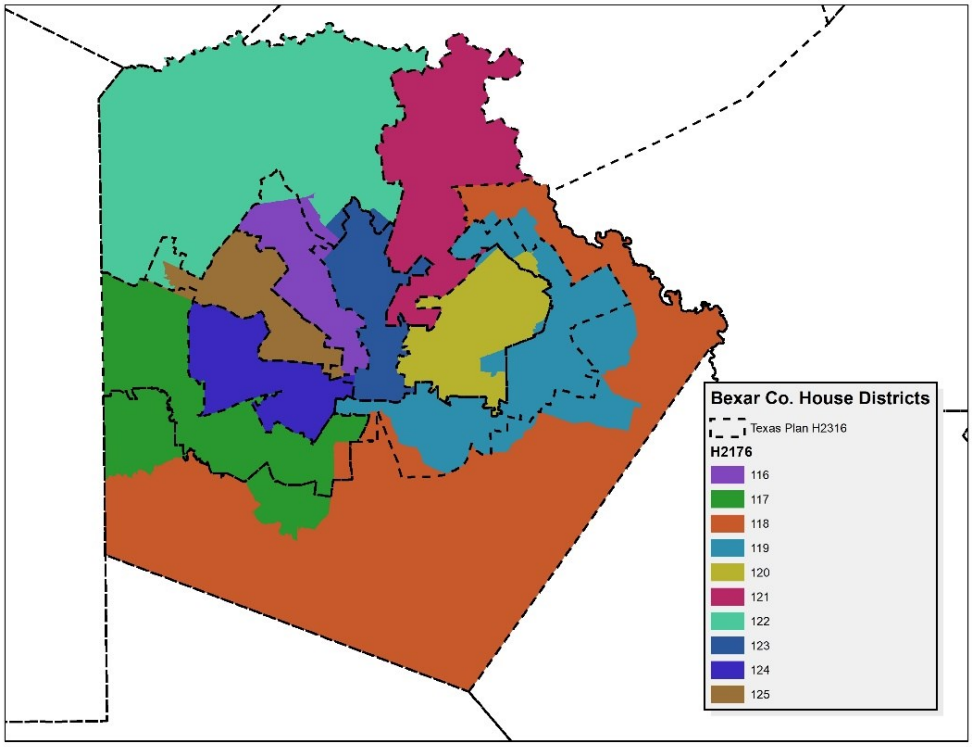
	Population	Total CVAP	Hispanic CVAP	Black CVAP	White CVAP	Hispanic CVAP percentage	Black CVAP percentage	White CVAP percentage
Enacted HD 31	184,966	116,945	76,169	2,319	36,760	65.1%	2.0%	31.4%
Revised HD 31	190,434	120,046	95,647	1,641	21,311	79.7%	1.4%	17.8%

Texas House District 118 (Bexar County)

31. Maps 6A and 6B compare the boundaries of HD118 in the legislative committee plan (H2176) and the current enacted plan (H2316). Map 6A shows the boundaries of HD118 in the current enacted plan. The dotted lines in Map 6B illustrate these same boundaries. The colored areas in Map 6B show the allocation of areas to different House Districts under the committee plan. The current enacted plan added areas that had been in HD117 and 119 in the committee plan, and it removed an area that had been in 118 in the committee plan.



Map 6A. Boundaries of HD118 and other Bexar County House Districts under current enacted plan H2316.



Map 6B. House Districts in current enacted plan H2316 (dotted lines) compared to districts in the committee plan H2176.

32. Table 7 shows that HD118 has a Hispanic CVAP majority in both versions of the plan, but considerably higher in the committee plan (65.5%) than in the enacted plan (57.4%). This difference results from the removal of some areas in the committee plan that are nearly 90% Hispanic (moved to HD117 and HD119), and the addition of some areas that are less than 50% Hispanic from HD117 and HD119.

Table 7. Components of change in the composition of HD 118 between the committee and current enacted plans							
	Total CVAP	Hispanic CVAP	Black CVAP	White CVAP	Hispanic CVAP percentage	Black CVAP percentage	White CVAP percentage
Area common to both plans	115,955	70,198	5,259	36,290	60.5%	4.5%	31.3%
Removed from HD 118 and added to:							
117	6,972	6,256	123	493	89.7%	1.8%	7.1%
119	11,184	10,030	83	980	89.7%	0.7%	8.8%
Added to HD 118 from:							
117	6,851	3,282	565	2,698	47.9%	8.2%	39.4%
119	16,040	6,239	1,929	7,026	38.9%	12.0%	43.8%
District totals							
Committee plan	134,112	86,484	5,465	37,763	64.5%	4.1%	28.2%
Enacted plan	138,846	79,719	7,753	46,014	57.4%	5.6%	33.1%

VII. Analysis of Socioeconomic Disparities

33. The analysis of socioeconomic disparities is presented below separately for the entire State of Texas and five large urban counties, based on analyses of microdata from the 2015-2019 ACS, and for the ten largely rural counties that are included in enacted House District 31 (based on published county-level tables from the 2015-2019 ACS). The indicators of socioeconomic status are inter-related aspects of the human capital and financial resources of residents. They are widely used in the research literature on socioeconomic disparities, and I have used them in this way in many publications. They include the mean household income, income per capita, and share of persons in households with incomes below the poverty line (all based on 2019 inflation-adjusted dollars and guidelines), share of persons in the civilian labor force who are unemployed, share of persons age 25 and above who have completed at least 12 years of education, share of persons age 5 and above who speak English "very well" or "speak only English," share of persons who have any health insurance coverage, and share of persons in a household with at least one automobile or light truck available for use. The county-level tabulations do not include

vehicle availability. As described in Appendix B, results are presented in Table 8 separately for non-Hispanic whites, non-Hispanic blacks (including those reporting more than one race), and Hispanics. However, due to the small black populations in the counties in HD31, results are not reported for blacks in Table 9. Based on analysis of variance of the microdata, all relationships between race/ethnicity and socioeconomic indicators are statistically significant at the $p<.001$ level. That is, there is less than a 0.1% chance that these sample data are drawn from a population in which there is no difference across racial/ethnic groups. As described in Appendix B, due to the small sample sizes in the ACS for rural counties in HD31, the sampling variability of estimates for individual counties is large relative to the reported estimates, and I do not rely on measures of statistical significance for Table 9. However the estimates in Table 9 are the best available unbiased estimates. In other words, they are not biased upwards or downwards, and there is no better source of estimates. Under these conditions it is standard practice in social science research to draw conclusions from estimates based on small samples, particularly when – as is true in this case – they reveal a pattern of disparities that is highly consistent across different indicators and counties.

34. Table 8 documents substantial socioeconomic disparities between Hispanics and whites in all five major urban counties. In only two instances is there parity between Hispanics and whites (vehicle access in Dallas and Tarrant Counties). In some counties and on some measures the disparities are especially large. For example, Hispanic household income is less than half that of whites in Dallas and Harris Counties. Per capita income of Hispanics is less than 40% of per capita income of whites in these counties. The share of Hispanics below the poverty line is three times as high as the white share in Harris County. However, despite these variations, the main pattern of disparities across this set of five large metropolitan counties is

similar. Hispanics are greatly disadvantaged on multiple dimensions of socioeconomic status in comparison to whites.

35. Table 8 also reports results for the black population. On several indicators black residents are greatly disadvantaged in comparison with whites, but not so much as Hispanics. Disparities between blacks and whites are largest in mean household income, income per capita, poverty, and unemployment. Blacks are considerably more likely than Hispanics to have completed high school and to speak English fluently, and they are more likely to have health insurance coverage, and on these indicators their disparity with whites is smaller.

36. Table 8 also provides an overall statewide comparison across groups. It shows that Hispanics have less favorable socioeconomic standing than non-Hispanic whites on every indicator. The mean household income of Hispanics is only 60.3% of the mean household income of whites. Income per capita of Hispanics is barely half that of whites, and the share of Hispanics below the poverty line is more than double that of whites. There are very large disparities in high school completion (68.7% for Hispanics vs. 95.0% for whites), ability to speak English "very well" or "speak only English" (70.3% vs 98.8%), and health insurance coverage (72.3% vs. 89.8%). Hispanics are also somewhat more likely to report being unemployed when interviewed during 2015-2019, and slightly less likely to have at least one vehicle available for use by their household.

Table 8. Socioeconomic disparities between whites, blacks, and Hispanics statewide and in major counties (American Community Survey 2015-2019)									
		Mean household income	Income per capita	Below poverty line	Unemployed	Completed high school	English spoken very well	Has health insurance	Vehicle available
Texas	White	118,849	49,201	0.084	0.041	0.95	0.988	0.898	0.977
	Hispanic	71,749	24,356	0.209	0.053	0.687	0.703	0.723	0.966
	Black	74,146	30,181	0.193	0.077	0.918	0.98	0.841	0.923
Bexar	White	113,266	48,627	0.093	0.043	0.964	0.981	0.91	0.969
	Hispanic	73,694	26,486	0.187	0.055	0.78	0.829	0.813	0.95
	Black	77,691	31,954	0.165	0.064	0.943	0.989	0.877	0.918
Dallas	White	138,831	62,635	0.075	0.035	0.959	0.98	0.904	0.97
	Hispanic	67,754	22,334	0.19	0.042	0.566	0.564	0.656	0.972
	Black	67,036	30,173	0.197	0.074	0.916	0.971	0.839	0.897
Tarrant	White	124,826	49,973	0.067	0.038	0.958	0.988	0.904	0.981
	Hispanic	75,335	25,609	0.172	0.048	0.659	0.69	0.715	0.982
	Black	76,459	30,611	0.176	0.065	0.934	0.968	0.846	0.945
Harris	White	145,518	62,266	0.069	0.047	0.966	0.98	0.916	0.974
	Hispanic	71,459	24,344	0.211	0.054	0.652	0.602	0.676	0.965
	Black	72,923	29,806	0.201	0.091	0.923	0.98	0.842	0.916
El Paso	White	94,960	43,387	0.108	0.053	0.963	0.964	0.909	0.973
	Hispanic	64,849	22,852	0.222	0.057	0.769	0.622	0.771	0.959
	Black	76,670	35,194	0.115	0.051	0.965	0.983	0.882	0.942

37. Table 9 presents results on a similar set of variables for whites and Hispanics in the ten counties in the current enacted HD31. Estimated values for both whites and Hispanics vary considerably across counties, which is to be expected when data are based on limited sample sizes. As a result, it is difficult to draw conclusions based on any single county. To summarize the general pattern in this region, the table also presents the average values (means) across all ten counties (weighting each county by its 2020 non-Hispanic white and Hispanic populations, respectively).

38. The table shows that Hispanics have considerably lower household income and income per capita than whites in all ten counties. Their poverty share and share with no health insurance are higher in all counties except Brooks County. Their unemployment rate is higher on average, higher in six counties but lower in four counties. Their share of high school

graduates is considerably lower and their share of fluent English speakers is considerably lower in all ten counties.

Table 9. Indicators of socioeconomic status for non-Hispanic whites and Hispanics, for counties in enacted HD31 (ACS 2015-2019)

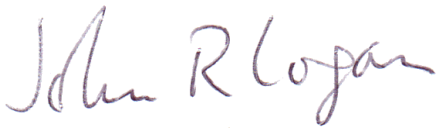
	Brooks County	Duval County	Jim Hogg County	Karnes County	La Salle County	Live Oak County	McMullen County	Starr County	Wilson County	Zapata County	Group-Weighted Mean
Median household income											
White	$31,058	$55,125	NA	$71,036	$56,732	$64,085	$104,583	$74,453	$84,474	$56,400	$66,438
Hispanic	$28,079	$38,188	$32,296	$46,953	$46,304	$36,467	$51,635	$30,309	$66,932	$32,566	$40,973
Income per capita											
White	$11,421	$20,854	$19,912	$50,849	$29,348	$32,603	$50,954	$21,714	$37,788	$35,632	$31,108
Hispanic	$14,784	$17,451	$16,534	$15,179	$20,176	$15,051	$12,061	$14,126	$25,108	$19,481	$16,995
Below poverty											
White	0.457	0.024	0.130	0.087	0.041	0.126	0.103	0.223	0.064	0.195	0.145
Hispanic	0.412	0.248	0.322	0.255	0.192	0.255	0.135	0.348	0.131	0.356	0.266
Civilian labor force unemployed (age 16-64)											
White	0.050	0.112	0.065	0.030	0.056	0.031	0.066	0.000	0.052	0.000	0.046
Hispanic	0.125	0.106	0.116	0.081	0.034	0.017	0.065	0.152	0.055	0.108	0.086
High school or more (age 25+)											
White	0.857	0.926	0.928	0.922	0.858	0.842	0.986	0.764	0.920	0.760	0.876
Hispanic	0.674	0.657	0.728	0.651	0.598	0.634	0.845	0.531	0.798	0.604	0.672
Speak English very well (age 5+)											
White	1.000	1.000	0.924	0.988	0.976	0.998	1.000	0.707	0.989	1.000	0.958
Hispanic	0.842	0.855	0.838	0.742	0.813	0.759	0.933	0.556	0.847	0.587	0.777
Has health insurance											
White	0.769	0.863	0.811	0.933	0.821	0.867	0.971	0.775	0.912	1.000	0.872
Hispanic	0.778	0.772	0.781	0.801	0.815	0.769	0.670	0.652	0.816	0.698	0.755

39. Whites' incomes are lower and their poverty is higher in HD31 than statewide, but their standing on other indicators is similar to the Texas white average. Similarly, Hispanics' incomes are lower and their poverty and unemployment rate is higher in this region than the statewide Hispanic average. But they are more similar to Hispanics statewide on education, English language fluency, and health insurance coverage.

40. The socioeconomic disparities described here are important as indicators of the overall disadvantages that Hispanics in these areas face in comparison to whites. In my own research and in the literature on political participation, they have also been found to be associated with lower likelihood for citizens to register to vote or to vote if registered (see especially my findings in *Journal of Ethnic and Migration Studies* [2009], *Journal of Ethnic and Migration*

Studies [2012], *Social Forces* [2012], and *Sociological Perspectives* [2021], and the citations to other research found in these articles).

Date: June 14, 2022



John R. Logan

Appendix A. CVAP Estimation

I estimated CVAP at the 2020 block level for every racial/ethnic category and for the total population, and I aggregated the estimates for every block within an enacted or proposed district to yield that category's percentage of the district's CVAP.

The data sources I used are:

- Block-level population estimates by race/ethnicity and age in the Census 2020 Public Law 94-171 Summary File.
- Tract-level estimates of CVAP for a limited set of race and Hispanic origin categories in a "special file" of the 2016-2020 American Community Survey (ACS).
- Tract-level estimates of age for a limited set of race and Hispanic origin categories in the main 2016-2020 American Community Survey (ACS).

The ACS data are the only available estimate of CVAP. I rely on the five-year ACS 2016-2020 tabulations because tract data are only provided for five-year aggregations. A concern with relying on data for this cumulative sample is that a group's share of citizens in its voting-age population may have changed over time. If it were higher in 2020 than in 2016, the 2016-2020 estimate would underestimate it. In Step 3 below, I provide evidence that Hispanic citizen share was indeed rising in this period, so using the five-year series understates Hispanic citizen share and also the Hispanic CVAP percentage in legislative districts.

Relying on ACS data adds other complications to the estimation of CVAP in 2020. While the 2020 Census provides full-count estimates of the population age 18 and above for very detailed categories of race and Hispanic origin, the ACS data report voting age citizens and age for a more limited set of categories.

- CVAP should be estimated for African Americans, defined by OMB standards as persons who are "non-Hispanic black alone or in combination with any other race." The ACS does not report this category. It does report CVAP by three components (black alone, black and white, and black and American Indian/Alaska Native), but it does not report any other combinations.
- The ACS special tabulation of CVAP does not also report voting age population (VAP) by group (VAP) for census tracts. This tabulation is available separately from the main ACS, which reports the age distribution for Hispanics and several other race categories, but does not distinguish Hispanics from non-Hispanics within those race categories. Census 2020 data are a reliable source to estimate the non-Hispanic share of each race group for the 18+ population. I applied the 2020 "non-Hispanic share" to the ACS "race by age" tabulation to determine the estimated VAP by race and Hispanic origin that is needed as the denominator in calculating the CVAP percentage (CVAP/VAP) in 2016-2020. To do this requires the reasonable assumption that the non-Hispanic share of each group did not meaningfully change between 2016-2020 and 2020.

The following sections describe in some detail the steps taken to develop the CVAP estimates for 2020 blocks in Texas.

Estimation steps

1. CVAP in the ACS at the 2010 tract level

My first step in estimation uses the ACS estimates of CVAP by race and Hispanic origin. In these tabulations the Census Bureau rounds the estimates (estimates between 1 and 7 are rounded to 4 and estimates 8 and higher are rounded to the nearest 5). The published categories are:

Total
Not Hispanic or Latino (NH)
*NH White Alone (NHW)
*NH Black or African American Alone (NHB)
*NH Asian Alone (NHA)
*NH Native Hawaiian or Other Pacific Islander Alone (NHPI)
*NH American Indian or Alaska Native (AIAN) Alone
NH American Indian or Alaska Native and White
NH Asian and White
NH Black or African American and White
NH American Indian or Alaska Native and Black or African American
NH Remainder of Two or More Race Responses
*Hispanic or Latino

I used the categories marked with an asterisk (*)in the analysis. The remaining categories cannot be analyzed separately through the remaining steps, and I combined them in this analysis into a residual category ("NH Multiracial").

The ACS reports CVAP for persons who are "NH Black or African American Alone" but not for "NH Black or African American Alone or in Combination with Another Race." Fortunately, the citizen share for the "alone" category can also be applied to the "in combination" category. To test this approach, I analyzed microdata for the whole state of Texas from the 2019 ACS PUMS sample. As noted in my report, I did not use the 2020 ACS PUMS because the Census Bureau describes it as "experimental" due to the problems in sampling during the pandemic. The one-year sample for the whole state in 2019 is very large and it was designed to be representative at the state level, so I can rely on these most recent data rather than data for the whole 2015-2019 period. In this sample, in 2019 the "NH black alone" citizen share was .9520, compared to .9529 for "NH black alone or in combination," which makes me confident that I can use the former as an estimate of the latter.

Note that the 2020 census's "NH Other Race Alone" category also is not reported by the ACS, and it cannot be inferred as the difference between the "total" and the sum of all other categories because of the rounding of those categories' counts. This is a small category. My analysis of the 2019 ACS PUMS microdata shows that it was 1.2% of the population in Texas. Its citizen share in 2019 was .8577. In the absence of a tract-level estimate, I estimate the citizen share for "NH Other Race Alone" persons in every tract at the statewide value of .8577.

2. VAP estimation

For areas larger than census tracts, the ACS CVAP tables also include estimates of the full voting age population (VAP) that can be used as the denominator in computing CVAP

percentage (CVAP/VAP). For tract estimates one must turn to the main ACS 2015-2019 or 2016-2020 tract files.

It is essential to use the ACS sample data for this purpose because it is the same sample from which CVAP is drawn, so the VAP will correspond to exactly the same people as the CVAP. The ACS provides the number of persons age 18 and over for the following categories of race and Hispanic origin:

Hispanic or Latino
NH White Alone
White Alone
Black or African American Alone
Asian Alone
Native Hawaiian or Pacific Islander Alone (NHPI)
American Indian or Alaska Native Alone (AIAN)
Some Other Race Alone
Two or More Races

These categories mostly correspond to those for which CVAP is reported, noting that "Two or More Races" is the same as the "Multiracial" category created from the CVAP counts. There are two exceptions. The age distribution for Some Other Race Alone is reported, but it cannot be used because it is missing from the CVAP tabulation. More important, all the race categories except NH White Alone combine Hispanics and non-Hispanics. A further step is needed to estimate the non-Hispanic share of the 18+ population in the other five categories.

The age breakdown by race and Hispanic origin is not reported by the ACS. However, the 2020 block data include counts of persons age 18+ for 70 detailed combinations of race, separately for Hispanics and non-Hispanics. I aggregated these 2020 data into the race categories reported in the ACS race by age tabulation. Then I calculated the non-Hispanic counts of voting age population for each racial category as the product of its non-Hispanic share in the tract (from Census 2020) times its total 18+ population in the ACS (where Hispanics and non-Hispanics are combined).

3. CVAP percentage

Step 2 yields estimates of VAP in the same categories as CVAP in Step 1. The CVAP percentage for each race/ethnic category is the ratio of CVAP to VAP in the census tract. I computed this ratio for the following categories:

Hispanic or Latino
NH White Alone
NH Black or African American Alone
NH Asian Alone
NH Native Hawaiian or Pacific Islander Alone (NHPI)
NH American Indian or Alaska Native Alone (AIAN)
NH Multiracial

I set citizen share for NH Other Race Alone at .8577 for all tracts. Citizen share for multiracial persons includes those who are black and some other race, although in Step 4 this value is applied only to the count of multiracial persons who are not black.

As noted above, relying on ACS tract data for citizenship information requires the assumption that the citizen share of the 18+ population of every racial/ethnic category was unchanged between the ACS 2016-2020 estimates and the 2020 Census. However, it is possible to use the PUMS microdata from the ACS in 2015 and 2019 (a 1% sample of the population with weights intended to make it representative for large geographic units such as states) to examine this assumption. If the citizen share of a given group were rising in this period, I would conclude that the actual citizen share in 2020 was higher than the average for 2016-2020 as reported in the ACS tract data.

The PUMS microdata confirm that the citizen share among Hispanics age 18 and above was increasing in this period. It was .7072 in 2015 and rose to .7429 in 2019. This change is highly statistically significant, unlikely to be due to sampling variation. It is possible for rates to both rise and fall over time, depending in part on the volume of immigration by non-citizen adults. There are substantive reasons to interpret this rise as a natural tendency for a population group that is growing through fertility (as is the case for Hispanics), a point previously made by Chapa et al (2011). [1] First, many Hispanics who were age 14-17 at the time of ACS data collection had reached age 18 by 2020. Second, these young adults were more likely than older Hispanics to be citizens by virtue of being born in the U.S. Under these conditions, there would be a natural demographic trend toward increasing citizen share for Hispanics.

A similar smaller trend is observed for non-Hispanic Asians, whose citizen share statewide increased from .6408 in 2015 to .6502 in 2019.

Consequently, the CVAP percentages estimated for purposes of this report for 2020 blocks are a conservative estimate for Hispanics, possibly underestimating Hispanic CVAP percentage by 2-3%.

4. Block-level CVAP in 2020

The final step is to multiply the tract-level estimate of CVAP percentage by the count of persons 18+ (VAP) in every block for each race/ethnic category. This step yields the group's CVAP estimate for the block. This is the procedure recommended by Chapa et al (2011, pp. 11-13) to develop CVAP estimates at units smaller than the county level.

In some cases, particularly for the smallest racial categories, there is no CVAP information for a tract in the ACS but nevertheless there is a non-zero VAP in the 2020 block. In these cases, I used the mean value of citizen share across all Texas census tracts in this step.

As noted in step 1, the citizen share estimated for persons who are "NH black alone" is applied twice. It is applied to the number of voting age residents who are NH black alone to estimate the NH black alone CVAP. It is also applied to the full number of persons who are "NH black alone and in combination."

The final categories for which I estimated CVAP in 2020 blocks are as follows:

[1] Chapa, Jorge, Ana Henderson, Aggie Jooyoon Noah, Werner Schink, and Robert Kengle. 2011. "Redistricting: Estimating Citizen Voting Age Population." Research Brief of the Chief Justice Earl Warren Institute of Law and Social Policy, University of California, Berkeley Law School.

Hispanic or Latino
NH White Alone
NH Black Alone
NH Black or African American Alone or in Combination
NH Asian Alone
NH Native Hawaiian or Pacific Islander Alone (NHPI)
NH American Indian or Alaska Native Alone (AIAN)
NH Other Race Alone
NH Multiracial (non-black multiracial)

Alternative Estimation Using Texas Legislative Council Procedures

I have created estimates of district CVAP percentages for Hispanics and persons who are non-Hispanic black alone or in combination. These estimates are based on 2016-2020 ACS data on citizen share at the tract level, which are then applied to each group's PL-94 2020 voting age population (VAP) for every block in the tract.

I have also created alternative estimates using the procedures followed by the Texas Legislative Council (TLC) in 2021, applying the TLC procedures to the recently released 2016-2020 ACS.

The procedure has these steps, which notably make no use of the voting age population by race/ethnicity from Census 2020. 1) The estimate of CVAP is taken from the ACS block group counts, using the racial/ethnic categories found in ACS. 2) Hispanics are one category. The ACS does not report CVAP for persons who are non-Hispanic black alone or in combination, which is how TLC describes the "black" population for redistricting purposes. TLC instead uses a "similar" ACS estimate that includes non-Hispanics who are black alone, black in combination with white, and black in combination with American Indian and/or Alaska Native. This count omits non-Hispanics who are black in combination with any other race or with any two or more other races. 3) To estimate each group's CVAP percentage in a district, TLC allocates whole block groups to districts. A block group is allocated to a district if it is wholly within the district or 50% or more of its total population as enumerated in Census 2020 is within the district. The 50% criterion assumes that each group's CVAP is located within or outside a district in the same proportion as the total population of all ages, whether citizen or not. TLC notes in addition that in cases of split block groups, the procedure results in some citizen voting age persons being counted as living in a district where they do not reside.

I have estimated CVAP for Congressional Districts in the Houston area using the TLC approach as applied to 2016-2020 ACS data. This is the one case where the Hispanic CVAP is close to the 50% threshold to be a majority Latino CVAP district. This procedure requires identifying which whole block groups to assign to each proposed district. It is carried out in two steps. 1) First, I identify blocks where the entire block group is within the same district. 2) For those block groups that are split between two districts, I calculate the 2020 populations of blocks in each district and assign all blocks to the district with the larger population share. Then I aggregate the ACS reported CVAP for Hispanics and for a "black" category that includes non-Hispanics who are black alone, black in combination with white, and black in combination with American Indian and/or Alaska Native. As stated in my report (p. 12), the TLC methodology yields

estimated Hispanic CVAP shares in proposed CD29' and CD38' (the districts with a Hispanic majority CVAP) that were within a tenth of a percent of my block-based procedure.

Census 2020 Undercount

A concern with the PL94 data from Census 2020 is that the Census Bureau has reported results of its Post-Enumeration Survey that document systematic undercounting of African Americans, Hispanics, and American Indians or Alaska Natives (AIAN) and overcounting of non-Hispanic whites, Asians, and Native Hawaiians or Other Pacific Islanders (NHPI). Specifically, the Bureau's report concludes that the black population was undercounted by 3.30% (compared to 2.06% in 2010). The Hispanic population was undercounted by 4.99%, a statistically significant increase from the 2010 undercount of 1.54%. The AIAN undercount was 5.64%. In contrast, the overcount was 1.64% for non-Hispanic whites, 2.62% for Asians, and 1.28% for NHPI. The implications of the undercount are particularly relevant for Texas, due to its combination of large Hispanic and black populations.

I have calculated how my estimates of every group's CVAP percentages in each block are likely affected by the undercount. For example, if the Hispanic undercount in a given block were 4.99% (equal to the national average), the true Hispanic CVAP percentage in that block would be 5.25% higher than the undercounted value. Similarly, if the national estimate held for a given block, the true black CVAP percentage would be 3.41% higher than my estimate, and the true AIAN CVAP percentage would be 5.98% higher. Hence there is strong reason to conclude that the estimates of CVAP percentage in this report, where I make no undercount correction, are understated for these three groups.

Appendix B. Data for Socioeconomic Disparities Analysis

1. ACS 2015-2019 PUMS Microdata

My analysis of socioeconomic disparities Texas-wide and in major urban areas is based on the ACS 2015-2019 PUMS microdata. In this file the survey data for a 1% sample of persons in every year is aggregated across five years. The Census Bureau designs the samples for each year so that the cumulative sample will be maximally representative of the population of small areas.

In order to protect the confidentiality of the sampled persons and households, people's location is identified only at one geographic scale within states. This scale is termed the Public Use Microdata Area (PUMA). It is much larger than a census tract and larger than many counties, with an average population size of 100,000. For the purpose of describing group-specific socioeconomic status in the areas of the state examined here, it was necessary to create a crosswalk between those areas and the PUMAs contained within them. The analyses reported here define the areas as follows:

Harris County	PUMAs 4601-4638.	County 201
Dallas County.	PUMAs 2301-2322.	County 113
Tarrant County	PUMAs 2501-2516	County 439
Bexar County	PUMAs 5901-5916.	County 029
El Paso County	PUMAs 3301-3306	County 141

The PUMS microdata make it possible to define subgroups of the population as non-Hispanic white alone, non-Hispanic black alone or in combination with another race, and Hispanic.

2. ACS 2015-2019 county tabulations

I used county-level tabulations from ACS 2015-2019 to distinguish counties within HD31. The PUMS microdata cannot be used for this purpose because HD31 includes portions of three PUMAs, which involve numerous other counties. No combination of PUMAs can represent the residents of HD31.

Data are reported separately for each of ten counties:

Brooks	County 47
Duval	County 131
Jim Hogg	County 247
Karnes	County 255
LaSalle	County 283
Live Oak	County 297
McMullen	County 311
Starr	County 427
Wilson	County 493
Zapata	County 505

Separate tabulations are reported by the Census Bureau for non-Hispanic white alone, non-Hispanic black alone, and Hispanic. Some additional combinations of black with another race are also available, but others are omitted. The ACS samples in these counties have small numbers of black respondents, and data are not reported separately for black residents for a number of counties and key variables. For this reason, my analysis of disparities in HD31 is limited to a comparison of whites and Hispanics.

Appendix C. Compactness of Proposed Districts

This report refers to a variety of previous and currently enacted redistricting plans, and also to alternative illustrative plans that I developed.

A relevant quantitative measure to assess the maps I created is the ***Polsby-Popper*** measure of compactness. The Polsby-Popper measure is the isoperimetric ratio comparing a region's area to its perimeter. In the case where the district is a circle, this metric achieves its maximum value of 1. In real-world applications it tends to be much lower. I calculated the Polsby-Popper scores for Congressional Districts in Houston and West Texas and for State House Districts in West Texas, which I present below. For comparison I also calculated the Polsby-Popper scores for all of the enacted Congressional Districts and State House Districts in Texas (C2193 and H2361). The tables below show that the compactness of the districts I propose is well within the usual range for the State of Texas.

Appendix Table 1 reports these scores. The average enacted CD in Texas has a score of .189, with a wide range of values from .038 to .532. My illustrative CDs in Houston have a mean score of .185, and a range from .056 to .369. The three proposed CDs in West Texas range from .222 to .463. Enacted HDs in Texas have an average score of .251, with a range from .070 to .608. The proposed HDs in West Texas have a mean of .319, and a narrower range from.163 to .480. The proposed districts in these three areas have values of compactness that are within the usual distribution of values in Texas.

Appendix Table 1. Polsby-Popper scores for CDs and HDs					
38 Enacted CDs			**150 enacted HDs**		
Mean	0.189		**Mean**	0.251	
Minimum	0.038		**Minimum**	0.070	
Maximum	0.532		**Maximum**	0.608	
Proposed CDs in Houston			**Proposed HDs in West Texas**		
18'	0.056		**74'**	0.163	
10'	0.072		**81'**	0.171	
29'	0.083		**77'**	0.265	
17'	0.137		**79'**	0.365	
38'	0.138		**78'**	0.467	
7'	0.142		**75'**	0.480	
2'	0.150		**Mean**	0.319	
8'	0.203				
22'	0.232				
9'	0.252				
36'	0.275				
14'	0.297				
27'	0.369				
Mean	0.185				
Proposed CDs in West Texas					
20'	0.138				
23'	0.222				
16'	0.463				
Mean	0.275				