Exurban Settlement Pattern and the Exurban Condition: A Typology of US Metropolitan Areas

Paper prepared for the 53rd Annual North American Meetings of the Regional Science Association, Toronto, Ontario, November 16, 2006

Authors:

Jill K. Clark, Department of Geography, Ohio State University
Darla K. Munroe, Department of Geography, Ohio State University
Elena G. Irwin, Department of Agricultural, Environmental and Development Economics, Ohio State University

Abstract:

Exurbia is a settlement form that is receiving increased attention in both academia and the popular press. Researchers have developed an understanding of the magnitude of this settlement pattern; we turn our focus to the spatial pattern or configuration of this development. How can we characterize the spatial imprint of exurbia? Do metropolitan exurban footprints vary significantly across U.S. regions? Are there notable associations between variations in exurban pattern and characteristics of metropolitan areas? To answer these questions, we first identify and measure exurban areas across all metropolitan areas of the U.S. using a spatially explicit population database developed by Oakridge Laboratory (LandScan raster data with an average cell size of approximately 0.67 square km). We quantify variations in exurban settlement patterns across U.S. metropolitan statistical areas (MSAs) using spatial measures that capture the size, shape, and relative location of exurban development. We find that metropolitan exurban patterns are indeed heterogeneous, with some types following regional trends and others not. Third, we develop a typology of exurbia by MSA using a cluster analysis that groups metropolitan exurban areas by their spatial pattern. Using this typology, we profile eight MSAs that are representative of the different exurban patterns. Results reveal significant associations between exurban pattern characteristics and socio-economic and locational characteristics of MSAs, including average household income, commuting time, and jurisdictional fragmentation. The findings indicate that exurbia is functional component of the urban system. And these findings suggest that exurban development patterns may follow one of several possible trajectories of change over time. However, substantial heterogeneity across exurban regions also exists, suggesting that local conditions matter in determining regional outcomes and that exurban areas are unlikely to converge to a homogeneous extended urban form. Finally, when examining exurbia, there are regional trends, but when we examine the physical pattern or configuration of exurbia, correlations between exurban development and regions disappear

Introduction

Exurbia is a settlement form that is receiving increased attention in both academia (Brown, Johnson, Loveland and Theobald 2005) and the popular press because of its rapid growth and pervasiveness. Exurbia grew nearly sevenfold in transitional metropolitan counties between 1950 and 2000 and nearly tenfold in the counties adjacent to metropolitan areas (Brown et al. 2005). Urbanization is outstripping population growth, resulting in people using more land per person (Fulton, Pendall et al. 2001). As US urban areas decentralize and the majority of the growth occurs at the edge (Berube and Forman 2002), exurbia is created. Exurbia, therefore, is part of the urban system in the US. It is part of the urban-rural continuum, perhaps as a separate type or perhaps as suburbs of the suburbs. Regardless, it does have a relationship in the dynamics of the urban system, and the interaction of the system's core and periphery.

A number of approaches to defining exurbia exist. Common themes can be culled from these definitions, including: exurbia as a mix of rural and urban land uses; exurbia as low-density development; exurbia as the commuting zone of a large, urbanized area; exurbia as a settlement form somewhere between the suburbs and truly rural areas; and exurbia as a place of transition (Spectorsky 1955; Patel 1980; Lamb 1983; Morrill 1992; Nelson 1992; Davis, Nelson et al. 1994; Nelson and Sanchez 1997; Audirac 1999; Theobald 2001; Berube 2006). Most commonly, exurbia is conceptualized as a place of transition between urban and rural, located between the suburbs and truly rural areas, and within the commuting zone of a large, urbanized area.

When examining population growth and change across the United States (US), we often parse space into regions such as the rust-belt and the corn-belt, the Southwest and the Northeast, and the like. But does the *pattern* of exurban development follow these typical regional classifications? Although there appears to be some regional trends in decentralization of population (Berube and Forman, 2002), we do not know much about the actual pattern of decentralization across regions or metropolitan areas. Furthermore, the related regional characteristics that may be associated with pattern relative to the gross amount of development, independent of its distribution, remain unclear.

The motivation for this research is simple. The emergence of exurbia as a dominant pattern in the urban system requires us to pay attention to it. The goal of this paper is to provide a better understanding of the variation exurban pattern of US metropolitan statistical areas (MSAs or metro areas) and if metropolitan-level processes are associated with different patterns. Specifically, the objectives are to address the following research questions: Is there variation between the exurban patterns found in US metro areas? If so, which metro areas are most like others and vice versa? What metro-level processes/conditions are associated with exurbia? Our first descriptive exurban paper was presented last year at 52nd Annual North American Meetings of the Regional Science Association, Las Vegas, NV. This paper uses the same exurban definition and pattern classification, and then builds from there to address the questions above[1]. The following sections of this paper cover literature that reviews the metro-level characteristics associated with exurbia, the study area used, methods, findings and discussion, and conclusions.

[1] The 2005 paper by Clark, J., R. McChesney, D. Munroe and E. Irwin entitled "Spatial Characteristics of Exurban Settlement Pattern in the U.S." can be found at: http://exurban.osu.edu/papers.htm#National

Metro-level Characteristics Associated with Exurbia

Metro-level, or urban system-wide, characteristics and processes are often associated with exurban growth, sprawl[2] (a related development) and urban decentralization. The following are the themes of these characteristics that are reviewed in this section: regional population dynamics, economic structure, regional infrastructure and urban form, governance, natural resources, and regional variation. Many of these factors occur in tandem, and can be mutually reinforcing. The purpose is to review likely metro-level conditions that are related to exurbanization and then examine if any of these regional processes are also related to the overall pattern signature of the metro area. Other papers, such as Burchfield et al. (2006), provide a rich literature reviews on the topic.

US population dynamics over the past couple decades has translated into a decentralization of population from our core urban centers. Fulton, Pendall et al. (2001) found that high-density metropolitan areas and those that are growing slowly consume more land for urbanization. Residential choice behavior leads to households with the means to move away from the central city to do so, either as flight from blight or to get a piece of the American Dream, creating declines in the central city. Or, perhaps it is a desire to be near natural amenities, such as climate, topography or water that drives the move (McGranahan 1999; Shumway and Otterstrom 2001). Advances in transportation reduce commuting costs, make it even easier to live further away (Mieszkowski and Mills 1993). Natural evolution theory posed by Mieszkowski and Mills (1993) is fueled by rising incomes. Rising incomes allow people to separate themselves and locate in new communities on the fringe (Brueckner 2000). Brueckner (2000) argues that market failures, which are associated with taking into account the value of open space when it is converted to urban use, lead to decentralization. Another market failure that is not taken into account in residential decision-making is congestion. Increased use of roadways is associated with commuting and other costs of services that are not incorporated into the personal costs of commuting and therefore does not affect residential decision-making (Brueckner, 2000). This is exacerbated by the pervasive development of ring-roads and growth of other automobile oriented infrastructure increases accessibility to outer areas (Burchfield, Overman et al. 2006)

In his famous 1956 article, Tiebout explains how the mobility of homeowners pushes local governments to adjust local policies to achieve the optimal community composition. Collectively, the impact of many "small box" governments making daily decisions regarding land use can result in a more fragmented, decentralized urban system. This can have negative effects that are realized in the urban form (Pendall 1999; Fulton, Pendall et al. 2001; Carruthers 2003; Byun and Esparza 2005). Local governments often have the authority to implement their own growth controls, without consideration of regional dynamics or the effects these land use

[2] It is important to distinguish exurbia from the notion of suburban sprawl. The word "sprawl," despite its popular appeal, is an imprecise term used for different urban forms. "Sprawl" promotes the idea that the development is attached to or extending from something, with amoeba-like arms. In reality, exurbia merely needs to be only loosely within proximity of urban areas so that exurbanites can experience urban benefits when they want to. The pattern of exurban development typically occurs scattered and in traditionally rural areas, regardless, perhaps, of the suburbanization pattern.

tools may have on neighboring jurisdictions (Byun and Esparza 2005). Growth controls lead to a tight housing market and therefore, growth and development spill over from growth-controlled locales to their non-growth controlled neighbors. Therefore, the more political fragmentation in a metropolitan area, the greater the likelihood of spillovers and suburban sprawl (Byun and Esparza 2005). Specifically in regards to land use policy, Pendell (1999) examined land use controls and their impact on sprawl. He found that land use controls such as low-density only zoning and building permit caps affect how land is developed.

In addition to people decentralizing, industry and job dispersal has also been occurring the last two decades (Nelson, Drummond et al. 1995; Gordon, Richardson et al. 1998; Burchfield, Overman et al. 2006). As employment decentralizes, people follow jobs out from the urban center, and more jobs in turn follow the people (Carruthers and Vias 2005). Over a one-third of workers work more than ten miles from traditional central business districts (Glaeser and Kahn 2001). In their 1992 study, Thurston and Yezer found that the suburbanization contributes to the decentralization of the service, transportation, and communication and public utilities sectors. They found that the manufacturing sector does not follow this trend. As people and jobs decentralize, new urban centers develop on the fringe. McMillen and Smith (2003) developed an empirical model of sub-center formation. Sub-centers are places with significantly higher pop than surrounding areas and have an effect on spatial structure (land prices, etc). Sub-center formation impacts urban form. As sub-centers develop, people are able to live further and further from the urban core because the commutershed grows exponentially. Sub-centers, or edge cities, are bustling economic and job centers, and create new and promising markets (Garreau 1994). The number of sub-centers rise with increase population and commuting costs, and result in polycentric urban areas (McMillen and Smith 2003).

Changes in the sectoral makeup of metro economies have led to fundamental changes in urban form. Economic diversification and growth in services in the early 1980s led to a new wave of suburbanization. Agglomeration economies in turn have strong implications for intra-metropolitan location. Growth in advanced services, such as business and financial services and other functions requiring direct contact with clients, contributed to the emergence of a polycentric urban form (Coffey and Schearmur 2001). Aspects of regional infrastructure that accompany these sectoral shifts can also contribute to decentralization. For instance, increases in the use of information technology may lessen the locational advantage of a central business district if it serves as a substitute for face-to-face communication (Gordon and Richardson 1997). The empirical evidence on this point is mixed, however. For example, Sohn et al. (2002) find that limited accessibility of well-equipped information networks exerted an agglomerative effect on firm location at the zipcode level in metropolitan Chicago.

Several authors have studied regional trends in urban decentralization, suburbanization and exurbanization. For instance, Berube and Forman (2002) examined suburbanization across the US. They describe the core cities of the Mid-west to be “hollowing-out,” with growth occurring on the fringe. The South’s fringe grew rapidly in the 1990s, but did not experience the same emptying in the core. The Northeast is land locked and has some downtown neighborhoods growing, while the West generally has growth occurring in all part of the region (core and suburbs). Berube (2006) also examined exurbia in isolation. He found that the South and Midwest are more exurbanized than the Northeast and West. Reviewing maps in the study

by Brown et al (2005) (they do not use the same regional divisions) it appears that the South, eastern portion of the Midwest, and the Northeast have experienced tremendous amounts of exurbanization (as they define it). Fulton, Pendall et al. (2001) focused their study on sprawl and found that the West has most dense metropolitan areas, and the South is growing in population but sprawling as well, but not nearly as bad as the Northeast and Midwest (which have older metropolitan areas). Otterstrom (2001) also describes the West as the most concentrated in 1990s. He describes the East South Central region as the most dispersed. Glaeser and Kahn (2001) contend that the South also has the most job sprawl.

Perhaps these trends are a result of the Northeast and Midwest being settled first and having their "frontiers" close (Otterstrom 2001). A significant population dispersion occurred between 1790 and first decade of the 1900s, the years of frontier expansion (Otterstrom 2001). The Northeast and Midwest are now in the "equilibrium seeking stage," while the west is still in urban amplification/rural decline phase (Otterstrom 2001). The South and West are now the major population and growth centers. They are not built-out like the Northeast (Frey 2005).

As mentioned earlier, many of these factors are related to one another. For instance, Glaeser and Kahn (2001) significant relationship between job decentralization and political fragmentation. Also, economic restructuring to service-based industries in the West is related to natural amenities, which in turn are both related to income growth population growth patterns (Shumway and Otterstrom 2001). To what extend do these characteristics follow exurban pattern or vice versa? For this study, we examine the relationship between each metro characteristic and exurban pattern to provide a basis from which to take research related to the exurban footprint and the question of the relationship between function and form.

Study Area

The extent of the study area for this analysis is the lower 48 United States (see Map 1). We are interested in defining the US "exurban field": the areas of the US in which exurban development takes place. We began by defining the outer boundary of the exurban field using the metropolitan statistical areas defined in 2003 by the US Bureau of the Census. There are 356 MSAs in the lower 48 states, comprised of 1,080 counties. MSAs are geographic areas that consist of the county or counties associated with at least one core urbanized area with a population of at least 50,000, plus adjacent counties having a high degree of social and economic integration with the core, as measured through commuting ties with the counties containing the core. Thus, the MSA delineation provides an approximate geographical extent of the commutershed that corresponds to large urbanized areas in the U.S.

To isolate the exurban field within MSAs, we omitted the more densely populated areas. In the U.S., urbanized areas are densely settled areas (typically at least 1,000 people per square mile) with a population of at least 50,000 people. Using Geographic Information Systems (GIS), we remove the urbanized areas from the MSAs. In addition, we omitted non-developable land by removing major water bodies and federal lands (including National Forests, Bureau of Land

Management lands, National Wildlife Refuges, National Parks and Wilderness Areas).[3] The remainder area is the less densely populated area of MAs, what we refer to as the U.S. exurban field. This method of identifying the exurban field delineates the exurban field based on the notion of a potential commutershed, and, it captures those areas that that are dependent on urbanized areas, but are not already urbanized.

Data

With this definition in hand, data from the 2003 LandScan population distribution model, created by the US Department of Energy's Oak Ridge National Laboratory (UT Battelle, LLC, 2005), were used to describe the spatial characteristics of exurban settlement patterns located within the exurban field. The LandScan model estimates worldwide ambient populations at a 30" by 30" resolution (approximately 0.69 square km in the lower 48 states), which is the finest-scale global population data produced to date (Bhaduri, Bright, Coleman & Dobson, 2002). The model spatially allocates population on this grid by assigning a probability coefficient to each cell, which is then applied to census counts. The probability coefficients for each cell are based on factors that contribute to population density, e.g. transportation networks, land cover, slope, and nighttime lights.

We then collected secondary data on the following metro-level characteristics: urbanized area size, average urbanized area population density, exurban road density, percent of workers commuting more than thirty minutes; natural amenity index; average household income; percent of employment within one mile of the central business district (CBD); percent of jobs in professional and management services; percent of jobs in finance, insurance, information and real estate; average agricultural sales per acre; the density of local governments; and, population change between 1990 and 2000.[4]

Methods

This section addresses the methods used to identify exurbia, categorize exurban pattern, cluster metropolitan exurban types, and to examine regional characteristics that are associated with these exurban types. To identify the pattern of exurban settlement using data on population

[3] The spatial data for federal lands, major water bodies, and state, county and urbanized area boundaries were obtained from the National Atlas of the United States of America, US Department of the Interior: http://www.nationalatlas.gov/maplayers.html.

[4] Data on population, urbanized area size, average urbanized area population density, commuting times, and average household income were taken from the 2000 US Population Census (www.census.gov). Data on the road mileage by county were obtained from US Department of Transportation (USDOT) (Office of Highway Policy Information, USDOT, 2005). Employment data for 2000 by zip code were acquired using the Economic Census "Zip Code Business Patterns" (Bureau of the Census, 2000). The central business districts (CBDs) used in this analysis are those that were delineated in the 1982 Economic Census Geographic Reference Manual (Glaeser, Kahn & Chu, 2001). Because this is the most recent data available, only those CBDs in metropolitan areas that existed in 1982 are identified in this study. The 1982 CBDs were attributed to the appropriate 2003 MAs. To calculate the percent of metropolitan employment that is located within one mile of the central business district, an area-weighted assignment was made for zip codes that crossed the one-mile CBD buffer boundary. Data on number of employees is from the 2003 US County Business Patterns (www.census.gov). The amenity index was downloaded from the USDA Economic Research Service website – http://www.ers.usda.gov/Publications/AER781/. Finally, John Carruthers (Carruthers and Ulfarson, 2006) shared his jurisdictional fragmentation data.

density, a classification scheme is necessary. We assigned a density class and settlement type for each cell according to the categorization found in Table 1. While any classification scheme is to some extent ad hoc, the definition for the medium density class used here to quantify exurban settlement patterns generally reflects lot sizes typified by the "hobby farms" that can support houses without sewer connections, in addition to reflecting densities suggested by other researchers (Daniels 1999; Theobald 2001; Wolman, Galster et al. 2005). Maps 2 and 3 provide illustrations of these categories for selected metropolitan exurban regions.

To consider the spatial configuration of individual exurban patches and their spatial relation with other patches, we identified the patch shape, size and contiguity as the three most important attributes of patches in the landscape. First, each exurban density patch was categorized as one of three possible shapes: single cell, linear or clumped. Second, each patch was categorized as either small or large relative to the regional median size, where region refers to one of the four US Bureau of the Census regions (East, South, Midwest and West). Third, contiguity of an exurban patch was measured by whether or not a more dense settlement type is within a two cell distance. This three-by-two-by-two classification scheme results in ten unique shape-size-contiguity combinations that describe the spatial configuration of exurban settlement patches. Figure 4 illustrates the corresponding three by two by two matrix. This matrix also identifies a natural rural-urban continuum of the various combinations from most rural-like exurban development (1) to most suburban-like exurban development (10). This rank ordering is indicated by the arrow in Figure 1.

To develop the metropolitan exurban types, a cluster analysis was conducted. Specifically, a hierarchical clustering was used in SPSS, Average Linkage between Groups, that minimizes variation within groups using standardized variables. (See Figure 2 for a description of SPSS's Average Linkage between Groups.) The natural log of the following variables was used: total area of exurban-density settlement in kilometers; total population of the metropolitan area; percentage of exurban-density settlement in each of the ten pattern types (see Figure 1). In addition, standardization of variables enables all variables to have an equal impact on the computation of distances. Therefore, it is easier to interpret the relative contribution of each variable to the cause of variation between cases. For each metropolitan exurban type, the most characteristic metropolitan area for that pattern is selected by examining differences from the mean pattern.

One-way ANOVA was conducted to identify statistically significant differences among the metropolitan area clusters (F-test significant at .05 level results in rejection of the null hypothesis that means of all groups are equal).

Findings and Discussion

As reported in an earlier paper (Clark, McChesney et al. 2005), the total estimated exurban settlement in the exurban field is 173,291 square kilometers, with the South having the most exurban settlement type at 80,441 square kilometers, then the Midwest at 39,206 square kilometers, the Northeast coming in third with 30,307 square kilometers, and finally the West has the least amount of exurban settlement type. To indicate the extent of exurbia compared to urban areas, the following lists the amount of exurban settlement type divided by urbanized areas

by region: South – 9.69, Midwest – 9.12, Northeast – 8.47 and the West – 7.83. The higher the ratio, the more deconcentrated (in general) the urban system is in form. This follows the general findings of previous research noted above regarding the regional differences in population decentralization. However, the average amount of exurban settlement pattern by metropolitan area is greatest in the Northeast, at 673 square kilometers, followed by the South at 544 square kilometers, the Midwest at 446 square kilometers, and then finally the West at 310 square kilometers. While the South has the most exurban settlement, the Northeast MSAs, on average, have the most exurban settlement. The Midwest has the second highest ratio of exurban to urban settlement. The West follows as expected on all measures.

A key factor we wished to investigate was the evidence for significant regional variations in pattern. Figure 3 illustrates the average exurban settlement type (sq. km.) by exurban pattern by region, using only contiguity and shape pattern qualities for simplicity. (Refer back to Figure 1 for a description of pattern types.) The Northeast region has the most exurban settlement type, followed by the South, the Midwest and finally the West. The Northeast, proportionately has the most contiguous exurban settlement, while proportionately the Midwest has the most isolated exurban pattern. However, testing pattern (a rank-order of the amount of each of the ten patch types) by Census region using a one-way ANOVA indicates that overall that there is no significant difference between all four main US Census regions.

We then attempted to identify commonalities across MSAs according to the pattern of exurban developing. Cluster analysis yielded eight clusters. Eight clusters were chosen for a couple of several reasons. First, the cluster membership at eight was stable. Furthermore, eight clusters was an efficient result. Finally, eight clusters were effective because it captured the largest variation, without introducing too many types.

A listing of all cluster types, with all metropolitan areas is located in Appendix A. The following table (Table 2) shows the type, the number of metropolitan areas in each type, total exurban settlement in each type and the average amount of exurban settlement by metropolitan area. The names of the types were chosen to reflect the pattern group. Two of the categories have low membership. The pattern of these two clusters were distinct from all other clusters and incorporating their few members with another cluster created too much variance in the new combined cluster. Figure 4 illustrates the variation of average exurban settlement pattern by metropolitan in each type. Table 3 provides the results of the ANOVA of metro-level characteristics and the metropolitan exurban types. Finally, Table 4 presents the metro-level characteristics that are statistically significant and their means by type. It is these three tables and one figure that are used to describe each of the types in the following text.

The first type, *Below Average Exurbia, Dispersed, Isolated and Linear* has 44 MSAs, located all across the country (Map 5) and accounts for 9,372 square kilometers. Elizabethtown, KY is the most characteristic of this pattern type. What distinguishes this type the most regarding pattern is that it has the highest average dispersed exurbia. Almost fifty percent the exurban settlement is isolated. This type overall has a lower than average amount of exurbia, and lowest average amount of exurbia by metropolitan. But, this type has a higher than average exurban/urbanized area ratio, meaning that on average, the metropolitan areas in this type have more exurban development given the size of their urbanized areas. This type has the smallest

urbanized areas and the lowest urbanized areas population, shorter commutes on average, the lowest average household income, and lower number of local governments. *Average Exurbia, Dispersed, Isolated and Linear Exurbia* has the second lowest percentage of employment in finance, insurance and real estate and the lowest percentage of professional and management jobs.

Below Average Exurbia – Contiguous exurban type has 27 metro areas as members and accounts for 7,519 square kilometers. Again, these are found across the country, though not as much in the western states (Map 6). Niles-Benton Harbor, MI is the most characteristic metropolitan of this type. This type has lower average amount of exurbia like *Average Exurbia, Dispersed, Isolated and Linear Exurbia*. And like the previous type, it has a higher than average exurban/urbanized area ratio. The general pattern is higher than average clumped, contiguous exurbia. Like the previous type, this type has below average urban area size, population, and population density. It also has below average income and the lowest percentage of employment in finance, insurance and real estate and the second lowest percentage of professional and management jobs. *Below Average Exurbia, Contiguous* has the high percent of jobs within three miles of the central business district. The two major differences between this type and the previous type is that *Below Average Exurbia, Contiguous* has a higher metropolitan population and a more contiguous exurban form.

Next, is the *Average Exurbia, Low Population* type that has 57 metro areas as members. This type is also found across the US like the previous two types, but has more of a coastal presence (see Map 7). Average Exurbia, Low Population covers 12,764 square kilometers and has lower than average exurban settlement per metropolitan at 224 square kilometers. Santa Cruz, CA is the most characteristic of this pattern. This type is most near the national average pattern. It also ranks just below average in most of the regional characteristics, such as income, and employment in professional and management position and finance, insurance and real estate. It has lower population on average and lower urbanized population, which are its main distinctions from the next type.

The next metropolitan exurban type is *Average Exurban Pattern, High Population*, which, as the name indicates is like the previous category, but with three main distinctions, the pattern exhibits more isolated exurban development, it has a much higher metropolitan population, and also a much higher urbanized area population. This type is found across the US, but not as much in the south (Map 8). Having said that, Savannah, GA is the most characteristic of the 71 MSAs that make up this type. This type is also near average pattern, but with a higher amount of total exurbia, higher average exurban settlement per metropolitan area and a much higher urbanized area population, and a higher average number of governments than previous type. *Average Exurban Pattern, High Population* has the highest average population density of urbanized areas of any type. Overall, this type has average population and income.

Nearly Unbound Contiguous Exurbia exurban type has the most members at 104 (Map 9). As such, Nearly Unbound Contiguous Exurbia has the greatest amount of at 74,389 square kilometers. Its average amount of exurban settlement by metropolitan area is high, but still under the *Unbound Contiguous Exurbia* type. Decatur, AL is the most characteristic of this type. The pattern associated with this type is higher than average of clumped contiguous exurbia. This

type has the highest average urban area population and density of local governments. This type is associated with higher than average metropolitan area population and commuting. There is very little employment, relative to the other types, within three miles of the central business district. Second to *Unbound Contiguous Exurbia*, this type has high percentage of jobs in professional and management, and finance, insurance and real estate.

Unbound Contiguous Exurbia has 30 metropolitan areas associated with it, covering 37,038 square kilometers. Worcester, MA is the most characteristics of this type. *Unbound Contiguous Exurbia* has by far the highest average amount of exurbia by metropolitan area. This is one of the three types that demonstrates a regional trend (Map 10). *Unbound Contiguous Exurbia*, as one may expect is concentrated more where we find the most exurban regions of the country, the South and the Northeast. This type is most unlike the average pattern and is dominated by continuous exurbia. This type has the highest 2000 metropolitan population, and the largest urbanized areas. The urbanized areas are so large on average, that the immense amount of exurbanization, when compared to the urbanized areas, is much lower than other categories, with the exurban area/urbanized area ratio at 8.08. These metropolitan areas have the highest commuting and the least amount of jobs within one miles of the central business district. The highest percentage of professional and management jobs and finance, insurance and real estate jobs are found here. It has the highest household income and the second highest number of governments.

The *High Amenities, Low Exurbanization* metropolitan exurban type has sixteen members, with Palm Bay, FL being the most typical of the pattern. This type is one of the two types that showed a regional bias, concentrating in the south (Map 11). This type has the most single and linear settlement pattern, but has the smallest exurban footprint when compared to urbanized area size, at 5.24, and along with that ratio, the second smallest average exurban footprint by metropolitan. As the name indicates, this type has the highest amenity indexes, driven by water and winter temperatures.

The last metropolitan exurban type is *Dispersed, Clumped Exurbia* that has only seven members. The most typical of this pattern is St. Cloud, MN. This type is grouped mostly in the upper north central portion of the country (Map 12). The pattern exhibited by this cluster was sufficiently different from all other clusters to warrant its own type. Almost all of the 3,097 sq. km. of this pattern is clumped, but unlike the *Unbound Contiguous Exurbia*, roughly 35% of the landscape is *isolated* clumps. Overall, this type has low amenities and higher income when compared to other types. It has the lowest percent of employment in professional and management positions. Dispersed Clumped Exurbia has the smaller urbanized areas on average, but the highest exurban/urbanized area ratio, at 19.22, meaning that on average, there is over nineteen times the amount of exurbia than there is urbanized area in these metropolitan areas. Dispersed, Clumped Exurbia has any characteristics that the Below Average Exurbia types have, but aside from shape, it has much lower percentage of jobs close to the CBD and a higher number of local governments.

In reviewing the eight different metropolitan exurban types, a continuum of exurbia emerges to some extent: at one end are more isolated and smaller exurban settlements, while at the other end is a vast a contiguous hyper-exurbia. Six of the eight exurban pattern types

identified here appear to fall along this continuum: *Below Average Exurbia, Dispersed, Isolated and Linear -> Below Average Exurbia, Contiguous Pattern >- Average Exurbia, Low Pop -> Average Exurban Pattern, High Pop -> Nearly Unbound Contiguous Exurbia -> Unbound Contiguous Exurbia*. There are unique footprints associated with two metropolitan area types, *High Amenity, Low Exurbanization* and *Dispersed, Clumped Exurbia,* that do not follow this generalization and therefore warrant further exploration.

Many of the metro-level characteristics are either positively or negatively correlated across the continuum of six exurban patterns (Table 4). For example, we find that XXX. In addition, we find that some aspects of pattern appear to be more related to the metro-level characteristics associated with population deconcentration and urban sprawl. The contiguous patterns are perhaps more suburban, having a greater association with characteristics such as higher population and higher incomes.

Finally, only three of the metropolitan exurban types are geographically clustered in specific Census regions, *Unbound Contiguous Exurbia, High Amenities, Low Exurbanization,* and *Dispersed, Clumped Exurbia,* but only *Dispersed, Clumped Exurbia* is isolated in just one of the US Census regions. One potential explanation as to why *Unbound Contiguous Exurbia* is concentrated in the Northeast is that were settled first and had their "frontiers" closed first, but this would need to be examined further (Otterstrom 2001). *High Amenities, Low Exurbanization* occurs where these amenities are available. We have yet to develop a hypothesis as to why *Dispersed, Clumped Exurbia* is concentrated in the upper Midwest.

Conclusions

Exurbia is not only increasing in size, but it is increasingly a concern of urban, suburban, and exurban communities in a given urban system because of the dynamics that connect these areas. In this paper we examine the configuration of exurbia by metropolitan region and the variation in exurbia from one metropolitan area to the next. We then group together metro areas according to this configuration and explore metro-level characteristics and their association with these groups, or types. Our typology therefore is based on pattern, not process or metropolitan characteristics.

We find that exurbia is a part of the urban system; i.e., that exurban pattern is indicative of intraregional processes. There are clear associations between the type of exurban pattern and metropolitan-level variables that signal urban deconcentration. For example, higher urbanized area population density, higher ratio of exurban land to urbanized land area, and greater economic diversification in the growth in services are all associated with exurban pattern. Furthermore, the exurban footprint is associated with many regional processes known to shape metropolitan area urban form, such as governmental fragmentation, employment decentralization and new economic diversification. These findings demonstrate a correspondence between exurban development patterns and the underlying processes associated with urban systems. As such, it is possible that the type of exurban pattern associated with a particular metro area can change over time and that commonalities across metropolitan areas can change as the functional urban system transforms.

While it appears that six of the eight exurban pattern types represent a continuum of exurbia, it is not necessarily true that this continuum represents a single trajectory over time along which exurban areas evolve. Indeed, our findings suggest multiple possible trajectories that may apply to different types of exurban regions. In particular, regions associated with the exurban pattern types that fall to the far left and far right of Table 4 seem to be fundamentally different from those in the middle, which are more associated with characteristics that are commonly associated with urban deconcentration and urban sprawl. In contrast, the correspondence between the characteristics of these regions and their exurban pattern is not fully explained by traditional suburbanization theories. For example, *Below Average Exurbia, Contiguous Pattern* has one of the highest exurban area/urbanized area ratios at 9.86, but does not rank high in decentralized employment or long commutes.

Clearly other factors are significant contributors to pattern since the correlation of characteristics across exurban pattern types is not perfect. For example, we omit zoning and other growth management policies, which clearly can affect regional exurban patterns.

When we examine the total amount of exurban development, there are regional trends (at least, "region" according to the census definitions), but when we examine the physical pattern or configuration of exurbia, correlations between exurban development and regions disappear. This is telling of the need to go beyond descriptive analysis examining these trends on a region-by-region basis and attempt to compare, contrast and illustrate metropolitan areas that have similar functional form instead. Furthermore, because this paper only provides a descriptive analysis, more research is needed to examine how these functional systems are formed and how they behave.

Acknowledgements

The authors would like to thank John Carruthers for data on jurisdictional fragmentation. The authors would also like to thank Nathaniel Baum-Snow and Matt Kahn who shared the CBD location coordinates. The authors appreciate access to the Department of Energy's Oak Ridge National Laboratory's LandScan database.

References

Audirac, I. (1999). Unsettled views about the fringe: Rural-urban or urban-rural frontiers. Contested Countryside: The Rural Urban Fringe in North America. O. J. F. a. M. B. Lapping. Brookfield, Ashgate: 7-32.

Berube, A. (2006). Finding Exurbia: America's Changing Landscape at the Metropolitan Fringe. Washington DC, The Brookings Institution.

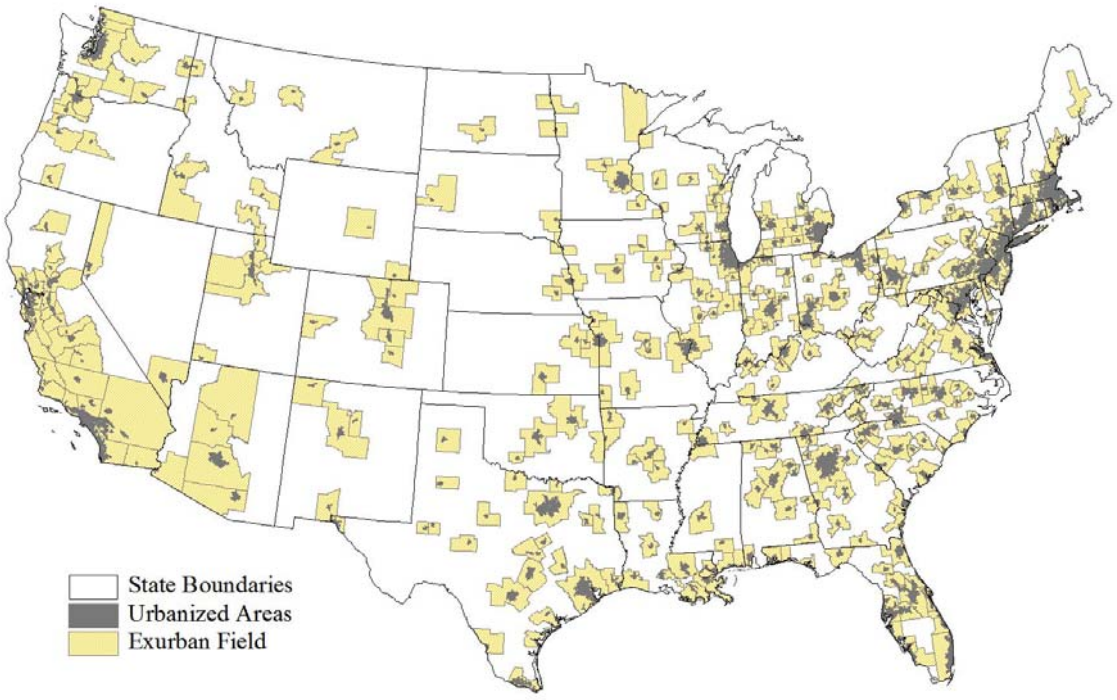
Brueckner, J. K. (2000). "Urban Sprawl: Diagnosis and Remedies." International Regional Science Review 23(2): 160-171.

Burchfield, M., H. G. Overman, D. Puga and M. A. Turner (2006). "Causes of Sprawl: A Portrait from Space." The Quarterly Journal of Economics May: 587-633.

Byun, P. and A. X. Esparza (2005). "A Revisionist Model of Suburbanization and Sprawl: The Role of Political Fragmentation, Growth Control and Spillovers." Journal of Planning Education and Research 24: 252-264.

Carruthers, J. I. (2003). "Growth at the fringe: The influence of political fragmentation in United States metropolitan areas." Papers in Regional Science 82(4): 475-499.
Carruthers, J. I. and A. C. Vias (2005). "Urban, Suburban, and Exurban Sprawl in the Rocky Mountain West: Evidence from Regional Adjustment Models." Journal of Regional Science 45(1): 21-48.
Clark, J. K., R. McChesney, D. K. Munroe and E. G. Irwin (2005). Spatial Characteristics of Exurban Settlement Pattern in the U.S. 52nd Annual North American Meetings of the Regional Science Las Vegas, NV.
Daniels, T. L. (1999). When City and Country Collide : Managing Growth in the Metropolitan Fringe Washington, DC, Island Press.
Davis, J. S., A. C. Nelson and K. J. Dueker (1994). "The New 'Burbs: The Exurbs and Their Implications for Planning Policy." Journal of the American Planning Association 60(1): 45-58.
Frey, W. H. (2005). Metro America in the New Century: Metropolitan and Central City Demographic Shifts Since 2000. The Living Cities Census Series. Washington DC, Metropolitan Policy Program, The Brookings Institution.
Fulton, W., R. Pendall, M. Nguyen and A. Harrison (2001). Who Sprawls the Most? How Growth Patterns Differ Across the U.S. Survey Series. Washington DC, Center on Urban & Metropolitan Policy, The Brookings Institution.
Garreau, J. (1994). "Edge Cities." American Demographics 16(2): 24-33.
Glaeser, E. L. and M. Kahn (2001). Job Sprawl: Employment Location in the U.S. Metropolitan Areas. Survey Series. Washington DC, Center on Urban & Metropolitan Policy.
Gordon, P. and H. Richardson (1997). "Are Compact Cities a Desirable Planning Goal?" Journal of the American Planning Association 63(1): 95-106.
Gordon, P., H. W. Richardson and G. Yu (1998). "Metropolitan and Non-metropolitan Employment Trends in the US: Recent Evidence and Implications." Urban Studies 35(7): 1037-1057.
Lamb, R. F. (1983). "The Extent and Form of Exurban Sprawl." Growth and Change 14(1): 40-48.
McGranahan, D. (1999). Natural Amenities Drive Rural Population Change- AER-781. Washington DC, USDA Economic Research Service.
McMillen, D. P. and S. C. Smith (2003). "The Number of Subcenters in Large Urban Areas." Journal of Urban Economics 53: 321-338.
Mieszkowski, P. and E. S. Mills (1993). "The Causes of Metropolitan Suburbanization." Journal of Economic Perspectives 7(3): 135-147.
Morrill, R. (1992). "Population Redistribution within Metropolitan Regions in the 1980s: Core, Satellite, and Exurban Growth." Growth and Change 23(3): 277-293.
Nelson, A. C. (1992). "Characterizing Exurbia." Journal of Planning Literature 6(4): 350-368.
Nelson, A. C., W. J. Drummond and D. S. Sawicki (1995). "Exurban Industrialization: Implications for Economic Development Policy." Economic Development Quarterly 9(2): 119-133.
Nelson, A. C. and T. W. Sanchez (1997). "Exurban and Suburban Households: A Departure from Traditional Location Theory?" Journal of Housing Research 8(2): 249-276.
Otterstrom, S. M. (2001). "Trends in National and Regional Population Concentration in the United States from 1790 to 1990: From the Frontier to the Urban Transformation." The Social Science Journal 38: 393-407.

Patel, D. I. (1980). Exurbs: Urban Residential Developments in the Countryside. Washington, DC, University Press of America.
Pendall, R. (1999). "Do Land-Use Controls Cause Sprawl?" Environment and Planning B: Planning and Design 26: 555-571.
Shumway, J. M. and S. M. Otterstrom (2001). "Spatial Patterns of Migration and Income Change in the Mountain West: The Dominance of Service-Based, Amenity-Rich Counties." Professional Geographer 53(4): 492-502.
Sohn et al. 2002 Song, Kim and Hewings (2001). Information Technology Impacts on Urban Spatial Structure in the Chicago Region, Geographical Analysis 34(4): 313-29.
Spectorsky, A. C. (1955). The Exurbanites. Philadelphia, Lippincott.
Theobald, D. M. (2001). "Land-use Dynamics Beyond the American Urban Fringe." Geographical Review 91(3): 544-565.
Wolman, H., G. Galster, R. Hanson, M. Ratcliffe, K. Furdell and A. Sarzynski (2005). "The Fundamental Challenge in Measuring Sprawl: Which Land Should Be Considered?" The Professional Geographer 57(1): 94-105.

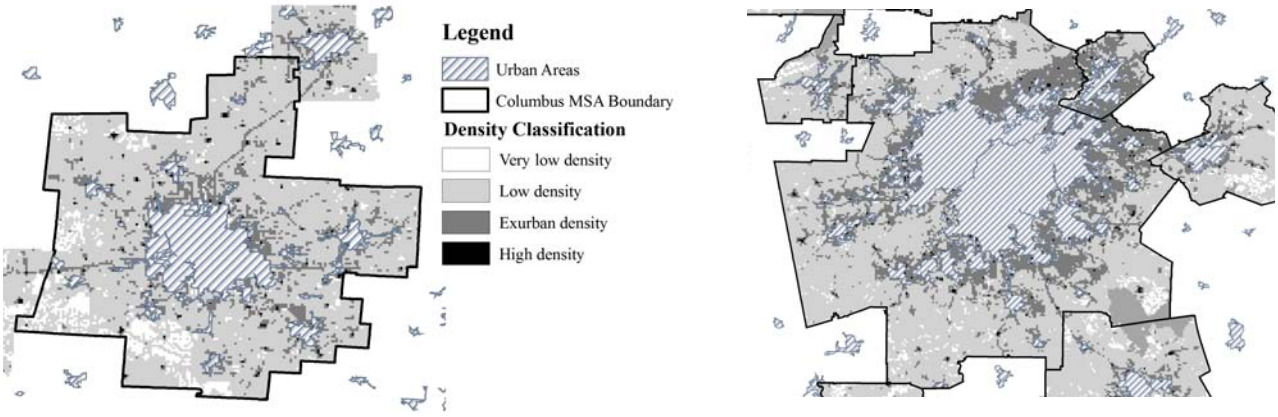


Map 1: Study Areas

Density class	Settlement type	People per square mile	No. of acres per household[a]
Very low	Rural/wilderness	0-10	165 or greater
Low	Rural	10-100	16.5-165
Medium	Exurban	100-1,000	1.6-16.5
High	Suburban/urban	1,000-100,000	1.6 or less

[a] Based on average household size in the U.S.

Table 1. Settlement Type Classification



Maps 2 and 3. Density Patterns, Columbus, Ohio (left) and Atlanta, Georgia (right)

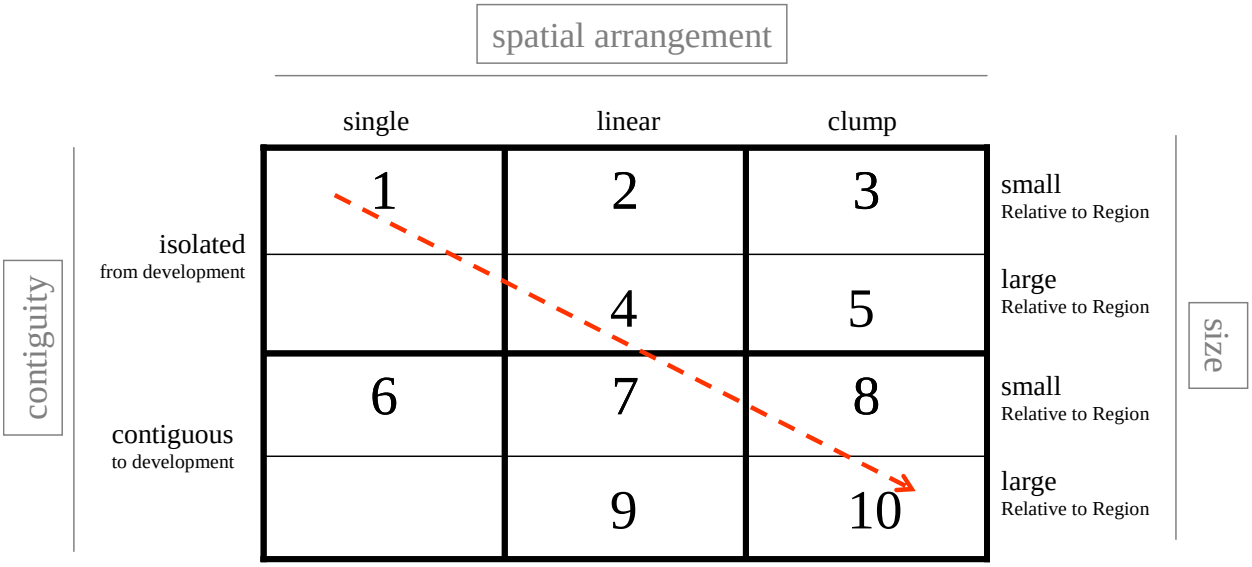


Figure 1. Matrix and Rank Ordering of Spatial Patch Types

Average Linkage within Groups

Before the first merge, let $SUM_i = 0$ and $N_i = 1$ for $i = 1$ to N. Update s_{tr} by

$$s_{tr} = s_{pr} + s_{qr}$$

Update SUM_t and N_t by

$$SUM_t = SUM_p + SUM_q + s_{pq}$$

$$N_t = N_p + N_q$$

and choose the most similar pair based on

$$\frac{SUM_i + SUM_j + s_{ij}}{\left((N_i + N_j)(N_i + N_j - 1)\right)/2}$$

Figure 2. Average Linkage within Groups – SPSS index

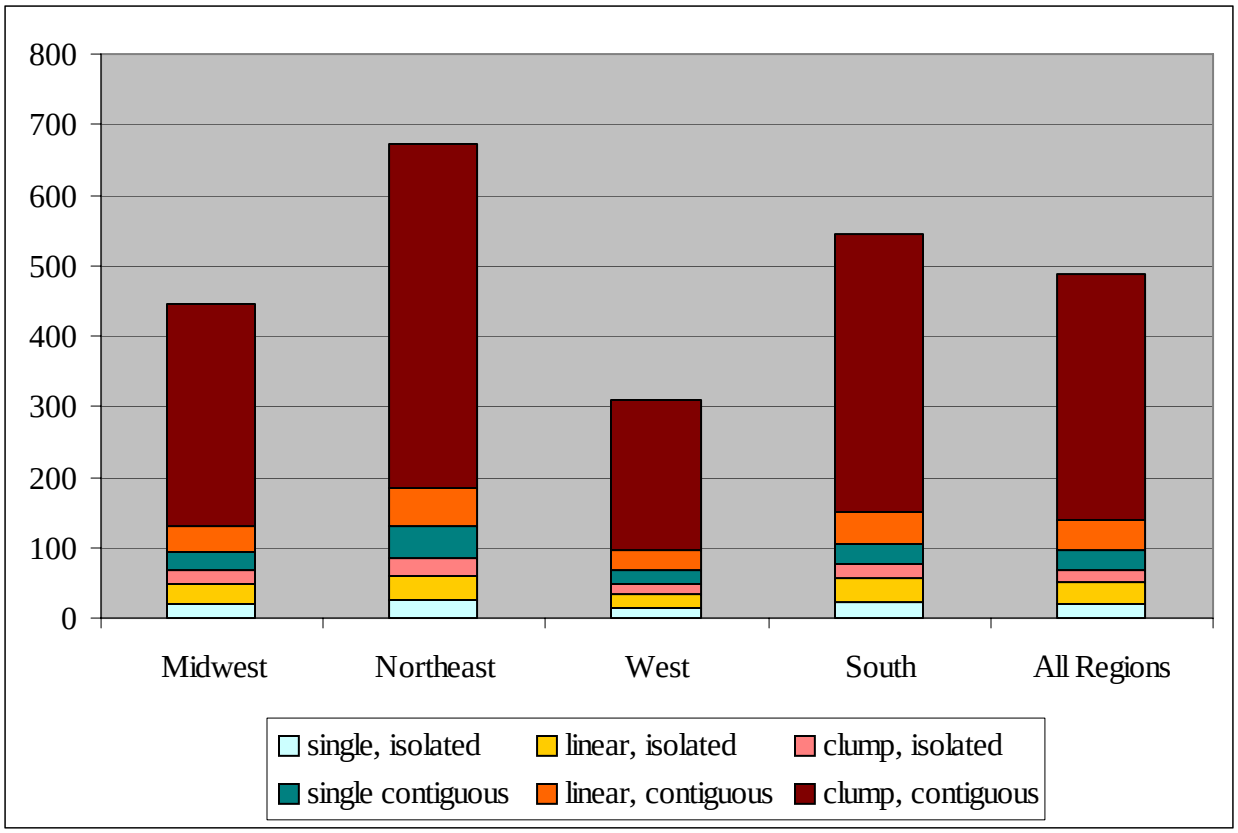


Figure 3. Average Exurban Settlement Type (sq. km.) by Exurban Pattern by Region

Metropolitan Exurban Typology	N	Total Exurban Settlement (sq. km.)	Ave. Exurban Settlement by Metro (sq. km.)
Below Average Exurbia, Dispersed, Isolated and Linear	44	9,372	213
Below Average Exurbia, Contiguous	27	7,519	279
Average Exurban Pattern, High Population	71	25,549	340
Average Exurbia, Low Population	57	12,764	224
Nearly Unbound Contiguous Exurbia	104	74,389	715
Unbound Contiguous Exurbia	30	37,038	1,235
High Amenities, Low Exurbanization	16	3,564	223
Dispersed, Clumped Exurbia	7	3,097	442
Total	356	173,291	487

Table 2. Metropolitan Exurban Typology

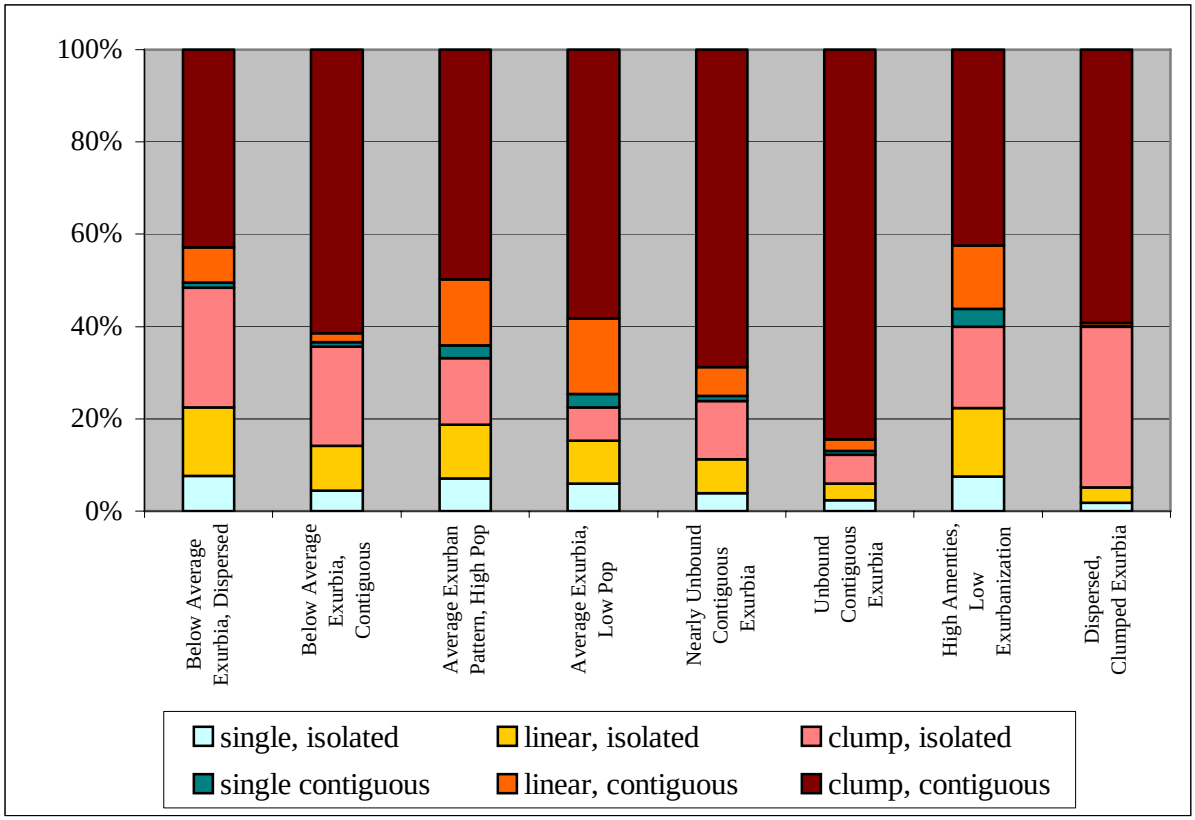


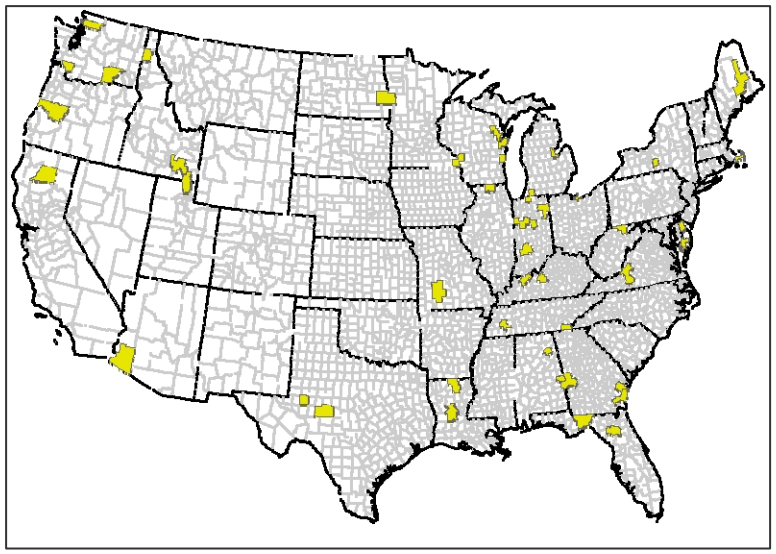
Figure 4. Exurban Pattern by Metropolitan Exurban Type

Regional Characteristics	F-Test	Sign.
four main census regions	1.93	0.06
nine disaggregated regions	2.90	0.01
metropolitan statistical area population, 2000	13.63	0.00
percent population change, 1990-2000	1.64	0.12
urbanized area size, sq. mi.	14.57	0.00
urbanized area density, people/sq. mi.	5.77	0.00
exurban sq mi./urbanized area sq. mi. ratio	4.50	0.00
road density outside of urbanized area, mi./sq. mi.	0.82	0.57
average household income	2.93	0.01
percent employment within 1 mile of the central business district	6.53	0.00
percent with commute greater than 30 minutes	9.56	0.00
percent of total employment in professional and management	6.05	0.00
percent of total employment in finance, insurance, and real estate	2.19	0.03
agricultural sales/acre	1.96	0.06
number of local governments	5.04	0.00
amenity index - January temp	5.21	0.00
amenity index - water	2.15	0.04

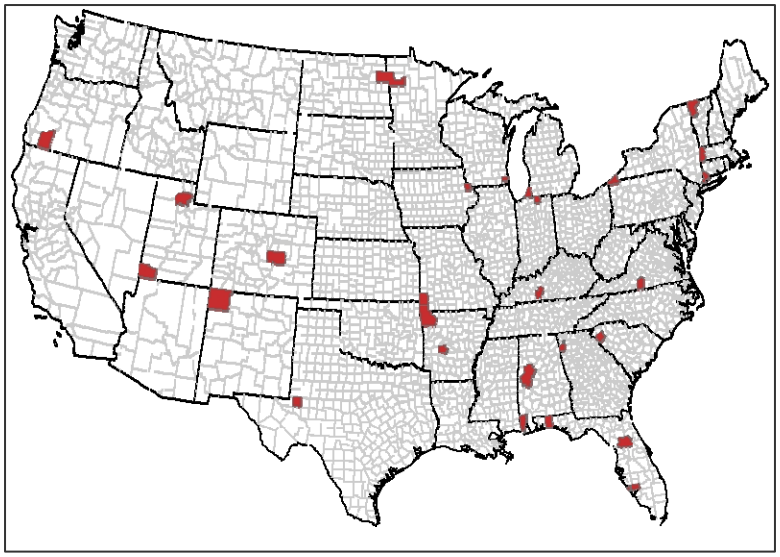
Table 3. ANOVA results - Metro-level Characteristics and Metro Exurban Types

	Below Average Exurbia, Dispersed, Isolated and Below Average Exurbia, Contiguous Pattern	Average Exurbia, Low Pop	Average Exurban Pattern, High Pop	Nearly Unbound Contiguous Exurbia	Unbound Contiguous Exurbia	High Amenties, Low Exurbanization	Dispersed, Clumped Exurbia	Average
metropolitan statistical area population, 2000	167,013	219,652	254,615	768,797	########	1,096,020	261,859	210,572	649,074
urbanized area size, sq. mi.	76	250	212	206	444	830	209	71	314
urbanized area population, 2000	113,960	158,111	180,993	664,206	915,189	894,948	206,850	138,788	542,325
urbanized area density, people/sq. mi.	1,854	1,784	2,202	2,563	2,050	2,009	1,813	2,035	2,117
exurban area/urbanized area ratio	9.57	9.86	8.57	8.32	9.36	8.08	5.24	19.96	9.00
average household income	48,133	50,291	49,785	51,244	52,491	56,063	49,842	52,429	51,284
% employment w/in 1 mi. of the central business district	29.77	30.33	22.80	18.72	15.19	10.75	22.45	18.24	19.22
% with commute greater than 30 minutes	21.62	23.36	24.34	24.06	29.22	30.70	24.20	19.52	25.73
% total employment in professional and management	10.76	10.94	10.69	12.50	13.51	15.16	12.72	9.14	12.34
% total employment in finance, insurance, and real estate	8.22	7.22	8.30	9.23	8.93	9.88	8.77	9.36	8.75
number local governments	35	37	58	85	102	93	49	44	74
amenity index - January temp	-0.48	0.13	0.05	-0.07	-0.04	-0.27	1.00	-0.26	-0.05
amenity index - water	0.42	0.45	0.17	0.23	0.43	0.45	0.89	-0.09	0.36

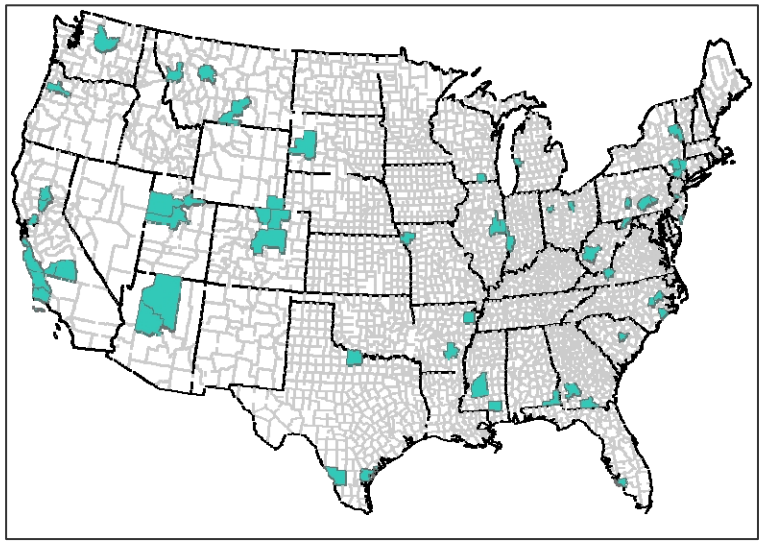
Table 4. Average Regional Characteristics by Metropolitan Area, by Metropolitan Exurban Type



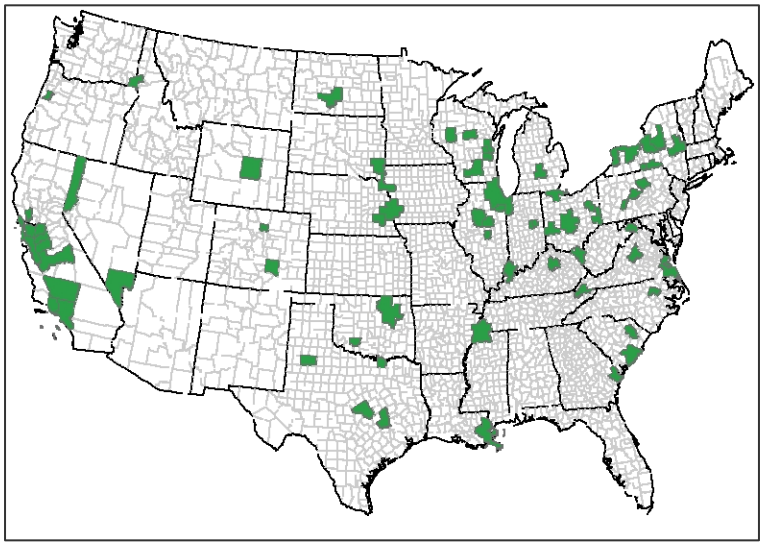
Map 5. *Below Average Exurbia, Dispersed, Isolated and Linear*



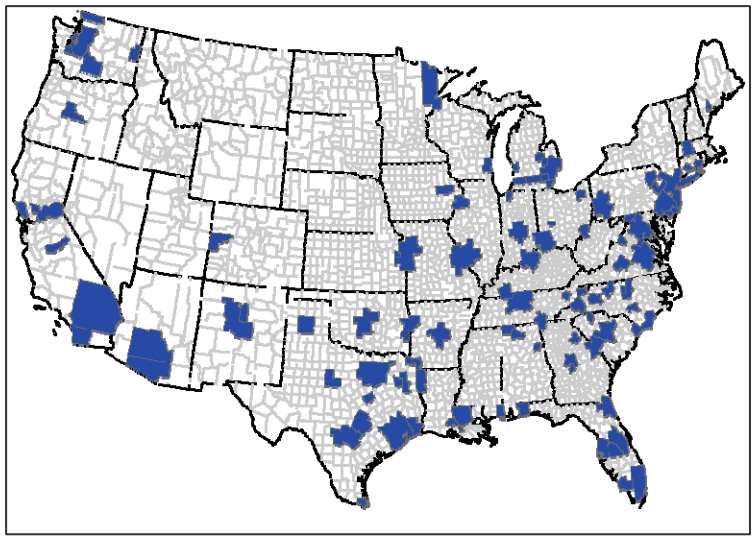
Map 6. *Below Average Exurbia – Contiguous*



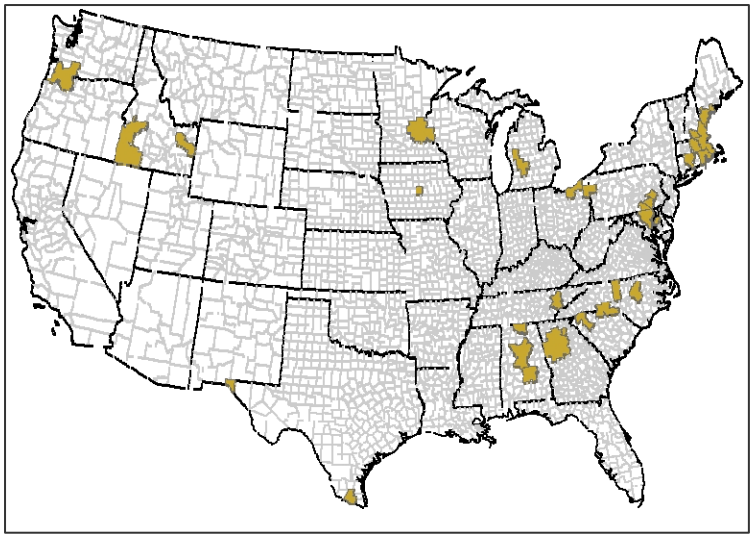
Map 7. *Average Exurbia, Low Population*



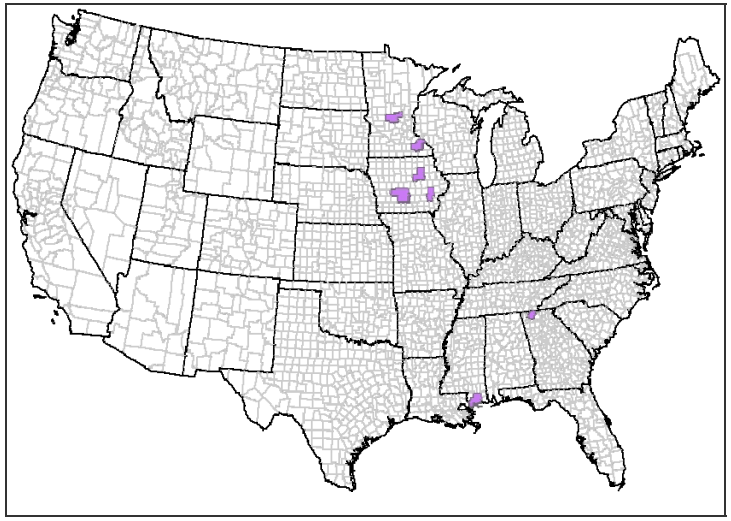
Map 8. *Average Exurbia, High Population*



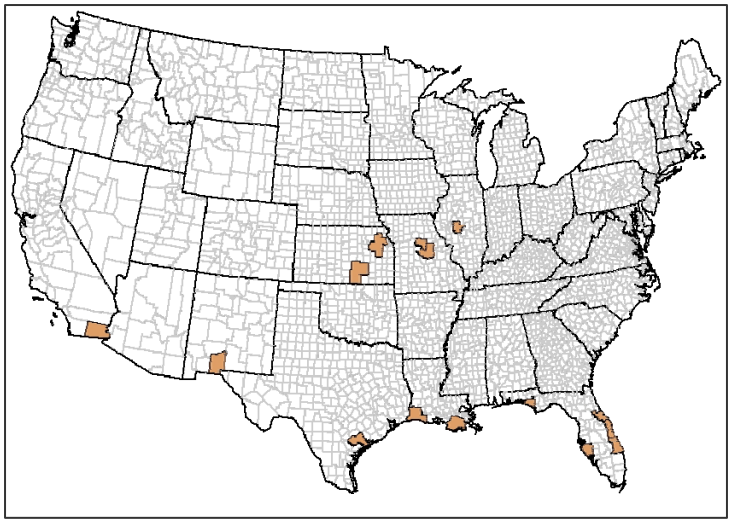
Map 9. *Nearly Unbound Exurbia*



Map 10. *Unbound Exurbia*



Map 11. *Dispersed Exurbia*



Map 12. *High Amenity Exurbia*

Appendix A

Below Average Exurbia – Dispersed, Isolated and Linear	**Below Average Exurbia – Contiguous, Average Pattern**
Alexandria, LA	Anderson, SC
Auburn--Opelika, AL	Bowling Green, KY
Bangor, ME	Bridgeport--Stamford--Norwalk, CT
Barnstable Town, MA	Burlington--South Burlington, VT
Bay City, MI	Colorado Springs, CO
Bloomington, IN	Danville, VA
Brunswick, GA	Dubuque, IA
Cleveland, TN	Elkhart--Goshen, IN
Coeur d'Alene, ID	Erie, PA
Columbus, GA-AL	Farmington, NM
Dover, DE	Fayetteville--Springdale--Rogers, AR-
Elizabethtown, KY	Fort Walton Beach--Crestview--Destin,
Eugene--Springfield, OR	Grand Forks, ND-MN
Fargo, ND-MN	Hot Springs, AR
Fort Wayne, IN	Joplin, MO
Gadsden, AL	Medford, OR
Gainesville, FL	Mobile, AL
Green Bay, WI	Niles--Benton Harbor, MI
Hinesville--Fort Stewart, GA	Ocala, FL
Ithaca, NY	Odessa, TX
Jackson, TN	Ogden--Clearfield, UT
Kennewick--Richland--Pasco, WA	Pittsfield, MA
Kokomo, IN	Punta Gorda, FL
La Crosse, WI-MN	Racine, WI
Lafayette, IN	Rome, GA
Logan, UT-ID	St. George, UT
Longview--Kelso, WA	Tuscaloosa, AL
Midland, TX	
Monroe, LA	**Dispersed, Clumped Exurbia**
Morgantown, WV	
Mount Vernon--Anacortes, WA	Dalton, GA
Owensboro, KY	Des Moines, IA
Pocatello, ID	Gulfport--Biloxi, MS
Redding, CA	Iowa City, IA
Roanoke, VA	Rochester, MN
Rockford, IL	St. Cloud, MN
Salisbury, MD	Waterloo--Cedar Falls, IA
San Angelo, TX	
Sandusky, OH	
Sheboygan, WI	
South Bend--Mishawaka, IN-MI	
Springfield, MO	
Tallahassee, FL	
Yuma, AZ	

Average Exurban Pattern, High Pop.	**Average Exurban Pattern, High Pop. Cont.**
Albany--Schenectady--Troy, NY	San Jose--Sunnyvale--Santa Clara, CA
Anderson, IN	Savannah, GA
Appleton, WI	Sherman--Denison, TX
Bakersfield, CA	Sioux City, IA-NE-SD
Binghamton, NY	Sioux Falls, SD
Bismarck, ND	State College, PA
Bloomington--Normal, IL	Stockton, CA
Boulder, CO	Syracuse, NY
Buffalo--Cheektowaga--Tonawanda, NY	Toledo, OH
Canton--Massillon, OH	Tulsa, OK
Casper, WY	Utica--Rome, NY
Charleston--North Charleston, SC	Virginia Beach--Norfolk--Newport News
Charlottesville, VA	Wausau, WI
Chicago--Naperville--Joliet, IL-IN-WI	Weirton--Steubenville, OH-WV
College Station--Bryan, TX	Wheeling, WV-OH
Columbus, OH	Williamsport, PA
Corvallis, OR	Winchester, VA--WV
Dayton, OH	
Decatur, IL	**Unbound Contiguous Exurbia**
Eau Claire, WI	
Elmira, NY	Ames, IA
Evansville, IN-KY	Atlanta--Sandy Springs--Marietta, GA
Florence, SC	Baltimore--Towson, MD
Fond du Lac, WI	Birmingham--Hoover, AL
Fresno, CA	Boise City--Nampa, ID
Huntington--Ashland, WV-KY-OH	Boston--Cambridge--Quincy, MA-NH
Johnstown, PA	Charlotte--Gastonia--Concord, NC-SC
Kankakee--Bradley, IL	Cleveland--Elyria--Mentor, OH
Killeen--Temple--Fort Hood, TX	El Paso, TX
Kingsport--Bristol, TN-VA	Gainesville, GA
Lansing--East Lansing, MI	Grand Rapids--Wyoming, MI
Las Vegas--Paradise, NV	Greensboro--High Point, NC
Lawton, OK	Greenville, SC
Lewiston, ID-WA	Hartford--West Hartford--East Hartfor
Lexington-Fayette, KY	Huntsville, AL
Lincoln, NE	Idaho Falls, ID
Los Angeles--Long Beach--Santa Ana, C	Knoxville, TN
Lubbock, TX	Lancaster, PA
Madison, WI	Manchester--Nashua, NH
Memphis, TN-MS-AR	McAllen--Edinburg--Pharr, TX
Merced, CA	Minneapolis--St. Paul--Bloomington, M
Modesto, CA	Montgomery, AL
Muncie, IN	Portland--South Portland, ME
Napa, CA	Portland--Vancouver--Beaverton, OR-WA
New Orleans--Metairie--Kenner, LA	Providence--New Bedford--Fall River,
Omaha--Council Bluffs, NE-IA	Raleigh--Cary, NC
Oshkosh--Neenah, WI	Reading, PA
Oxnard--Thousand Oaks--Ventura, CA	Worcester, MA
Peoria, IL	York--Hanover, PA
Pueblo, CO	Youngstown--Warren--Boardman, OH-PA
Reno--Sparks, NV	
Rochester, NY	
Rocky Mount, NC	
San Francisco--Oakland--Fremont, CA	

Nearly Unbound Exurbia	Nearly Unbound Exurbia Cont.
Abilene, TX	Lynchburg, VA
Akron, OH	Macon, GA
Albuquerque, NM	Madera, CA
Allentown--Bethlehem--Easton, PA-NJ	Miami--Fort Lauderdale--Miami Beach,
Amarillo, TX	Michigan City--La Porte, IN
Ann Arbor, MI	Milwaukee--Waukesha--West Allis, WI
Anniston--Oxford, AL	Monroe, MI
Asheville, NC	Morristown, TN
Athens-Clarke County, GA	Myrtle Beach--Conway--North Myrtle Be
Atlantic City, NJ	Naples--Marco Island, FL
Augusta-Richmond County, GA-SC	Nashville--Murfreesboro, TN
Austin--Round Rock, TX	New Haven--Milford, CT
Baton Rouge, LA	New York--Newark--Edison, NY-NJ-PA
Battle Creek, MI	Norwich--New London, CT
Beaumont--Port Arthur, TX	Oklahoma City, OK
Bellingham, WA	Olympia, WA
Bend, OR	Orlando, FL
Bremerton--Silverdale, WA	Parkersburg--Marietta, WV-OH
Brownsville--Harlingen, TX	Pascagoula, MS
Burlington, NC	Pensacola--Ferry Pass--Brent, FL
Cedar Rapids, IA	Philadelphia--Camden--Wilmington, PA-
Chattanooga, TN-GA	Phoenix--Mesa--Scottsdale, AZ
Cincinnati--Middletown, OH-KY-IN	Pittsburgh, PA
Clarksville, TN-KY	Richmond, VA
Columbia, SC	Riverside--San Bernardino--Ontario, C
Dallas--Fort Worth--Arlington, TX	Sacramento--Arden-Arcade--Roseville,
Davenport--Moline--Rock Island, IL-IA	Saginaw--Saginaw Township North, MI
Decatur, AL	St. Louis, MO-IL
Detroit--Warren--Livonia, MI	San Antonio, TX
Duluth, MN-WI	San Diego--Carlsbad--San Marcos, CA
Durham, NC	Santa Fe, NM
Fayetteville, NC	Santa Rosa--Petaluma, CA
Flint, MI	Scranton--Wilkes-Barre, PA
Florence, AL	Seattle--Tacoma--Bellevue, WA
Fort Smith, AR-OK	Shreveport--Bossier City, LA
Grand Junction, CO	Spartanburg, SC
Hagerstown--Martinsburg, MD-WV	Spokane, WA
Harrisonburg, VA	Springfield, MA
Hickory--Morganton--Lenoir, NC	Springfield, OH
Holland--Grand Haven, MI	Tampa--St. Petersburg--Clearwater, FL
Houston--Baytown--Sugar Land, TX	Texarkana--Texarkana, TX-AR
Indianapolis, IN	Tucson, AZ
Jackson, MI	Tyler, TX
Jacksonville, FL	Vineland--Millville--Bridgeton, NJ
Johnson City, TN	Waco, TX
Kalamazoo--Portage, MI	Warner Robins, GA
Kansas City, MO-KS	Washington--Arlington--Alexandria, VA
Lafayette, LA	Wilmington, NC
Lakeland--Winter Haven, FL	Winston-Salem, NC
Lawrence, KS	Yakima, WA
Lewiston--Auburn, ME	
Little Rock--North Little Rock, AR	
Longview, TX	
Louisville, KY-IN	

Average Exurban Pattern, Low Pop.	**Average Exurban Pattern, Low Pop. Cont.**
Albany, GA Altoona, PA Billings, MT Blacksburg--Christiansburg--Radford, Cape Coral--Fort Myers, FL Champaign--Urbana, IL Charleston, WV Cheyenne, WY Chico, CA Corpus Christi, TX Cumberland, MD-WV Danville, IL Denver--Aurora, CO Dothan, AL Flagstaff, AZ Fort Collins--Loveland, CO Glens Falls, NY Goldsboro, NC Great Falls, MT Greeley, CO Greenville, NC Hanford--Corcoran, CA Harrisburg--Carlisle, PA Hattiesburg, MS Jackson, MS Jacksonville, NC Janesville, WI Jonesboro, AR Kingston, NY Laredo, TX Lebanon, PA Lima, OH Mansfield, OH Missoula, MT Muskegon--Norton Shores, MI Ocean City, NJ Pine Bluff, AR Poughkeepsie--Newburgh--Middletown, N Prescott, AZ Provo--Orem, UT Rapid City, SD St. Joseph, MO-KS Salem, OR Salinas, CA Salt Lake City, UT San Luis Obispo--Paso Robles, CA Santa Barbara--Santa Maria--Goleta, C Santa Cruz--Watsonville, CA Sumter, SC Terre Haute, IN Trenton--Ewing, NJ Valdosta, GA Vallejo--Fairfield, CA	Visalia--Porterville, CA Wenatchee, WA Wichita Falls, TX Yuba City--Marysville, CA **High Amentias, Low Exurbanization** Columbia, MO Deltona--Daytona Beach--Ormond Beach, El Centro, CA Houma--Bayou Cane--Thibodaux, LA Jefferson City, MO Lake Charles, LA Las Cruces, NM Palm Bay--Melbourne--Titusville, FL Panama City--Lynn Haven, FL Port St. Lucie--Fort Pierce, FL Sarasota--Bradenton--Venice, FL Springfield, IL Topeka, KS Vero Beach, FL Victoria, TX Wichita, KS