

## Population Growth and Sprawl in the Chesapeake Bay Watershed

Does a growing population contribute to urban sprawl? The relationship between population growth and sprawl appears obvious to some but is denied or minimized by just as many. What has been lacking is a systematic, comprehensive, consistent means of quantifying the role of population growth in sprawl in recent decades. A national study by NumbersUSA, “Weighing Sprawl Factors in Large U.S. Cities” does just that.

Dozens of factors contribute to sprawl, from federal highway subsidies to the pursuit of more affordable housing and better public schools. All but one of these, population growth, have the net effect of increasing the amount of land consumption per resident, that is, of decreasing density.

The amount of land taken up by a city, town, or any urbanized area is the simple product of the number of residents times the amount of land consumed per resident, as shown in the following equation:

$$A = P \times a$$

**Where:**  $A$  = Area of urbanized/developed land in acres or square miles

$P$  = Population of the urban/suburban area

$a$  = urbanized land per person (i.e. the inverse of density, which is number of people per unit area of land)

One means of measuring the amount of sprawl then is the increase in ‘A’ over time. Fortunately, it is easy to measure the amount of overall sprawl because of a painstaking process conducted by the U.S. Bureau of the Census for a half-century.

*Weighing Sprawl Factors in Large U.S. Cities* and the figures below rely solely on Census data on Urbanized Areas of the United States to measure Overall Sprawl. The Census Bureau uses a rather complicated but consistent set of conditions to measure the spread of cities into surrounding rural land. The Bureau calls the contiguous developed land of the central city and its suburbs an “Urbanized Area.”

The relationship between population growth and sprawl can be quantified by comparing rates of change in population and urbanized land area over the same period of time. The table on the next page makes this comparison for nine urbanized areas the Census Bureau has identified in the Chesapeake Bay Watershed Area. Population growth and increased

per capita land consumption have played almost equal roles in the loss of some 1200 square miles of rural land in the Chesapeake Bay Watershed Area. According to U.S. Bureau of the Census data, increased per capita land consumption was associated with about 55% of the sprawl in the Watershed and population growth was associated with about 45% of the sprawl, although there is great variation among the different Urbanized Areas of the Chesapeake Bay Watershed.

The Chesapeake Bay Watershed is home to more than 3,000 species of plants and animals, and nearly 15 million people today. The restoration and long-term protection of the Bay depends on halting the urban sprawl that is threatening the biodiversity and water quality of the area.

## Chesapeake Bay Watershed Urbanized Areas – Table 1

Urbanized Area	Sprawl in Square Miles		% of Total Sprawl related to POPULATION GROWTH was	% of Total Sprawl related to GROWTH IN PER CAPITA LAND CONSUMPTION was
	1970-1990	1980-1990		
Baltimore, MD	282.9		28%	72%
Hagerstown, MD-PA-WV		4.8	47%	53%
Harrisburg, PA	71.4		30%	70%
Lynchburg, VA	65.7		32%	68%
Norfolk-Virginia Beach, VA <sup>1</sup>	221.4		85%	15%
Petersburg, VA	24.4		6%	94%
Richmond, VA	158.1		47%	53%
Scranton-Wilkes-Barre, PA <sup>2</sup>	20.4		0%	100%
Washington, DC-MD-VA <sup>3</sup>	450.1		47%	53%
<b>TOTALS</b>	<b>1,299.2</b>		<b>45%</b>	<b>55%</b>

*Data sources: 1970 Census of Population, Volume 1 – Characteristics of the Population, Part 1 – United States Summary, Table 20 – Population and Land Area of Urbanized Areas, 1970 and 1960 (issued June, 1973); 1980 Census of Population, Number of Inhabitants, United States Summary, Table 34 – Population, Land Area, and Population Density of Urbanized Areas: 1980; 1990 Census of Population and Housing, Summary Population and Housing Characteristics, United States, Table 8 – Land Area and Population Density: 1990.*

<sup>1</sup> Includes Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach.

<sup>2</sup> Prior to 1980, Scranton and Wilkes-Barre were separate Urbanized Areas.

<sup>3</sup> Includes District of Columbia, Maryland and Virginia suburbs, and Arlington CDP (Census Designated Place).

**Note: In the Scranton-Wilkes-Barre Urbanized Area, the actual percentages for shares to Population Growth and Growth in Per Capita Land Consumption were –89% and 189%, respectively.**

**Chesapeake Bay Watershed Urbanized Areas – Table 2**

Urbanized Area	% Growth in Land Area		% Growth in Population	
	1970-1990	1980-1990	1970-1990	1980-1990
Baltimore, MD	91%		20%	
Hagerstown, MD-PA-WV		13%		6%
Harrisburg, PA	91%		22%	
Lynchburg, VA	177%		39%	
Norfolk-Virginia Beach, VA <sup>1</sup>	50%		41%	
Petersburg, VA	58%		3%	
Richmond, VA	109%		42%	
Scranton-Wilkes-Barre, PA <sup>2</sup>	11%		- 9%	
Washington, DC-MD-VA <sup>3</sup>	91%		36%	

<sup>1</sup> Includes Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach.

<sup>2</sup> Prior to 1980, Scranton and Wilkes-Barre were separate Urbanized Areas.

<sup>3</sup> Includes District of Columbia, Maryland and Virginia suburbs, and Arlington CDP (Census Designated Place).

### Chesapeake Bay Watershed Urbanized Areas – Table 3

<b>1970-1990 Chesapeake Bay Urbanized Areas Raw Data</b>						
Population, per capita land use and total land area from 1970 and 1990 U.S. Census Bureau reports						
<b>Urbanized Area</b>	<b>1970 Population</b>	<b>1990 Population</b>	<b>1970 Per Capita Land Use (acres/person)</b>	<b>1990 Per Capita Land Use (acres/person)</b>	<b>1970 Total Land Area (sq. miles)</b>	<b>1990 Total Land Area (sq. miles)</b>
Baltimore	1,579,781	1,889,873	0.1254	0.2006	309.6	592.5
Harrisburg	240,751	292,904	0.2084	0.3273	78.4	149.8
Lynchburg	70,842	98,138	0.3361	0.6711	37.2	102.9
Norfolk - Virginia Beach	936,522	1,323,098	0.3023	0.3210	442.3	663.7
Richmond	416,563	589,980	0.2222	0.3284	144.6	302.7
Scranton – Wilkes-Barre	427,035	388,225	0.2711	0.3318	180.9	201.3
Washington, DC/MD/VA	2,481,489	3,363,031	0.1275	0.1797	494.5	944.6

<b>1980-1990 Chesapeake Bay Urbanized Areas Raw Data</b>						
Population, per capita land use and total land area from 1970 and 1990 U.S. Census Bureau reports						
<b>Urbanized Area</b>	<b>1980 Population</b>	<b>1990 Population</b>	<b>1980 Per Capita Land Use (acres/person)</b>	<b>1990 Per Capita Land Use (acres/person)</b>	<b>1980 Total Land Area (sq. miles)</b>	<b>1990 Total Land Area (sq. miles)</b>
Hagerstown	66,277	70,206	0.3573	0.3811	37.0	41.8

*Sources same as in other tables.*