

## APPENDIX A

### **Percent Changes in Each of 100 Largest Urbanized Areas (1970-90)**

The "sprawl" in the 4th and 5th columns is the increase in the size of the contiguous developed area of each Urbanized Area from 1970 to 1990, as measured by the Census Bureau. The raw data used to calculate those changes and the ones in the 2nd and 3rd columns can be found in Appendix B.

The "sprawl apportionment" in the 6th and 7th columns is the result of applying the "Holdren method" to the Census data. That method is explained on page 31 and in Appendix D.

Read the table like this (using the first line on Akron as an example): From 1970 to 1990, Akron was **79th** largest in terms of the square miles it sprawled over the surrounding countryside. The population of the Akron Urbanized Area declined by **2.7%** while the average amount of urban land for each resident grew by **29.9%**. These two factors combined to cause the urbanization of **53.6** square miles sprawl of previously rural land. That sprawl amounted to a **26.3%** increase (percent sprawl) in the total land covered by the Akron Area. When considering the two sprawl-inducing factors together, we find that **0%** of the **53.6** square miles of sprawl was related to population growth, while **100%** was related to land-use factors that increased per capita land consumption.

Urbanized Area (number is where city ranks in square miles of sprawl)	Sprawl Factors Percent Growth		Overall Sprawl		Sprawl Apportionment	
	Popu- lation	Per Capita Land Con- sumption	% Growth in Land Area	Square Miles Growth	Population Growth Factor's Portion	Per Capita Land Use Factor's Portion
Akron, OH ( <b>79</b> )	-2.7%	29.9%	26.3%	53.6	0.0%	100.0%
Albany-Schenec-tady- Troy, NY ( <b>75</b> )	4.6%	32.5%	38.7%	58.2	13.9%	86.1%
Albuquerque, NM ( <b>44</b> )	67.1%	18.1%	97.4%	111.4	75.5%	24.5%
Allentown-Bethlehem- Easton, PA ( <b>85</b> )	12.9%	27.8%	44.3%	43.6	33.1%	66.9%
Atlanta, GA ( <b>1</b> )	84.0%	42.0%	161.3%	701.7	63.5%	36.5%
Austin, TX ( <b>23</b> )	112.5%	49.9%	218.4%	187.4	65.1%	34.9%
Bakersfield,CA( <b>87</b> )	71.8%	0.0%	71.9%	41.1	99.9%	0.1%
Baltimore, MD( <b>14</b> )	19.6%	60.0%	91.4%	282.9	27.6%	72.4%
Baton Rouge, LA ( <b>52</b> )	46.7%	49.5%	119.3%	100.9	48.8%	51.2%
Birmingham, AL ( <b>27</b> )	11.5%	59.3%	77.6%	174.2	18.9%	81.1%
Boston, MA ( <b>19</b> )	4.6%	28.2%	34.1%	226.8	15.4%	84.6%
Bridgeport-Milford, CT( <b>99</b> )	0.1%	7.9%	8.0%	11.9	1.6%	98.4%
Buffalo-Niagara Falls, NY ( <b>68</b> )	-12.2%	52.1%	33.6%	71.8	0.0%	100.0%
Charleston, SC( <b>32</b> )	72.5%	46.6%	152.9%	151.7	58.7%	41.3%
Charlotte, NC ( <b>39</b> )	63.0%	40.3%	128.7%	241.7	59.1%	40.9%
Chattanooga, TN-GA ( <b>37</b> )	32.8%	65.7%	120.1%	140.1	36.0%	64.0%
Chicago, IL-NW Indiana ( <b>13</b> )	1.2%	22.6%	24.1%	307.3	5.3%	94.7%
Cincinnati, OH- KY ( <b>25</b> )	9.2%	39.8%	52.7%	176.6	20.8%	79.2%

Urbanized Area (number is where city ranks in square miles of sprawl)	Sprawl Factors Percent Growth		Overall Sprawl		Sprawl Apportionment	
	Popu- lation	Per Capita Land Con- sumption	% Growth in Land Area	Square Miles Growth	Population Growth Factor's Portion	Per Capita Land Use Factor's Portion
Cleveland,OH(100)	-14.4%	15.0%	-1.6%	-10.2	NA	NA
Colorado Springs, CO (60)	72.4%	13.8%	96.2%	86.6	80.8%	19.2%
Columbia, SC (53)	35.8%	41.8%	92.5%	95.6	46.7%	53.3%
Columbus, OH(46)	19.6%	22.9%	47.1%	110.4	46.5%	53.5%
Corpus Christi, TX (96)	26.9%	-5.9%	19.3%	25.2	100.0%	0.0%
Dallas-Fort Worth, TX (7)	58.7%	-15.1%	34.8%	372.4	100.0%	0.0%
Dayton, OH (83)	-10.6%	36.4%	21.9%	49.2	0.0%	100.0%
Denver, CO (29)	44.9%	8.1%	56.7%	166.0	82.6%	17.4%
Des Moines, IA (82)	14.8%	27.5%	46.4%	50.6	36.2%	63.8%
Detroit, MI (18)	-6.9%	37.9%	28.4%	247.4	0.0%	100.0%
El Paso, TX- NM (51)	69.2%	9.1%	84.6%	101.0	63.0%*	37.0%*
Flint, MI (71)	-1.2%	72.1%	69.9%	67.4	0.0%	100.0%
Ft. Lauderdale- Hollywood-Pom-pano, FL (43)	101.7%	-23.6%	54.1%	114.9	100.0%	0.0%
Fresno, CA (80)	72.5%	-2.7%	67.8%	53.6	100.0%	0.0%
Grand Rapids, MI (65)	23.7%	23.4%	52.7%	77.0	50.3%	49.7%
Greenville, SC (64)	58.0%	32.2%	108.9%	77.2	62.1%	37.9%
Harrisburg, PA(69)	21.7%	57.1%	91.1%	71.4	30.3%	69.7%
Hartford-Middle- town,CT (45)	17.5%	57.4%	84.9%	110.8	26.2%	73.8%
Honolulu, HI (97)	43.0%	-15.7%	20.6%	23.7	100.0%	0.0%
Houston, TX (2)	72.9%	26.4%	118.6%	638.7	70.1%	29.9%
Indianapolis,IN(59)	11.5%	10.3%	23.0%	87.7	52.7%	47.3%
Jackson, MS (35)	52.2%	97.4%	200.4%	144.7	38.2%	61.8%
Jacksonville, FL (31)	39.4%	3.6%	44.5%	156.4	90.3%	9.7%
Kansas City, MO-KS (15)	15.7%	33.4%	54.5%	268.6	33.6%	66.4%
Knoxville, TN (40)	59.8%	59.0%	154.1%	132.7	50.3%	49.7%
Lansing-E.Lansing, MI (95)	15.5%	16.4%	34.5%	25.3	48.7%	51.3%
Las Vegas, NV(47)	194.6%	-35.3%	90.7%	109.9	100.0%	0.0%
Little Rock-North Little Rock,AR(50)	37.2%	52.4%	109.0%	103.9	42.9%	57.1%
Los Angeles,CA(6)	36.5%	-8.4%	25.1%	393.8	100.0%	0.0%
Louisville, KY- IN (67)	2.1%	31.5%	34.3%	72.2	7.1%	92.9%
McAllen,Edinburg- Mission, TX (56)	188.8%	31.6%	280.1%	91.6	79.4%	20.6%
Memphis, TN (34)	24.3%	40.4%	74.4%	145.5	39.1%	60.9%
Miami-Hialeah, FL (54)	57.0%	-13.2%	36.3%	94.0	100.0%	0.0%
Milwaukee,WI(76)	-2.1%	14.6%	12.2%	55.5	0.0%	100.0%

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Minneapolis-Saint Paul, MN (10)	22.0%	20.8%	47.4%	341.6	51.3%	48.7%
Mobile, AL (74)	16.7%	16.5%	35.9%	60.5	50.4%	49.6%
Nashville, TN (38)	27.8%	10.1%	40.8%	140.0	71.8%	28.2%
New Haven-Meriden, CT (62)	29.6%	35.0%	74.9%	80.4	46.4%	53.6%
New Orleans, LA (61)	8.2%	35.7%	46.8%	86.1	20.4%	79.6%
New York City-N.E. New Jersey(3)	-1.0%	23.6%	22.3%	541.3	0.0%	100.0%
Norfolk-Virginia Beach-Newport News, VA (20)	41.3%	6.2%	50.1%	221.4	85.1%	14.9%
Ogden, UT (55)	73.1%	44.8%	150.7%	91.9	59.7%	40.3%
Oklahoma City, OK (12)	35.3%	41.0%	90.7%	307.7	46.8%	53.2%
Omaha, NE-IA(86)	10.7%	15.3%	27.6%	41.8	41.6%	58.4%
Orlando, FL (17)	190.4%	3.2%	199.6%	262.9	97.2%	2.8%
Oxnard-Ventura, CA (84)	96.4%	-28.3%	40.9%	45.6	100.0%	0.0%
Pensacola, FL (58)	52.2%	53.7%	133.9%	88.9	49.4%	50.6%
Philadelphia,PA(5)	5.0%	47.5%	54.9%	412.4	11.2%	88.8%
Phoenix, AZ (9)	132.4%	-17.7%	91.3%	353.6	92.0%*	8.0%*
Pittsburgh, PA (24)	-9.1%	43.5%	30.5%	181.7	0.0%	100.0%
Portland-Vancouver, OR-WA (42)	42.1%	2.4%	45.4%	121.2	93.8%	6.2%
Providence- Pawtucket, RI-MA (77)	6.4%	15.0%	22.4%	54.6	30.8%	69.2%
Raleigh, NC (48)	100.9%	24.2%	149.5%	105.4	76.3%	23.7%
Richmond, VA(30)	41.6%	47.8%	109.3%	158.1	47.1%	52.9%
Riverside-San Bernardino, CA (33)	100.5%	-25.9%	48.6%	150.4	100.0%	0.0%
Rochester, NY (66)	3.0%	46.5%	51.0%	74.3	7.3%	92.7%
Sacramento, CA (57)	73.1%	-21.0%	36.7%	89.7	100.0%	0.0%
St. Louis, MO-IL (16)	3.4%	52.9%	58.1%	267.6	7.3%	92.7%
Salt Lake City, UT (70)	64.7%	-16.3%	37.9%	69.8	100.0%	0.0%
San Antonio, TX (21)	46.2%	34.4%	96.5%	215.1	56.2%	43.8%
San Diego, CA (11)	96.0%	-7.5%	81.3%	309.5	100.0%	0.0%
San Francisco-Oakland, CA (22)	21.5%	5.7%	28.4%	193.1	77.9%	22.1%
San Jose, CA (73)	40.0%	-12.8%	22.1%	61.2	100.0%	0.0%
Scranton-Wilkes-Barre, PA (98)	-9.1%	22.4%	11.3%	20.4	0.0%	100.0%
Seattle, WA (26)	40.9%	1.0%	42.3%	174.8	97.1%	2.9%
Shreveport, LA (81)	9.3%	42.1%	55.4%	52.2	20.3%	79.7%
Spokane, WA (91)	21.5%	20.2%	46.0%	35.8	51.5%	48.5%

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Springfield, MA-CT (72)	3.6%	22.6%	27.0%	64.1	14.8%	85.2%
Stockton, CA (94)	63.4%	-3.5%	57.7%	27.0	84.0%*	16.0%*
Syracuse, NY (90)	3.4%	34.3%	38.9%	37.4	10.1%	89.9%
Tacoma, WA (49)	49.5%	21.0%	80.5%	104.1	67.9%	32.1%
Tampa- St. Petersburg- Clearwater, FL (8)	97.8%	12.9%	123.3%	358.7	84.9%	15.1%
Toledo,OH-MI(93)	0.3%	16.5%	16.9%	27.9	1.8%	98.2%
Trenton, NJ-PA (92)	8.9%	34.5%	46.5%	30.4	22.4%	77.6%
Tucson, AZ (36)	96.9%	19.6%	135.4%	141.8	79.1%	20.9%
Tulsa, OK (41)	27.8%	32.3%	69.0%	124.3	46.7%	53.3%
Washington, DC-MD- VA (4)	35.5%	40.9%	91.0%	450.1	47.0%	53.0%
West Palm Beach-Boca Raton,FL(28)	176.4%	-18.7%	124.8%	170.2	100.0%	0.0%
Wilmington, DE-NJ- MD-PA (63)	21.1%	41.2%	71.0%	78.0	35.7%	64.3%
Wichita, KS (88)	12.1%	22.7%	37.5%	39.4	35.8%	64.2%
Worcester, MA- CT (78)	27.6%	28.8%	64.3%	54.3	49.0%	51.0%
Youngstown-Warren, OH (89)	-8.6%	42.3%	30.1%	38.7	0.0%	100.0%
<b>Total Sprawl</b>				<b>14,545. 2</b>		
<b>Average Urbanized Area (mean)**</b>	<b>41.7%</b>	<b>23.5%</b>	<b>69.6%</b>	<b>145.5</b>	<b>51.3%</b>	<b>48.7%</b>
<b>Aggregate average***</b>	<b>23.6%</b>	<b>22.6%</b>	<b>51.5%</b>		<b>50.9%</b>	<b>49.1%</b>

\* Adjusted: see Appendix F for explanation

\*\* Mean of the percentages in the column

\*\*\* Raw data on land and population for all cities are calculated together