



# UTAH STATE LEGISLATURE

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Utah State Senate  
Utah House of Representatives

February 13, 2020  
Dr. Steven Dillingham  
Director, U.S. Census Bureau  
4600 Silver Hill Road  
Washington, DC 20233

RE: Differential Privacy

Dr. Dillingham,

As state leaders, we appreciate the bureau's commitment to protect sensitive data, such as marital status, gender, racial, and ethnic information, which we agree should be protected. We not only commend the bureau's disclosure avoidance strategies, but we also appreciate the bureau's effort to provide a complete and accurate enumeration for redistricting purposes.

Our staff have performed an analysis using the 2010 Demonstration Data Products to determine the effects that differential privacy may have on Utah's future use of census data.

As we compared the demonstration file with the 2010 redistricting data, we were surprised to observe the actual number of census blocks in which populations were altered. In broad terms, our analysis indicates three concerns.

First, we observe a statewide net loss of nearly 15,000 people from our cities and towns. Two cities, for example, experienced more than a 50% population loss. Twenty cities experienced more than a 20% loss, 43 cities experienced more than a 10% loss, and one city experienced a 217% gain in population. With deviations this large, we are concerned for the efficacy of redistricting of local city council districts. Additionally, we are currently assessing how this net loss will impact state and federal funding that is disbursed in compliance with state revenue sharing statutes and federally mandated population formulas.

Second, we are concerned about the efficacy of future academic and professional policy analyses that we use to inform our public policy choices. We observe that the population loss in our cities and towns are re-allocated to unincorporated, rural areas of the state. Not only will this alter basic demographic information in both rural and urban areas of the state, but it may also adversely affect longitudinal studies about health, safety, and welfare. In essence, as legislators, we will be less confident in any conclusions derived from census data.

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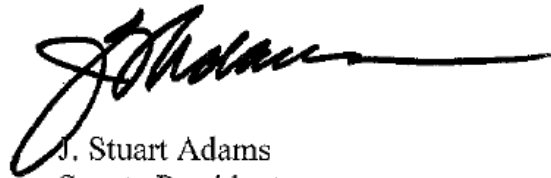
Finally, with respect to redistricting, we notice larger population shifts than expected, particularly within legislative house districts. Consequently, we fear that differential privacy will require the states to legally defend whether differential privacy protected census data will satisfy the states' constitutional obligation to meet population and equality requirements.

Based upon our analysis of differential privacy as applied to the 2010 census redistricting data, we believe, if differential privacy is applied to the 2020 redistricting data, that the integrity of the data used to redistrict the state into congressional and legislative districts, and also within our local jurisdictions, will be threatened.

It is therefore our recommendation that the bureau increase its efforts to hold the census block population data invariant.



Brad R. Wilson  
Speaker of the House  
Utah House of Representatives



J. Stuart Adams  
Senate President  
Utah State Senate

CC: James Whitehorne, Chief – Census Redistricting & Voting Rights Data Office – U.S. Census Bureau



# Differential Privacy

Overview | February 2020

**Differential Privacy** is a term used by the U.S. Census Bureau to describe a privacy technique that scrambles census data at the census block level in order to protect the personally identifiable information of census respondents. Although the Census Bureau has used privacy techniques since 1970, it has never used a privacy technique that alters data as much as differential privacy.

## U.S. Census Bureau

In addition to conducting a complete and accurate enumeration of the United States every 10 years, the Census Bureau is also required by federal law to keep all personally identifiable information collected during the census, such as age, race, gender, marital status, etc., confidential.

## Privacy Techniques Cracked

Using other public data sets, complex algorithms, and super computers, big data miners are now able to reconstruct personally identifiable information from the census data.

## New Privacy Strategy

During the 2020 census, the Census Bureau intends to implement differential privacy for the first time. The Census Bureau reports that this technique is mathematically proven to protect personally identifiable information.

## Privacy v. Accuracy

The more privacy the Census Bureau protects, the less accurate the enumeration becomes.

Inaccurate data creates three concerns:

- State and local redistricting will be based on incorrect census block data;
- Distribution of federal monies may not reflect the actual population of the recipient municipalities;
- Academics, professional researchers, and policy analysts will make future policy recommendations regarding the health, safety, and welfare of individuals and the economy on inaccurate information.

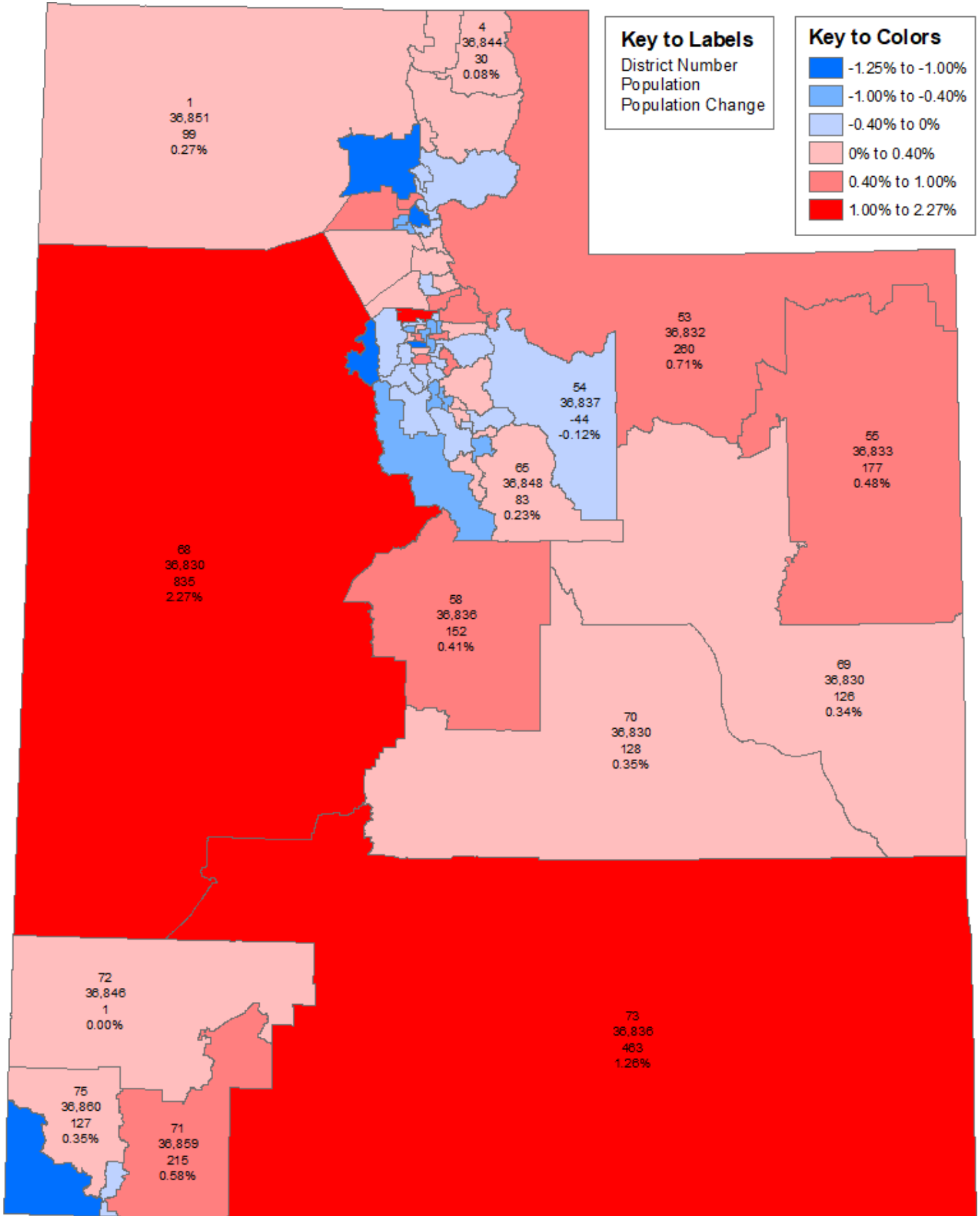
## Demonstration Data

In November 2019, the Census Bureau released demonstration products that allow data users to apply differential privacy to the 2010 census data. Using the demonstration products, we created the following maps and tables that demonstrate how differential privacy would have affected the 2010 census data. Although the demonstration does not predict future variances, it does show that differential privacy affects smaller units of geography, such as house districts, more than it does senate and congressional districts and it affects cities and towns more than it does counties. Moreover, we notice that differential privacy undercounts the population in urban areas and over counts the population in rural areas. Finally, municipalities experience a net loss of 14,718 under differential privacy.

## Comment Period

The Census Bureau is seeking input from data users regarding the impact differential privacy may have on those who use census data and products.

## House Districts



## House Districts

District	Population	Population Change Using Differential Privacy (Sorted by Percentage)	
		Number	Percentage
11	36,871	-462	-1.25%
29	36,853	-394	-1.07%
43	36,857	-386	-1.05%
74	36,874	-382	-1.04%
21	36,832	-372	-1.01%
40	36,855	-265	-0.72%
6	36,851	-264	-0.72%
56	36,852	-254	-0.69%
30	36,858	-235	-0.64%
64	36,846	-215	-0.58%
13	36,859	-193	-0.52%
44	36,847	-184	-0.50%
67	36,859	-175	-0.47%
14	36,873	-166	-0.45%
34	36,851	-159	-0.43%
35	36,860	-155	-0.42%
45	36,856	-146	-0.40%
51	36,853	-143	-0.39%
46	36,854	-143	-0.39%
52	36,841	-135	-0.37%
25	36,856	-119	-0.32%
60	36,851	-117	-0.32%
22	36,862	-112	-0.30%
10	36,870	-98	-0.27%
62	36,839	-91	-0.25%
48	36,842	-80	-0.22%
42	36,857	-75	-0.20%
32	36,839	-74	-0.20%
31	36,852	-71	-0.19%
41	36,844	-67	-0.18%
54	36,837	-44	-0.12%
20	36,855	-35	-0.09%
7	36,855	-24	-0.07%
8	36,867	-19	-0.05%
2	36,847	-18	-0.05%
16	36,850	-13	-0.04%
61	36,853	-3	-0.01%
72	36,846	1	0.00%

Key to Colors	
<span style="color: blue;">■</span>	-1.25% to -1.00%
<span style="color: lightblue;">■</span>	-1.00% to -0.40%
<span style="color: lightblue;">■</span>	-0.40% to 0%
<span style="color: pink;">■</span>	0% to 0.40%
<span style="color: red;">■</span>	0.40% to 1.00%
<span style="color: red;">■</span>	1.00% to 2.27%

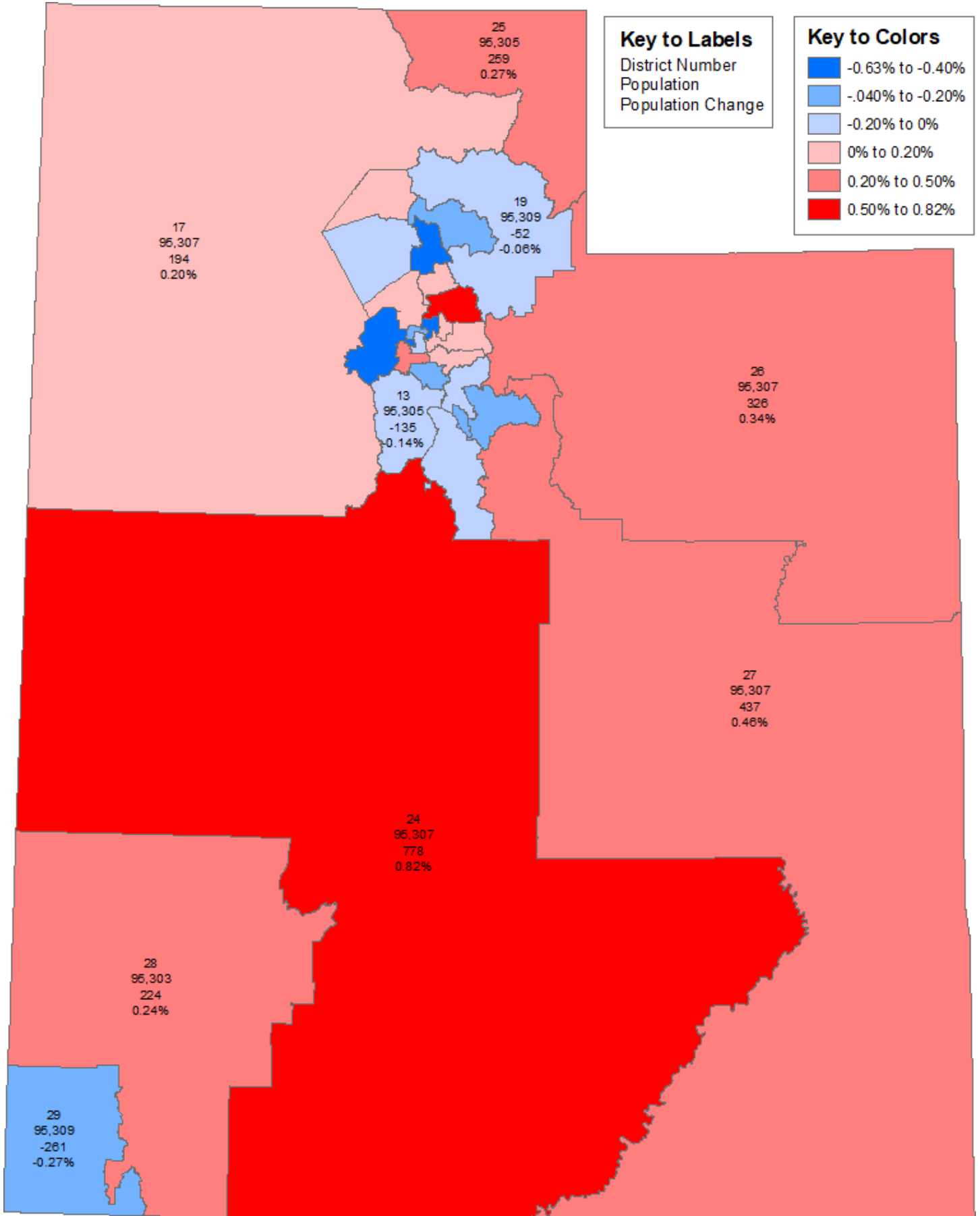
## House Districts

36	36,843	3	0.01%
59	36,844	12	0.03%
19	36,874	14	0.04%
17	36,871	22	0.06%
33	36,845	22	0.06%
66	36,857	25	0.07%
63	36,855	26	0.07%
4	36,844	30	0.08%
47	36,851	34	0.09%
3	36,852	51	0.14%
5	36,876	55	0.15%
23	36,855	59	0.16%
15	36,852	67	0.18%
38	36,847	70	0.19%
18	36,852	71	0.19%
65	36,848	83	0.23%
1	36,851	99	0.27%
27	36,857	125	0.34%
69	36,830	126	0.34%
75	36,860	127	0.34%
70	36,830	128	0.35%
57	36,854	137	0.37%
58	36,836	152	0.41%
55	36,833	177	0.48%
39	36,859	182	0.49%
28	36,864	207	0.56%
71	36,859	215	0.58%
24	36,852	227	0.62%
12	36,876	236	0.64%
9	36,845	239	0.65%
49	36,856	247	0.67%
53	36,832	260	0.71%
50	36,844	265	0.72%
37	36,841	360	0.98%
26	36,850	436	1.18%
73	36,836	463	1.26%
68	36,830	835	2.27%

### Key to Colors

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<span style="color: pink;">■</span>	0% to 0.40%
<span style="color: red;">■</span>	0.40% to 1.00%
<span style="color: darkred;">■</span>	1.00% to 2.27%

## Senate Districts

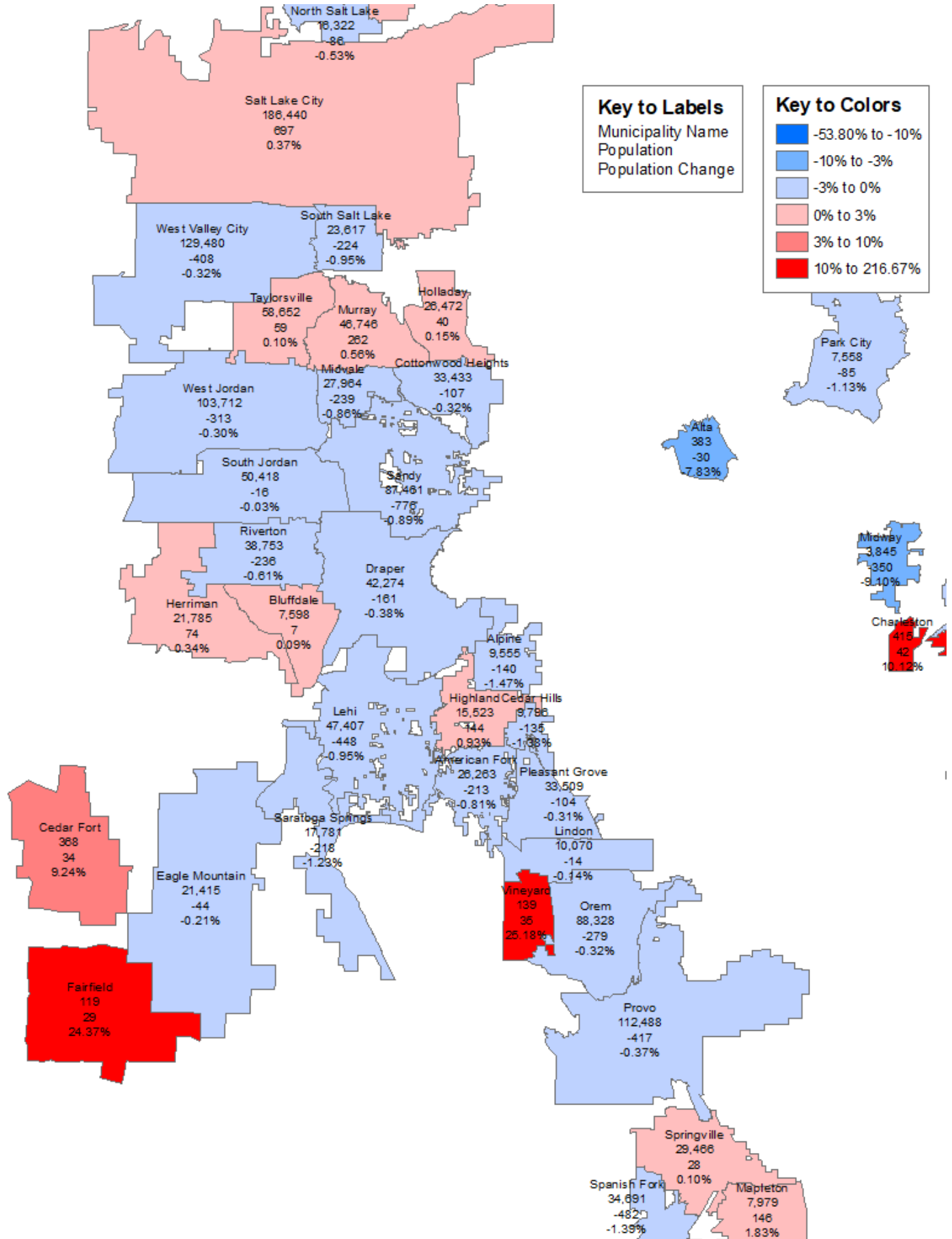


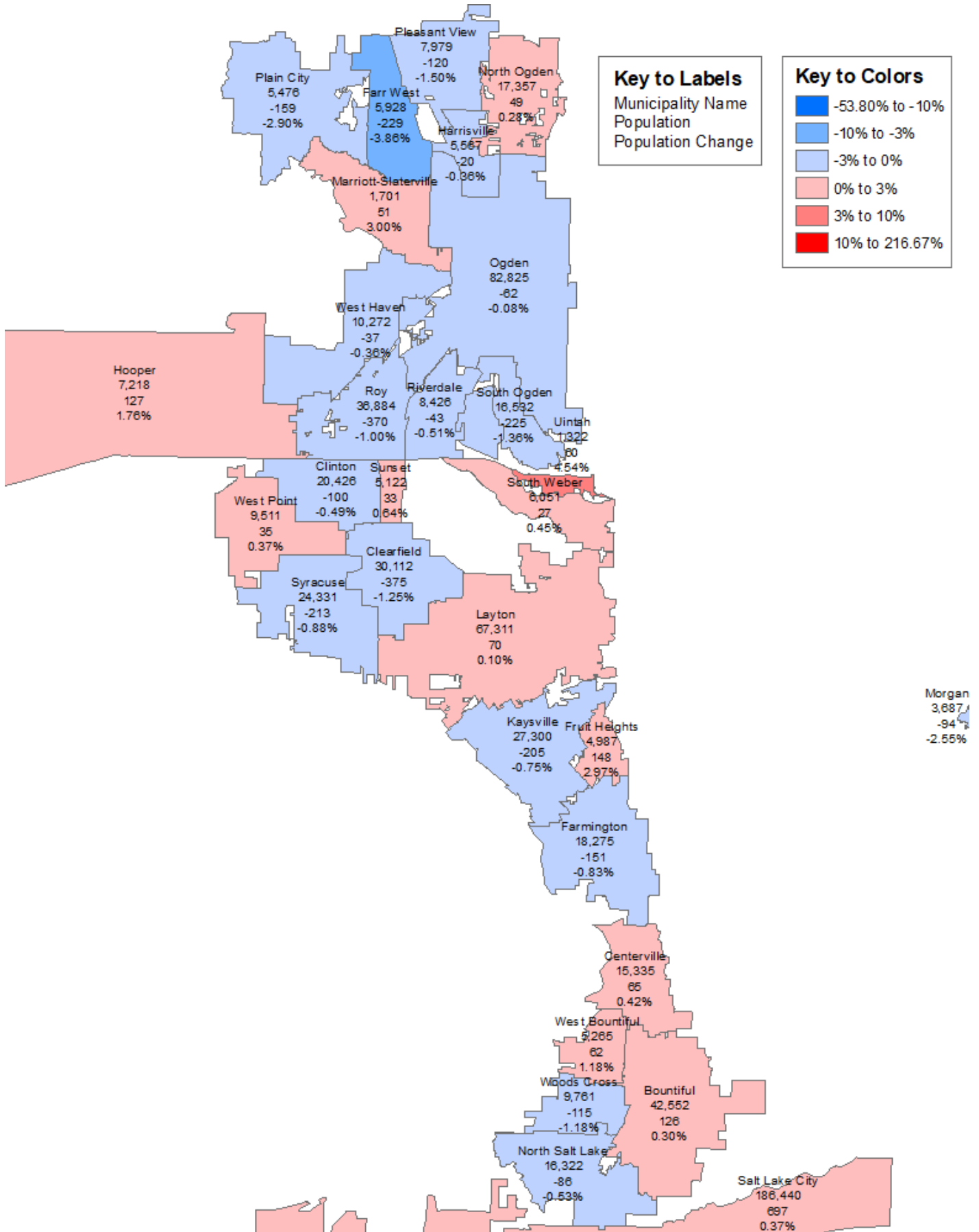
District	Population	Population Change Using Differential Privacy (Sorted by Percentage)	
		Number	Percentage
12	95,304	-605	-0.63%
3	95,304	-597	-0.63%
22	95,305	-552	-0.58%
11	95,306	-339	-0.36%
16	95,306	-280	-0.29%
5	95,307	-278	-0.29%
15	95,306	-266	-0.28%
29	95,309	-261	-0.27%
18	95,307	-205	-0.22%
21	95,306	-182	-0.19%
13	95,305	-135	-0.14%
6	95,306	-91	-0.10%
19	95,309	-52	-0.05%
14	95,309	-47	-0.05%
7	95,306	-18	-0.02%
8	95,309	1	0.00%
4	95,308	28	0.03%
1	95,304	119	0.12%
9	95,306	149	0.16%
23	95,307	158	0.17%
20	95,304	173	0.18%
17	95,307	194	0.20%
28	95,303	224	0.24%
25	95,305	259	0.27%
26	95,307	326	0.34%
27	95,307	437	0.46%
10	95,308	457	0.48%
2	95,308	605	0.63%
24	95,307	778	0.82%

Key to Colors	
<span style="background-color: #0070C0; width: 15px; height: 10px; display: inline-block;"></span>	-0.63% to -0.40%
<span style="background-color: #4472C4; width: 15px; height: 10px; display: inline-block;"></span>	-0.40% to -0.20%
<span style="background-color: #7091C8; width: 15px; height: 10px; display: inline-block;"></span>	-0.20% to 0%
<span style="background-color: #F4912F; width: 15px; height: 10px; display: inline-block;"></span>	0% to 0.20%
<span style="background-color: #C0504D; width: 15px; height: 10px; display: inline-block;"></span>	0.20% to 0.50%
<span style="background-color: #E06666; width: 15px; height: 10px; display: inline-block;"></span>	0.50% to 0.82%



## Select Municipalities





## Municipalities







Municipality	Population	Population Change Using Differential Privacy (Sorted by Percentage)	
		Number	Percentage
Tabiona	171	-92	-53.80%
Alton	119	-60	-50.42%
Kingston	173	-82	-47.40%
Henrieville	230	-101	-43.91%
Bryce Canyon City	198	-86	-43.43%
Clawson	163	-66	-40.49%
Hatch	133	-50	-37.59%
Brian Head	83	-29	-34.94%
Snowville	167	-56	-33.53%
Manila	310	-93	-30.00%
Sigurd	429	-118	-27.51%
Hanksville	219	-60	-27.40%
Fayette	242	-66	-27.27%
Meadow	310	-82	-26.45%
Bicknell	327	-80	-24.46%
Rockville	245	-56	-22.86%
Oak City	578	-132	-22.84%
Goshen	921	-190	-20.63%
Rush Valley	447	-92	-20.58%
Altamont	225	-45	-20.00%
Spring City	988	-192	-19.43%
Amalga	488	-88	-18.03%
Redmond	730	-130	-17.81%
Laketown	248	-40	-16.13%
Loa	572	-92	-16.08%
Francis	1,077	-172	-15.97%
Bear River City	853	-135	-15.83%
Hideout	656	-103	-15.70%
Joseph	344	-52	-15.12%
Kanosh	474	-69	-14.56%
Springdale	529	-75	-14.18%
New Harmony	207	-27	-13.04%
Enterprise	1,711	-219	-12.80%
Levan	841	-105	-12.49%
Escalante	797	-97	-12.17%
Fairview	1,247	-151	-12.11%

### Key to Colors

<span style="color: blue;">■</span>	-53.80% to -10%
<span style="color: lightblue;">■</span>	-10% to -3%
<span style="color: lightblue;">■</span>	-3% to 0%
<span style="color: pink;">■</span>	0% to 3%
<span style="color: red;">■</span>	3% to 10%
<span style="color: red;">■</span>	10% to 216.67%

## Municipalities

Cleveland	464	-55	-11.85%
Sterling	262	-31	-11.83%
Randolph	464	-52	-11.21%
Vernon	243	-27	-11.11%
Orangeville	1,470	-151	-10.27%
Plymouth	414	-42	-10.14%
Tropic	530	-53	-10.00%
Virgin	596	-59	-9.90%
Castle Valley	319	-31	-9.72%
Holden	378	-35	-9.26%
Midway	3,845	-350	-9.10%
East Carbon	1,301	-118	-9.07%
Woodland Hills	1,344	-121	-9.00%
Ferron	1,626	-146	-8.98%
Circleville	547	-48	-8.78%
Cornish	288	-24	-8.33%
Alta	383	-30	-7.83%
Mona	1,547	-116	-7.50%
Clarkston	666	-47	-7.06%
Fountain Green	1,071	-75	-7.00%
Elk Ridge	2,436	-165	-6.77%
Newton	789	-53	-6.72%
Myton	569	-38	-6.68%
Orderville	577	-37	-6.41%
Mayfield	496	-31	-6.25%
Fielding	455	-28	-6.15%
Howell	245	-15	-6.12%
Manti	3,276	-192	-5.86%
Moroni	1,423	-82	-5.76%
Hinckley	696	-39	-5.60%
Ballard	801	-40	-4.99%
Toquerville	1,370	-68	-4.96%
Independence	164	-8	-4.88%
Mount Pleasant	3,260	-159	-4.88%
Green River	952	-44	-4.62%
Kanab	4,312	-197	-4.57%
Nibley	5,438	-232	-4.27%
Monticello	1,972	-83	-4.21%
Lewiston	1,766	-70	-3.96%
Gunnison	3,285	-128	-3.90%
Farr West	5,928	-229	-3.86%
Fillmore	2,435	-94	-3.86%
Willard	1,772	-65	-3.67%

Key to Colors	
	-53.80% to -10%
	-10% to -3%
	-3% to 0%
	0% to 3%
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	10% to 216.67%

## Municipalities

Garland	2,400	-84	-3.50%
Coalville	1,363	-46	-3.37%
Honeyville	1,441	-48	-3.33%
Naples	1,755	-58	-3.30%
Smithfield	9,495	-310	-3.26%
Kamas	1,811	-59	-3.26%
Glenwood	464	-15	-3.23%
Elsinore	847	-27	-3.19%
Moab	5,046	-160	-3.17%
Plain City	5,476	-159	-2.90%
Minersville	907	-24	-2.65%
Payson	18,294	-484	-2.65%
Morgan	3,687	-94	-2.55%
Eureka	669	-17	-2.54%
Aurora	1,016	-25	-2.46%
Ephraim	6,135	-143	-2.33%
Cedar City	28,857	-667	-2.31%
Beaver	3,112	-67	-2.15%
Henefer	766	-16	-2.09%
Wellington	1,676	-35	-2.09%
Portage	245	-5	-2.04%
Castle Dale	1,630	-33	-2.02%
Price	8,715	-175	-2.01%
Centerfield	1,367	-27	-1.98%
Ivins	6,753	-133	-1.97%
Huntington	2,129	-41	-1.93%
Oakley	1,470	-28	-1.90%
Paragonah	488	-9	-1.84%
Deweyville	332	-6	-1.81%
Garden City	562	-10	-1.78%
Duchesne	1,690	-30	-1.78%
Salina	2,489	-44	-1.77%
Pleasant View	7,979	-120	-1.50%
Santa Clara	6,003	-90	-1.50%
Alpine	9,555	-140	-1.47%
Spanish Fork	34,691	-482	-1.39%
Roosevelt	6,046	-84	-1.39%
Cedar Hills	9,796	-135	-1.38%
Monroe	2,256	-31	-1.37%
South Ogden	16,532	-225	-1.36%
North Logan	8,269	-107	-1.29%
Tremonton	7,647	-97	-1.27%
Clearfield	30,112	-375	-1.25%

### Key to Colors

<span style="color: blue;">■</span>	-53.80% to -10%
<span style="color: lightblue;">■</span>	-10% to -3%
<span style="color: lightgrey;">■</span>	-3% to 0%
<span style="color: pink;">■</span>	0% to 3%
<span style="color: red;">■</span>	3% to 10%
<span style="color: darkred;">■</span>	10% to 216.67%

## Municipalities

Saratoga Springs	17,781	-218	-1.23%
Marysville	408	-5	-1.23%
Enoch	5,803	-69	-1.19%
Heber	11,362	-134	-1.18%
Woods Cross	9,761	-115	-1.18%
Mendon	1,282	-15	-1.17%
Brigham City	17,899	-206	-1.15%
Kanarrville	355	-4	-1.13%
Park City	7,558	-85	-1.12%
Perry	4,512	-46	-1.02%
Roy	36,884	-370	-1.00%
Apple Valley	701	-7	-1.00%
South Salt Lake	23,617	-224	-0.95%
Lehi	47,407	-448	-0.95%
Wendover	1,400	-13	-0.93%
Providence	7,075	-64	-0.90%
Hyrum	7,609	-68	-0.89%
Sandy	87,461	-776	-0.89%
Syracuse	24,331	-213	-0.88%
Midvale	27,964	-239	-0.85%
La Verkin	4,060	-34	-0.84%
Farmington	18,275	-151	-0.83%
American Fork	26,263	-213	-0.81%
Kaysville	27,300	-205	-0.75%
Richfield	7,551	-56	-0.74%
Leeds	820	-5	-0.61%
Riverton	38,753	-236	-0.61%
Hildale	2,726	-16	-0.59%
Richmond	2,470	-14	-0.57%
Tooele	31,605	-174	-0.55%
North Salt Lake	16,322	-86	-0.53%
Riverdale	8,426	-43	-0.51%
Clinton	20,426	-100	-0.49%
Draper	42,274	-161	-0.38%
Provo	112,488	-417	-0.37%
West Haven	10,272	-37	-0.36%
Harrisville	5,567	-20	-0.36%
Washington Terrace	9,067	-31	-0.34%
Hurricane	13,748	-46	-0.33%
Cottonwood Heights	33,433	-107	-0.32%
Orem	88,328	-279	-0.32%
West Valley City	129,480	-408	-0.32%
Pleasant Grove	33,509	-104	-0.31%

### Key to Colors

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<span style="color: red;">■</span>	3% to 10%
<span style="color: red;">■</span>	10% to 216.67%

## Municipalities

West Jordan	103,712	-313	-0.30%
Logan	48,174	-117	-0.24%
Eagle Mountain	21,415	-44	-0.21%
Parowan	2,790	-4	-0.14%
Lindon	10,070	-14	-0.14%
St. George	72,897	-88	-0.12%
Blanding	3,375	-3	-0.09%
Ogden	82,825	-62	-0.07%
South Jordan	50,418	-16	-0.03%
Paradise	904	0	0.00%
Bluffdale	7,598	7	0.09%
Springville	29,466	28	0.10%
Taylorsville	58,652	59	0.10%
Layton	67,311	70	0.10%
Holladay	26,472	40	0.15%
Hyde Park	3,833	8	0.21%
North Ogden	17,357	49	0.28%
Bountiful	42,552	126	0.30%
Herriman	21,785	74	0.34%
Washington	18,761	64	0.34%
Wellsville	3,432	12	0.35%
Santaquin	9,128	32	0.35%
West Point	9,511	35	0.37%
Salt Lake City	186,440	697	0.37%
Annabella	795	3	0.38%
Big Water	475	2	0.42%
Centerville	15,335	65	0.42%
South Weber	6,051	27	0.45%
Murray	46,746	262	0.56%
Genola	1,370	8	0.58%
Vernal	9,089	54	0.59%
Milford	1,409	9	0.64%
Sunset	5,122	33	0.64%
Nephi	5,389	41	0.76%
Panguitch	1,520	12	0.79%
Huntsville	608	5	0.82%
Leamington	226	2	0.88%
Highland	15,523	144	0.93%
West Bountiful	5,265	62	1.18%
Grantsville	8,893	108	1.21%
Salem	6,423	79	1.23%
Helper	2,201	28	1.27%
River Heights	1,734	27	1.56%

### Key to Colors

<span style="color: blue;">■</span>	-53.80% to -10%
<span style="color: lightblue;">■</span>	-10% to -3%
<span style="color: lightblue;">■</span>	-3% to 0%
<span style="color: pink;">■</span>	0% to 3%
<span style="color: red;">■</span>	3% to 10%
<span style="color: red;">■</span>	10% to 216.67%

## Municipalities

Delta	3,436	54	1.57%
Hooper	7,218	127	1.76%
Mapleton	7,979	146	1.83%
Mantua	687	13	1.89%
Millville	1,829	38	2.08%
Corinne	685	17	2.48%
Elwood	1,034	29	2.80%
Fruit Heights	4,987	148	2.97%
Marriott-Slaterville	1,701	51	3.00%
Uintah	1,322	60	4.54%
Rocky Ridge	733	41	5.59%
Elmo	418	25	5.98%
Cannonville	167	10	5.99%
Glendale	381	23	6.04%
Woodruff	180	11	6.11%
Sunnyside	377	25	6.63%
Lynndyl	106	8	7.55%
Wallsburg	250	23	9.20%
Cedar Fort	368	34	9.24%
Charleston	415	42	10.12%
Daniel	938	99	10.55%
Central Valley	528	57	10.80%
Koosharem	327	46	14.07%
Scipio	327	56	17.13%
Emery	288	52	18.06%
Stockton	616	113	18.34%
Trenton	464	93	20.04%
Wales	302	63	20.86%
Fairfield	119	29	24.37%
Vineyard	139	35	25.18%
Junction	191	49	25.65%
Lyman	258	72	27.91%
Boulder	226	66	29.20%
Antimony	122	54	44.26%
Torrey	182	82	45.05%
Ophir	38	46	121.05%
Scofield	24	52	216.67%

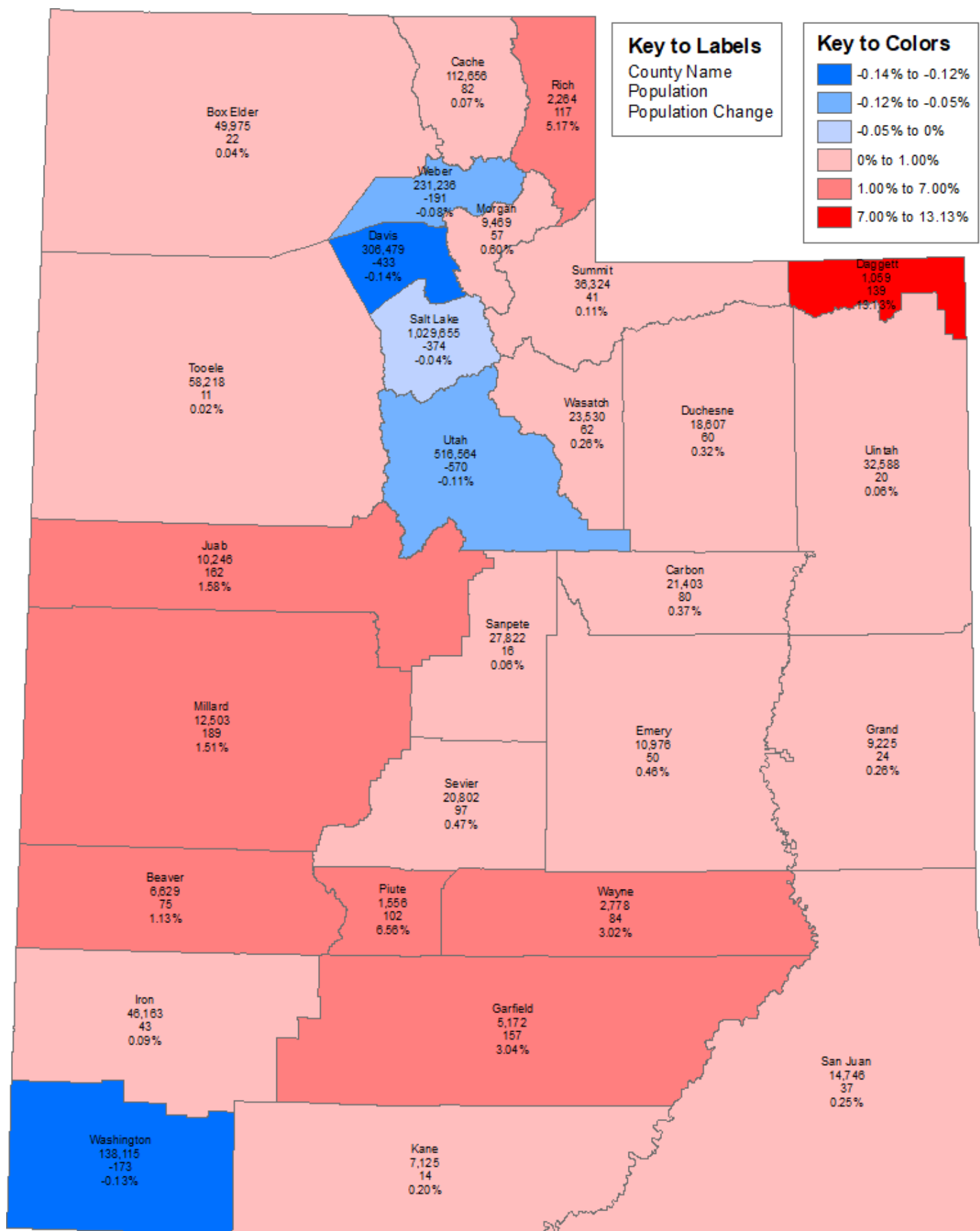
### Key to Colors

<span style="color: blue;">■</span>	-53.80% to -10%
<span style="color: lightblue;">■</span>	-10% to -3%
<span style="color: lightpink;">■</span>	-3% to 0%
<span style="color: pink;">■</span>	0% to 3%
<span style="color: red;">■</span>	3% to 10%
<span style="color: darkred;">■</span>	10% to 216.67%

Net population loss to municipalities -14,718



## Counties

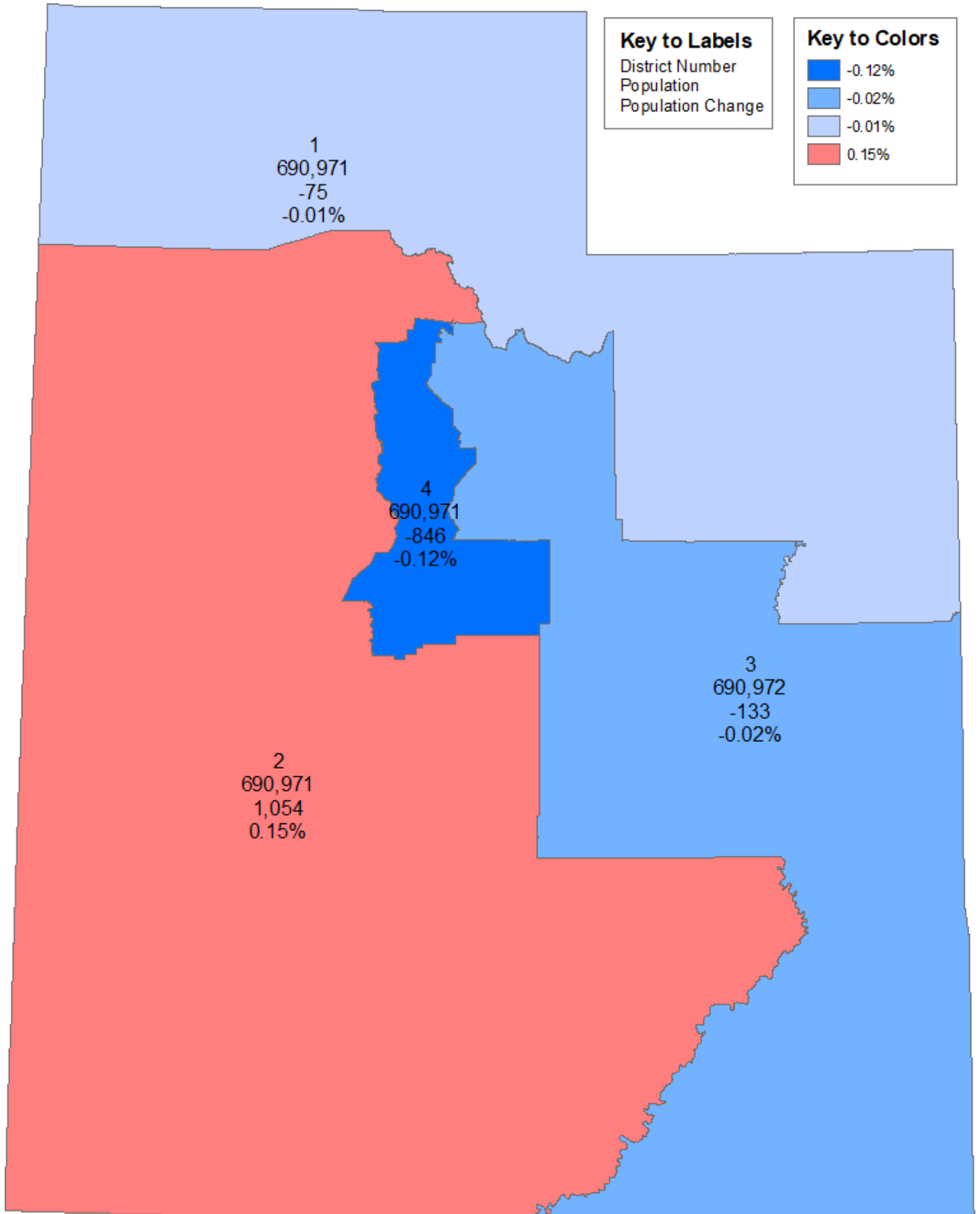


## Counties

County	Population	Population Change Using Differential Privacy (Sorted by Percentage)	
		Number	Percentage
Davis	306,479	-433	-0.14%
Washington	138,115	-173	-0.13%
Utah	516,564	-570	-0.11%
Weber	231,236	-191	-0.08%
Salt Lake	1,029,655	-374	-0.04%
Tooele	58,218	11	0.02%
Box Elder	49,975	22	0.04%
Sanpete	27,822	16	0.06%
Uintah	32,588	20	0.06%
Cache	112,656	82	0.07%
Iron	46,163	43	0.09%
Summit	36,324	41	0.11%
Kane	7,125	14	0.20%
San Juan	14,746	37	0.25%
Grand	9,225	24	0.26%
Wasatch	23,530	62	0.26%
Duchesne	18,607	60	0.32%
Carbon	21,403	80	0.37%
Emery	10,976	50	0.46%
Sevier	20,802	97	0.47%
Morgan	9,469	57	0.60%
Beaver	6,629	75	1.13%
Millard	12,503	189	1.51%
Juab	10,246	162	1.58%
Wayne	2,778	84	3.02%
Garfield	5,172	157	3.04%
Rich	2,264	117	5.17%
Piute	1,556	102	6.56%
Daggett	1,059	139	13.13%





### Key to Colors

<span style="color: blue;">■</span>	-0.14% to -0.12%
<span style="color: lightblue;">■</span>	-0.12% to -0.05%
<span style="color: verylightblue;">■</span>	-0.05% to 0%
<span style="color: pink;">■</span>	0% to 1.00%
<span style="color: red;">■</span>	1.00% to 7.00%
<span style="color: darkred;">■</span>	7.00% to 13.13%



District	Population	Population Change Using Differential Privacy (Sorted by Percentage)	
		Number	Percentage
4	690,971	-846	-0.12%
3	690,972	-133	-0.02%
1	690,971	-75	-0.01%
2	690,971	1054	0.15%

### Key to Colors

	-0.12%
	-0.02%
	-0.01%
	0.15%