

AN ECONOMIC PERSPECTIVE ON URBAN SPRAWL:

**With an Application to the American West and a Test of the Efficacy of
Urban Growth Boundaries***

By

Robert W. Wassmer

Professor
Public Policy and Administration
California State University, Sacramento
Sacramento, CA 95819-6081
Tel: (916) 278-6304
Fax: (916) 278-6544

rwassme@csus.edu

<http://www.csus.edu/indiv/w/wassmerr>

September 2002

ABOUT THE AUTHOR

Rob Wassmer's research and teaching interests are in policy-related microeconomic analysis, state and local public finance, and urban economics. He has authored over 20 published articles on these subjects and two books: *Readings in Urban Economics: Issues and Public Policy* (Blackwell, 2000) and *Bidding for Business: The Efficacy of Local Economic Development Incentives in a Metropolitan Area* (with co-author John Anderson, W.E. Upjohn Institute, 2000). Along with Marlon Boarnet, Professor Wassmer has recently completed a working paper commissioned by The Urban Land Institute on *The Benefits of Growth?*

*This work was in part supported by a sabbatical leave from California State University, Sacramento; and grants from the California Institute for County Government, the Capital Regional Institute, Valley Vision, the Lincoln Institute of Land Policy, and the California State University Faculty Research Fellows in association with the California Senate Office of Research. The views expressed here are only the author's.

AN ECONOMIC PERSPECTIVE ON URBAN SPRAWL:

With an Application to the American West and a Test of the Efficacy of Urban Growth Boundaries

ABSTRACT

This paper begins with a short background on what economics can offer to the debate over urban sprawl. This economic perspective is then compared to definitions of sprawl found in the previous planning literature and a possible consensus is reached on ways to quantify the degree of urban sprawl in a metropolitan area given the available data. Values for these measures are provided for metropolitan and urbanized areas throughout the western United States. Simple evidence on the presence of urban growth boundaries and the containment of urban sprawl is offered. Conclusions are drawn and a policy course for dealing with sprawl is suggested.

INTRODUCTION

In the next three or four years, Americans will have a chance to decide how decent a place this country will be to live in, and for generations to come. Already, huge patches of once green countryside have been turned into vast smog-filled deserts that are neither city, suburb, nor country and each day – at a rate of some 3,000 acres a day – more country is being bulldozed over...

The above statement could have come from a recent commentary written in any newspaper or newsmagazine in the United States. Many would be surprised to learn that it appeared in the opening paragraph of an article by the sociologist William Whyte titled “Urban Sprawl” in the January 1958 (p. 103) edition of Fortune magazine. Indeed, Thomas Black (1996) has traced the pejorative use of the term “sprawl” back to a speech made in 1937 by Earle Draper of the Tennessee Valley Authority to a national conference of planners:

For over 60 years, planners have used sprawl to categorize metropolitan development that produces undesirable social outcomes. The public actively adopted this term in the early 1990s and the concept of urban sprawl is now widely used to frame policy debates over population growth and population shifts in U.S. metropolitan areas. In California, where the U.S. Census Bureau anticipates that population will grow from 32.5 million in 2000 to 49.3 million in 2025, the question of how to accommodate a greater than 50 percent increase in population in 25 years is widely asked. How pleasant will it be to live and work in a state if a majority of its population growth occurs at low density at the fringe of current metropolitan areas?

Alternatively, conservative commentators like Thomas Sowell (1999) and George Will (1999) attribute this focus on urban sprawl, and the necessity of government directed “smart growth” as the most recent crisis contrived by Liberals to justify government interference in what they believe are location decisions better left to individuals and business. Nonetheless, it is hard to find a policymaker who publicly favors urban sprawl. At the same time, it is equally difficult to find someone who can concisely define what urban sprawl is and how to measure the degree to which it has occurred in a region. Though it is not hard to find a policymaker concerned over the negative outcomes that are widely attributed to urban sprawl: loss of open space and farmland, traffic congestion, air pollution, a greater percentage of the poor and racial/ethnic minorities living in inner ring cities, central city blight, etc.

Kenneth Small (2000), an urban economist, offers a medical analogy concerning how the public and policymakers often think about the “disease” of sprawl. Most recognize the undesirable symptoms of the disease and many have already come up with cures for it; unfortunately, most lack a complete understanding of the underlying causes of it. To better understand the concerns and claims that are now commonly expressed over urban sprawl, planners (and other policymakers in the trenches of urban development) need all the available tools to identify when urban sprawl has occurred in a metropolitan area.

One purpose of this paper is to offer an economic perspective on the cause of urban sprawl. This economic perspective is then compared to definitions found in the planning literature and a possible consensus is reached on ways to quantify the degree of urban sprawl in a metropolitan area given the available data. Recent values for these measures are provided for urbanized and metropolitan areas throughout the western United States. Simple evidence on the presence of urban containment policies and the suppression of sprawl is offered. Conclusions are drawn from this data and suggestions for crafting policy course to deal with urban sprawl are offered.

WHAT IS URBAN SPRAWL?

In one sense, urban sprawl is just another phrase for “excessive” metropolitan decentralization or suburbanization. Suburbanization occurs over time when a larger percentage of a metropolitan area’s

residential and/or business activity takes place outside of its central locations. Unfortunately, the positive determination of when urban decentralization becomes excessive is not a simple task.

As discussed by two prominent urban economists, Ed Mills (1999) and Jan Brueckner (2000), the process of urban decentralization has occurred in the United States for well over 75 years. In 1950, 57 percent of the population lived in the single central cities designated for each U.S. metropolitan area and 70 percent of the employment in the U.S. took place in these central cities. By the mid-1990s these percentages had respectively declined to 35 and 45 percent. Urban economists have extensively documented, modeled, and statistically examined this occurrence. Their conclusion being that 20th Century suburbanization occurred due to population growth, rising incomes, falling commuting costs, and to some extent, changing tastes on where and how Americans wish to live, work, and shop.

Economists point to the following cause and effect occurrences as the primary reasons for greater suburbanization. As population rises in a metropolitan area it becomes increasingly more difficult to locate the same percentage of residential and business activity in a metropolitan area's central places whose boundaries remain fixed. In addition, higher income residents generally demand larger quantities of housing and the inexpensive land to build it on is more likely on the fringe of currently developed urban areas. The construction of federally subsidized highways, and the relatively low private cost of using an automobile to get to work, has further facilitated the 20th Century movement to the suburbs. In addition, many people and businesses prefer a suburban setting; though there is some debate as to whether this preference is at least in part induced by the limited choices provided them (Ewing, 1997).

An Economic Concept Of Urban Sprawl

From an economic perspective, the point that further decentralization becomes excessive identifies the occurrence of urban sprawl. According to economists, the least value-laden way to identify this point is when further decentralization imposes greater net marginal costs on everyone in the metropolitan area than if the development had remained more centralized (Gordon and Richardson, 1996; Mills, 1999; and Brueckner, 2000). An economist's definition of these net marginal costs refers to both the additional private costs born by the individuals and businesses making the decision to locate in the

more decentralized location, plus the additional public costs that result from the decentralized location decisions of others. Economists use net marginal costs in the sense that they are net of the private and social benefits that also arise from the decentralized location decisions.

This way of economic thinking can help us to better understand why a household, where the primary and even secondary wage earner works in a central place decides to live in a non-central place. A household makes a residential location decision by weighing the private benefits of a decentralized location (possibly better public schools, cheaper land to build a larger house on, newer infrastructure, neighbors they would rather associate with, closer to public open space, etc.) against the private costs of the decentralized location (longer commuting times, less urban amenities, etc.). In this example, the household determines that the private benefits are greater than the private costs at a non-central location. However, in making this decision it is unlikely that the household fully considers the social costs (perhaps greater air pollution from a longer commute, greater freeway congestion, increased publicly-funded infrastructure costs, the social and economic isolation of the poor and/or racial/ethnic minorities left behind at the core of the metropolitan area, etc.) or social benefits of their decision to the entire metropolitan area

This example illustrates some of the private benefits and costs, and some of the public benefits and costs that need to be totaled in order to determine whether the privately determined location decision of a household (or business) is socially efficient. The difficulty in doing this totaling is that many of the public benefits and costs just described have no directly observable monetary equivalents. Though methods such as “willingness to pay” have been developed by economists to try and determine these monetary equivalents, they are far from perfect in assigning appropriate dollar values. Even understanding the difficulty of applying this evaluative technique, economists look at a marginal movement to decentralize urban activity in a metropolitan and define it as excessive (or sprawl) if the net total private and social costs of the decentralization, after accounting for private and social benefits, are positive. It is important to note that this marginal evaluative method neither labels all suburbanization as sprawl, nor does it condone all suburbanization done under the guise of individual decisions as beneficial.

Throughout the United States, people and businesses freely chose to decentralize their location in a metropolitan area and it is reasonable to assume that they only do so if the private benefits they receive from doing such are greater than the private costs. As Ned Levine (1997, p. 280) points out: “What to one person is ‘sprawl’ to another is his/her home.” Even so, it is reasonable for planners and other urban policymakers to try and assess the social costs generated by an individual or business that chooses a non-central location, or the social benefits they would have generated if they had chosen a more central location. Economists refer to these privately ignored social costs and benefits as externalities.

This positively defined form of excessive suburbanization, where net marginal cost is positive, offers a theoretically based reason for government to redirect the intra-metropolitan location decisions of households and firms. However, as mentioned above, the difficulty in deciding when to impose this redirection has always been in determining when the private and public costs of a form of suburbanization exceed the private and public benefits.

In addition, economists are quick to point out that excessive decentralization (or urban sprawl) is the result of numerous individual choices. If we agree that many U.S. households prefer low density living, spatial separation from others with lower incomes and social status, one-stop shopping, a location near open space; and that travel by private car is faster, cheaper, and perceived as safer from personal attack than mass transit, it is not surprising that many households end up choosing locations on the less developed fringe of urban areas. Given that many residents in a metropolitan area have made these choices, many businesses that choose to produce in a metropolitan area also desire low-density sites spread out across the area for ease of shipping, employee, and market access. In effect, the negative outcomes attributed to urban sprawl can be thought of as the summation of the many social costs and benefits that individuals and businesses have chosen to ignore when deciding upon a location at the urban fringe. The immortal words of a Pogo comic strip from Earth Day 1971 still rings true in regard to what causes the disease of urban sprawl: “Yep Son, we have met the enemy and he is us.”

A Practical Definition Of Urban Sprawl

The previous explanation for the underlying cause of urban sprawl is based in economics and rather abstract. It is not new and Robert Harvey and W.A.V. Clark made a similar argument as early as 1965. As a more concrete alternative to trying to calculate the private and public benefits, and the public and private costs of greater decentralization in a metropolitan area, policy activists have instead chosen to conceptualize excessive suburbanization in a way that they are certain that the total costs of a described form of suburbanization are greater than the total benefits. For instance, in a widely cited 1998 study the Sierra Club defines sprawl as “low-density development beyond the edge of service and employment, which separates where people live from where they work – thus requiring cars to move between zones.” Continuing this theme, the *Planning Commissioners Journal* (2002) describes urban sprawl as “dispersed development outside of compact urban and village centers along highways and in rural countryside.” Anthony Downs (1998), at the Brookings Institution, recognizes urban sprawl by observable traits such as unlimited outward extension of new development, low density developments in new-growth areas, leapfrog development, and strip commercial development.

Reid Ewing (1994 and 1997), an urban planner, takes a very deliberate approach to conceptualizing urban sprawl. Surveying 15 academic articles on the subject, written between 1957 and 1992, he found that the terms low-density, strip or ribbon, scattered, or leapfrog development are most often used to characterize urban sprawl. Ewing lumps these characteristics under the term “non-compact development,” but he is not satisfied with such a simple archetype. In his mind, urban sprawl is always a matter of degree and the difficulty in crafting a rule to recognize it occurs in distinguishing the scale of non-compactness that typify the forms of polycentric development that exists in most U.S. metropolitan areas. Ewing equates the degree of urban sprawl in a region to the extent of residential inaccessibility to jobs and shopping, and lack of functional open space in the region.

The economist’s method of identifying urban sprawl is theoretically sound, but extremely demanding to implement. Thus, it is no surprise that policy activists prefer depictions of types of

suburban development where they believe the marginal private and public costs of it occurring are greater than marginal private and public benefits.

QUANTIFYING URBAN SPRAWL

Everyone knows there are types of metropolitan decentralization in which the private and social costs of it occurring are greater than the private and social benefits it generates. The difficulty is in the creation of a specific canon that identifies a type of suburbanization that fails such a benefit/cost test. Though, as described above, some have stepped into this void and offered characteristics of metropolitan suburbanization in which they believe the costs to all in the metropolitan area are greater than the benefits. If we accept these characteristics, and Ewing's insight that defining sprawl is always a matter of degree, a declaration of the degree of sprawl in an urban area may be possible. Though the important question to ask of any declaration of sprawl done in this manner is whether the declarer can back up their claim of sprawl with an explicit account of the net marginal cost that such development imposes upon society.

Much of how planners define sprawl consists of descriptions of specific types of development. Using existing data sources, there are no simple ways to measure the occurrences of many of these types of development in a metropolitan area. Nonetheless, there are measurable characteristics that appear in these descriptions. These include low density, scattered, and/or dispersed development; the separation of where people live from where they work; and a lack of functional open space. These characteristics, along with the concept of excessive decentralization that occurs over time and measured in a relative sense, are what are next relied on to define ways of determining the degree of sprawl in an urban area.

The U.S. Census defines a "metropolitan area" by one central city and the surrounding county or counties that are economically integrated – in regards to commuting and shopping patterns – with the central city. In addition, the Census defines an "urbanized area" as the densely settled "central places" in an urban area plus the less densely settled territory (urban fringe) that surrounds these places.¹ The

¹ An urbanized area must have a minimum population of 50,000 and the area's fringe must consist of contiguous territory that has a density of least 1,000 persons per square mile. The urban fringe can also consist of outlying

Census considers central places to be the dominant employment and residential centers in each urbanized area. The primary distinction between a metropolitan area and an urbanized area is that the boundary of a Census designated urban area need not follow political boundaries.

An empirical comparison of the degree of urban sprawl in different metropolitan areas in the American West must begin with a unit of analysis. For this study it is the 61 metropolitan areas in what the Census defined in 1990 as the continental western United States, less the seven metropolitan areas in Idaho, Montana, and Wyoming. Metropolitan areas in the western United States grew up in an era of rising populations, rising real incomes, and declining transportation costs. Unlike metropolitan areas in other parts of the United States, this resulted in lower densities at the urban core. It is therefore reasonable to compare only western metropolitan areas, and to exclude other U.S areas whose metropolitan structures at a point in time are products of their quite different historical development. In addition, metropolitan areas in Idaho, Montana, and Wyoming are excluded because these three states are best considered outliers in terms of the wide majority of statewide development patterns in the West.²

Table 1 contains a description of all the included metropolitan areas in the western United States. The first column of this table provides the metropolitan area's name and whether the U.S. Census Bureau considers it a Metropolitan Statistical Area (MSA) or a Primary Metropolitan Statistical Area (PMSA).³ For this study, the Census defined central places in 1990 are considered the central places for that urbanized area for all years under consideration.⁴ As will be shown, central places play a primary role in the methods used here to compare the incidence of sprawl in the American West. A movement of metropolitan activity away from central places is very likely to reduce the density of population in settled portions of the urban area, to create more scattered and leapfrog development, to create greater separation

territory of such density if a road no longer than 1.5 miles in distance connects it to the central place(s), or a road 5 miles long if water or other undeveloped territory separates it from the central place(s).

² Metropolitan areas in the three excluded western states are small in total population and small in terms of the population in their central cities. The largest central cities in the excluded states of Idaho, Montana, and Wyoming only had 1992 populations of 136,000, 84,000, and 52,000 respectively.

³ A PMSA consists of integrated counties that are divisible into smaller, integrated units that consist of one or more counties. A MSA consists of counties that are not divisible into smaller, integrated units.

⁴ There are two urbanized areas (Logan, UT; and Longview, WA) that are not part of any Census defined metropolitan area.

between where people live and work, and to reduce the amount of functional open space scattered throughout an urban area. All of these occurrences are characteristics that planners have used to designate urban sprawl.

insert Table 1 approximately here

Since excessive suburbanization is a relative term, a metropolitan area's level of decentralization at one point in time needs to be compared with both its level at earlier points in time and the degree of decentralization in similar metropolitan areas at the same time. In the next section this is done for urbanized and metropolitan areas throughout the western United States.

URBAN DECENTRALIZATION IN THE WEST

Based upon the previous discussion, Tables 2 through 4 offers various ways of measuring the amount of decentralization and farmland loss that has occurred in the last three decades in the western United States. All of these tables are organized with the average for all metropolitan areas in a state listed in the top rows. Tables 2 and 3 are based upon information drawn from a state's urbanized areas. The disadvantage of using this unit of observation is it being only available for decennial census years and the data for 2000 has not been released yet. Table 4 relies on the metropolitan area (based upon its component counties) as the unit of observation and subsequently can report information drawn from as late as 1998.

Comparing Urbanized Areas

Central places are the dominant employment and residential centers in an urbanized area. Measures of the percentage of an urbanized area's population and land area that are contained in its central places offer a comparable indication of how centralized an urban area is. Measured in this manner, less centralized urban areas are also more likely to fit many of the characteristics of sprawl previously discussed: dispersed development outside of compact urban villages, low density development in new growth areas, residential inaccessibility to shopping and employment, and greater strip commercial development. In one of the only statistically based examination of the causes of urban

sprawl, Jan Brueckner and David Fansler (1983) have also used values drawn from Census designated urban areas.

An examination of the percentage of an urbanized area's population and land area contained in its central places at one point in time, and how it has changed over time, offer information on the degree that an urban area has sprawled. For instance, the first data row of Table 2 indicates that 54 percent of the U.S. population living in urbanized areas chose to live in their 1990-defined central places in 1970.⁵ By 1990 this percentage had fallen to 50 percent. Similarly, in 1970, 41 percent of the land in U.S. urban areas was located in its central places; by 1990, this percentage had fallen slightly to 39 percent. Only the metropolitan averages calculated for California and Oregon bucked this U.S. trend. On average, between 1970 and 1990, metropolitan areas in these two states had a greater percentage of urbanized population living in central places and land area in central places.

insert Table 2 approximately here

Table 2 also shows that state averages mask metropolitan-area specific changes within a state. For instance, 13 of California's 37 urbanized areas (Antioch, Los Angeles, Oxnard, Palm Springs, Riverside, Sacramento, Salinas, San Diego, Santa Barbara, Santa Cruz, Santa Rosa, Seaside, and Simi Valley) experienced a decline in both the percentages of population and land area in central places. The obvious lesson for policymakers in a large and diverse state like California is that blanket statements on the degree of sprawl in the state's metropolitan areas are not valid. Sprawl is a metropolitan-specific phenomenon and needs to be quantified in only that fashion.

Table 3 offers the percentage change in urban population, and the percentage change in urban fringe land that occurred in urbanized areas in the western United States between 1980 and 1990. Urban fringe land is defined as land in total urbanized area less land in central places. As John Landis (2000) and other planners have used, an index that could potentially measure the relative degree of sprawl in a

⁵ The decision to use the Census defined 1990 central places as the central places for 1970 and 1980 should bias the measures of decentralization calculated here in the direction of less decentralization than may have actually occurred. The reason being that the Census did not consider some places to be central in 1970 and 1980, but they

metropolitan area is calculated by dividing the percentage change in urban fringe (or non-central place) land by the percentage change in urban population. A value greater than one indicates that between 1980 and 1990 the fringe area of an urbanized area grew at a faster rate than the population in the entire urbanized area. If this has occurred, more and more people are living at lower density levels outside of the urbanized area's central places.

insert Table 3 approximately here

The top of Table 3 indicates that the 1980 to 1990 sprawl index for all of the United States was less than one. Population in all U.S. urbanized areas grew at a slower rate than land outside of central places in urbanized areas. On the contrary, four of the eight states in this western sample exhibited a 1980 to 1990 sprawl index greater than one. In California, Colorado, and Washington, average metropolitan growth in urban fringe land between 1980 and 1990 was twice at least twice as great as growth in urbanized population. Though again, this statewide metropolitan average masks significant variation among California's metropolitan areas. At one extreme is a ratio of fringe land growth to population growth of 21.4 and 14.7 respectively for Simi Valley and Salinas – representing a large increase in sprawl. At the other extreme, the -0.7 and -0.5 respective sprawl indexes for Riverside and San Bernardino – represent a decrease in sprawl. This is further evidence that the degree of further sprawl occurring across California's metropolitan areas differs greatly. Similar situations exist in other western states.

Comparing Metropolitan Areas

Data from the Census designated urbanized area, and the central places they contain represent the best widely collected information for assessing the degree of decentralization that has occurred in an area. Unfortunately, the most recent data from U.S. urbanized areas comes from only 1990. Since many claim that sprawl has escalated in the last decade, it is important to look at some measures drawn from the 1990s. For these we necessarily turn in Table 4 to the county-based definition of a metropolitan area that

did designate these places as central in 1990. By the Census definition, this means that more people moved into these 1990 designated Census places in 1990 than lived there in 1970 or 1980.

the Census uses. In other studies, David Rusk (1995), Peter Gordon and Harry Richardson (1996), John Brennan and Edward Hill (1999), and Bruce Katz (2000) have also suggested that metropolitan areas are an appropriate designation to study the occurrence of decentralization in U.S. urban areas. The 1990 central place definitions given in Table 1 are again used to designate a metropolitan area's central places in 1990 and 1998.

Since many lament the loss of farmland in a metropolitan area as a clear symptom of urban sprawl, Table 4 offers a comparable measure of farmland loss in metropolitan areas in the western United States between 1987 and 1997. The first two data columns of Table 4 list the fraction of total metropolitan land devoted to farming in 1987 and in 1997. The third data column offers the percentage change in this fraction between 1987 and 1997.⁶ As the first rows of Table 4 show, only metropolitan areas in New Mexico and Washington State saw average increases in the percentage of metropolitan area land devoted to farming.⁷ Over this 10-year period, the average percentage of a metropolitan area's land devoted to farming in California fell about 9.4 percent. But specific metropolitan areas varied from respective 53 and 46 percent farmland losses in Los Angeles and Orange, to respective 29 and 12 percent farmland gains in Santa Cruz and Salinas.

insert Table 4 approximately here

Table 4 also continues the practice from Table 2 of looking at how central place population, relative to total area population, has changed over time. Here the difference is that all counties in the 1990 Census defined metropolitan area account for the total urban area and data is available from 1998. As shown in the top row, in both 1990 and 1998, on average nearly the same percentages of the state of California's metropolitan populations were living in central places. While, for Colorado, Oregon, Utah, and Washington, the average across all of these states' metropolitan areas indicate that relatively fewer were living in central places.

⁶ This percentage change is calculated as 1997 decimal amount of metropolitan land in farming minus the 1987 decimal amount, all divided by 1987 decimal amount and then multiplied by 100.

⁷ Washington's average increase is only due to the large percentage increase observed in one metropolitan area (Bremerton).

However, as with earlier tables, Table 4 also shows that averages calculated from a state's metropolitan areas hide great differences in losses in central-place populations. For California, between 1990 and 1998, the Oakland metropolitan area led in central-place population loss with nearly a 10 percent decline in the percentage of metropolitan residents living in the cities of Alameda, Oakland, or Berkeley. In fact, 13 out of California's 25 metropolitan areas exhibited a decline in central population relative to total metropolitan population. At the same time, the Chico metropolitan area experienced a 10 percent increase in its metropolitan residents living in its central place of the City of Chico.

URBAN GROWTH BOUNDARIES AND OBSERVED DECENTRALIZATION

As a way to slow metropolitan decentralization in the American West, many of its regions have adopted various forms of urban containment policies (UCPs). UCPs are commonly referred to as urban growth boundaries and are designed to slow the degree of population decentralization and loss of farmland in a metropolitan area that would have occurred over time without them. Given the data provided in Tables 2 through 4, and understanding the controversy that still exists as to the efficacy of UCPs, important information can be obtained by comparing the average rate of decentralization and farmland loss in urbanized and metropolitan areas in the western United States that had a containment policy in place as compared to those that did not.

To make these comparisons we rely on information gathered by Arthur Nelson (2001) on the presence of UCPs throughout the United States. Nelson appropriately places UCPs into three distinct categories. The first category is "Closed-Region Containment." It is metropolitan wide, explicitly preserves land at the urban fringe and attempts to shift displaced development back to the center. The second category is "Open-Region Containment." It is also metropolitan wide, but does nothing to explicitly preserve open space at the fringe. Open Region Containment does try shift development back to the center of the urban area. The final type of UCP is "Isolated Containment." By definition it has not been instituted on a metropolitan wide basis and only intends to preserve limited land at some jurisdictional boundaries. Isolated containment also does nothing to shift development occurring outside of these jurisdictional boundaries back to the urban core. Since each of these types of UCPs differ in their

degree of containment and pursuit of shifting fringe development back to the metropolitan core, it is appropriate to examine each separately as to its impact on sprawl.

As taken from Nelson, a description of the western metropolitan areas that had one of the three urban containment policies in place in 1998 is in Table 5. Further investigation yielded the recorded information on the year that each of these UCPs began. The statistical examination conducted here began by identifying which metropolitan areas had what type of UCP in place in 1983. The sets of closed-region containment areas, open-region containment areas, and isolated containment areas were then used to calculate average and dispersion values for the percentage change in central place population / urban population between 1980 and 1990 (from Table 2), the percentage change in central place land / urban land between 1980 and 1990 (from Table 2), the sprawl index for 1980 to 1990 (from Table 3), the percentage change in farm land / metropolitan land between 1987 and 1997 (from Table 4), and the percentage change in central place population / metropolitan population between 1990 and 1998 (from Table 4). These values are then compared to the average values calculated from all other metropolitan areas that did not have a UCP in place before 1983. The results are summarized in Table 6.

insert Table 5 approximately here

Using the appropriate Z statistic test for the difference between two population means (Kanji, 1995, p. 23), notice from Table 6 that all of the measures of sprawl calculated from 1980 to 1990 indicate that the establishment of a closed-region containment before 1983 had the desired effect of increasing the amount of people and land in the central places and also reducing the ratio of urban fringe land to urban population (sprawl index). Over the same period, 1980 to 1990, the average measures of sprawl calculated for areas that had isolated containment policies in place indicated the occurrence of less sprawl than those areas that had no UCPs, but none of these differences were large enough to be considered statistically significant.

Alternatively, the two sprawl measures calculated between 1987 and 1997, and 1990 to 1998 show that the urban areas with any of the forms of urban containment policy exhibited no significant

differences in the average measures of sprawl than the average measures of sprawl calculated for areas with no containment policies. The reasons for this distinct finding could be either that the countywide

Table 6: Mean and (Standard Deviation) of Sprawl Measures Western Urban Areas Based Upon Presence of a Type of Urban Containment Policy (UCP)

Sprawl Measure	No UCP	Closed-Region Containment	Open-Region Containment	Isolated Containment
1980 to 1990 % Change in Central Place Population / Urban Population	-2.60 (18.47)	37.08* (6.071)	na	1.60 (9.87)
1980 to 1990 % Change in Central Place Land / Urban Land	-3.21 (26.25)	12.76* (22.76)	na	3.71 (12.24)
1980 to 1990 Sprawl Index (positive indicates greater sprawl)	2.19 (4.11)	-2.28* (6.66)	na	1.21 (8.38)
1987 to 1997 % Change in Farm Land / Metropolitan Land	-8.29 (28.48)	-10.29 (10.96)	9.02 (26.71)	-7.72 (8.38)
1990 to 1998 % Change in Central Place Population / Metropolitan Population	-1.41 (6.97)	-2.25 (5.05)	-0.98 (1.88)	0.62 (5.09)

* Indicates that difference between mean of sprawl measure and respective mean calculated for areas with no UCP is statistically significant from zero based upon a one-tailed Z test at a 90 percent degree of confidence.

definition of a metropolitan area necessarily used for the 1990s definitions of sprawl is inappropriate, or that closed-region containment became less effective over time. Further investigation is needed to sort these two possible reasons out.

CONCLUSIONS AND POLICY OPTIONS

While economists may have the theoretical high ground, they can't always follow through and operationalize their ideas.

This quote appears in an article by Paul Gottlieb (1999, p. 54) that he titled “Do Economists Have Anything to Contribute to the Debate on Urban Sprawl? (And Would Anybody Listen to Them if They Did?).” In this article he laments the shortage of quality work by economists on urban sprawl. As pointed out previously, this shortage is in part due to the difficulty in measuring the metropolitan area land use patterns that many have been labeled as urban sprawl: decentralized, low density, non-clustered

housing, leapfrog, too much strip development, and separation of uses. In this paper, an attempt has been made to overcome this difficulty and measure the degree of decentralized, low-density, and possibly leapfrog development in a metropolitan area. Over time, these measures were calculated for urbanized areas and metropolitan regions in the western United States. The picture that emerged concerning the degree of urban sprawl in the western United States is somewhat mixed, but definitely points to a comparably high degree of decentralization and continuing decentralization in some of the West's urban regions.

Whatever the form of data used to identify urban sprawl, analysts can learn from the economist's method of defining excessive suburbanization. If a type of suburbanization generates more private and social costs than it does private and social benefits, then it should be considered excessive. Perhaps this is also a reasonable way to characterize what the public is expressing when it labels some forms of suburban development as sprawl. If policymakers know that a certain form of suburbanization fails such a benefit/cost test, they should appropriately try to do something to reduce it. At the same time, an important lesson from this economic approach is this that not all forms of suburbanization should be slowed.

In reality, the exact measurement of all the costs and benefits associated with a type of suburbanization is difficult, if not impossible to fully attain. No matter, if policymakers keep in mind the fact that all forms of suburbanization yields benefits and costs, they can eliminate from consideration many of the value-laden discussions that this important policy issue has been relegated to for so long.

Policy Options

In the next 25 years, with the exception of Colorado, population growth in all the western states examined here will exceed the nearly 23 percent growth rate projected by the U.S. Census for the entire United States. Arizona and Washington's populations are expected to increase by about 33 percent, while New Mexico's rate of population growth over the next 25 years is expected to be just over 40 percent. The Census anticipates that California's population will grow by nearly 52 percent over the next two decades and a half.

The millions of additional people expected to reside in the western United States in the next 25 years will no doubt offer benefits to the states and their economies. Benefits include the creation of new jobs, new incomes, new tax revenues, and higher property values. But more people also mean that existing metropolitan areas will grow more populated.

Population growth in the West appears inevitable, but in many respects it should not be feared. What needs to be feared is population growth that is allowed to proceed in a manner that fails to maximize the benefits to be derived from it, and fails to minimize the costs that can arise from it. Call it the opposite of smart growth, such “dumb growth” is what needs to be avoided in the fast growing American West.

The question usually arises on whether there is a role for state government, or collaborations of county governments to influence the process of where people and businesses locate in a metropolitan area. The reason for a higher than local role in intra-metropolitan land use decisions are the external effects that are largely ignored in purely private decisions on where to locate and the usual lack of an appropriate regional level of government to deal with issues that flow over the boundaries of local levels of government. Regional policymakers should advocate approaches designed to steer population growth in a manner that maximizes the regional benefits to be derived from it, while minimizing the costs.

In an attempt to steer population growth back to central places, many of the West’s metropolitan areas - with the assistance of state enabling laws - have implemented various forms of urban containment policies. As shown in Table 6, there exists some correlative evidence that the most restrictive form of these containment policies (closed-region) has had this effect. However, an important lesson from economics is that the benefits of reducing sprawl through a broad-brush approach (like a metropolitan-wide growth boundary) needs to be weighed against the costs that it also generates. These costs can include increased central housing prices and congestion, and the displacement of the poor from central places. Planners and other urban analysts are currently investigating the magnitude of such costs. More of these costs studies, along with further proof on the degree that UCPs slow decentralization, need to be

completed before a final judgment can be made as to the desirability of UCPs to stopping excessive urban decentralization.⁸

Getting people or businesses to consider the social consequences of their location choices offers an economic-based reason for government to help steer the intra-metropolitan location decisions of individuals and firms. The economic solution calls for the design of policies that force people and businesses to take into consideration the social costs and benefits imposed upon others when choosing a location to reside in a metropolitan area. Since the social benefits and costs of intra-metropolitan location decisions extend beyond city and county borders, a regional strategy is the ideal.

Most western metropolitan areas, like most throughout the United States, lack a binding regional governance structure. With little prospect of such being extensively established in the near future, state government or coalitions of county governments in a region are the arenas in which a discussion can appropriately be convened to consider directing reinvestment into socially smarter locations. Perhaps the optimal role for state government would be to provide incentives for the creation of metropolitan-wide collaborative bodies (where they do not already exist) throughout the state that could approach this issue with appropriate solutions tailored to region-specific needs. Though, for these collaborative bodies to be effective at reducing excessive suburbanization, they will need the legal and institutional ability to employ both “carrots and sticks” to influence local land use decisions.

REFERENCES

Black, J. Thomas (1996). “The Economics of Sprawl,” *Urban Land*, March, 52-53.

Brennan, John and Edward Hill (November, 1999). Where are the Jobs?: Cities, Suburbs, and The Competition for Employment. *Survey Series*. Center on Urban and Metropolitan Policy. Washington, D.C.: Brookings Institution.

Brueckner, Jan K. (2000). Urban Sprawl: Diagnosis and Remedies. *International Regional Science Review* 23, 16-171.

Brueckner, Jan K. and David A. Fansler (1983). The Economics of Urban Sprawl: Theory And Evidence on the Spatial Sizes of Cities. *The Review of Economics and Statistics* 65 (3): 479-482.

⁸ For examples of these costs of UCP studies see Downs (2002), Shaw and Utt (2000), and Staley and Mildner (1999).

- Downs, Anthony (2002). Have Housing Prices Risen Faster in Portland than Elsewhere? *Housing Policy Debate* 13 (1): 7-31.
- Downs, Anthony (Fall, 1998). How America's Cities are Growing: The Big Picture. *The Brookings Review*.
- Ewing, Reid (Winter, 1997). Is Los Angeles-Style Sprawl Desirable? *American Planning Association Journal* 63 (1): 107-126.
- Ewing, Reid (Winter, 1994). Characteristics, Causes, and Effects of Sprawl: A Literature Review. *Environmental and Urban Issues*: 1-15.
- Garreau, Joel (1991). *Edge City: Life on the New Frontier*. New York: Anchor Books.
- Gottlieb, Paul D (Spring, 1999). "Do Economists Have Anything to Contribute to the Debate On Urban Sprawl? (And Would Anybody Listen if They Did?)" *Forum for Social Economics* 28 (2): 51-64.
- Gordon, Peter and Harry Richardson (1996). Employment Decentralization in U.S. Metropolitan Areas: Is Los Angeles an Outlier or the Norm? *Environment and Planning A* 28: 1727-1743.
- Harvey, Robert O. and W.A.V. Clark (1965). The Nature and Economics of Urban Sprawl, *Land Economics* 41(1), 1-9.
- Kanji, Gopal K. (1995). *100 Statistical Tests*. Thousand Oaks, CA: Sage Publications.
- Katz, Bruce and Jennifer Bradley (December 1, 1999). Divided We Sprawl. *The Atlantic Monthly*.
- Landis, John (2000). "Growth as Destiny: Understanding California's Postwar Growth Patterns and Trends." In *Metropolitan Development Patterns: 2000 Annual Roundtable*. Cambridge, MA: Lincoln Institute of Land Policy.
- Levine, Ned (Spring, 1997). [Letter]. *American Planning Association Journal* 63 (1), 279-282.
- Mills, Edwin S. (Summer, 1999). The Brawl Over So-Called Sprawl. *Illinois Real Estate Letter*, 1-7.
- Nelson, A. C. (2001). *Urban Containment Policy*, mimeo. Atlanta, GA: Department of City And Regional Planning, Georgia Institute of Technology.
- Planning Commissioners Journal (2002). *Sprawl Guide*. Retrieved September 2002 from World Wide Web: <http://www.plannersweb.com/sprawl/define.html> .
- Rusk, David (1995). *Cities Without Suburbs* (2nd Edition). Baltimore: Johns Hopkins University Press.
- Jane S. Shaw and Ronald D. Utt, editors (2000). *A Guide to Smart Growth: Shattering Myths, Providing Solutions*. Washington, D.C.: Heritage Foundation.
- Sierra Club (1998). *The Dark Side of the American Dream: The Costs and Consequences of Suburban Sprawl*. Washington, D.C.: Author.
- Small, Ken (2000). "Urban Sprawl: A Non-Diagnosis of Real Problems." In *Metropolitan Development Patterns: 2000 Annual Roundtable*. Cambridge, MA: Lincoln Institute of Land Policy.

Sowell, Thomas (Summer, 1999). The Brawl Over So-Called Sprawl. *Illinois Real Estate Letter*, 8.

Staley, Samuel R. and Gerard C.S. Mildner (October, 1999). Urban Growth Boundaries and Housing Affordability: Lessons from Portland. *Reason Public Policy Institute*. Retrieved September 2002 from World Wide Web: <http://www.rppi.org/urban/pb11.html>.

Whyte, William H. Jr. (1959, January). Urban Sprawl. *Fortune*, 103-109, 194, 198, 200.

Will, George F. (1999, February 15). Al Gore Has a New Worry: Smart Growth to Cure Suburban Sprawl is the Newest Rationale for Government Growth. *Newsweek*.

DATA SOURCES

Rand California (2000). *An Online Source for California and the United States Statistics*. Retrieved September 2002 from World Wide Web: <http://ca.rand.org>

University of Michigan Documents Center (2000). *1990 Census Data Locator*. Retrieved August 2000 from World Wide Web: <http://www.lib.umich.edu/libhome/documents.center/ceindex.html>.

U.S. Census Bureau (2000). *Economic Census of Retail Trade*. 1997 Edition. Retrieved September 2000 from World Wide Web: <http://www.census.gov>.

U.S. Department of Commerce (April, 1998). *State and Metropolitan Area Data Book*. 5th Edition. Washington, D.C: Bureau of the Census.

U.S. Department of Commerce (August, 1994). *County and City Data Book*. 12th Edition. Washington, D.C: Bureau of the Census.

U.S. Department of Housing and Urban Development (2000). *State of the Cities Data Systems*. Retrieved August 2000 from World Wide Web: http://webstage1.aspensys.coml/socds/socds_home.htm .

Table 1: Urban Area Definitions for the Western United States

1990 Metropolitan Area Name	1990 Counties in Metropolitan Area	1990 Central Places (Cities) in Metropolitan Area	1990 Metropolitan Area Name	1990 Counties in Metropolitan Area	1990 Central Places (Cities) in Metropolitan Area
Phoenix-Mesa AZ, MSA	Maricopa AZ, Pinal AZ	Mesa AZ, Phoenix AZ, Scottsdale AZ, Tempe AZ	San Diego CA, MSA	San Diego CA	Coronado CA, Escondido CA, San Diego CA
Tucson AZ, MSA	Pima AZ	Tucson AZ	San Francisco CA, PMSA	Marin CA, San Francisco CA, San Mateo CA	San Francisco CA
Yuma AZ, MSA	Yuma AZ	Yuma AZ	San Jose CA, PMSA	Santa Clara CA	Gilroy CA, Palo Alto CA, San Jose CA, Santa Clara CA, Sunnyvale CA
Bakersfield CA, MSA	Kern CA	Bakersfield CA	San Luis Obispo- Atascadero-Paso Robles CA, MSA	San Luis Obispo CA	Atascadero CA, Paso Robles CA, San Luis Obispo CA
Chico-Paradise CA, MSA	Butte CA	Chico CA	Santa Barbara-Santa Maria- Lompoc CA, MSA	Santa Barbara CA	Lompoc CA, Santa Barbara CA, Santa Maria CA
Fresno CA, MSA	Fresno CA, Madera CA	Fresno CA	Santa Cruz-Watsonville CA, PMSA	Santa Cruz CA	Santa Cruz CA, Watsonville CA
Los Angeles-Long Beach CA, PMSA	Los Angeles CA	Lancaster CA, Long Beach CA, Los Angeles CA, Pasadena CA	Santa Rosa CA, PMSA	Sonoma CA	Petaluma CA, Santa Rosa CA
Merced CA, MSA	Merced CA	Merced CA	Stockton-Lodi CA, MSA	San Joaquin CA	Lodi CA, Stockton CA
Modesta CA, MSA	Stanislaus CA	Modesto CA, Turlock CA	Vallejo-Fairfield-Napa CA, PMSA	Napa CA, Solano CA	Fairfield CA, Napa CA, Vacaville CA, Vallejo CA
Oakland CA, PMSA	Alameda CA, Contra Costa CA	Alameda CA, Berkeley CA, Oakland CA	Ventura CA, PMSA	Ventura CA	San Buenaventura (Ventura) CA
Orange CA, PMSA	Orange CA	Anaheim CA, Irvine CA, Santa Ana CA	Visalia-Tulare-Porterville CA, MSA	Tulare CA	Porterville CA, Tulare CA
Redding CA, MSA	Shasta CA	Redding CA	Yolo CA, PMSA	Yolo CA	Davis CA, Woodland CA
Riverside-San Bernardino CA, PMSA	Riverside CA, San Bernardino CA	Hemet CA, Palm Dessert CA, Palm Springs CA, Riverside CA, San Bernardino CA, Temecula CA	Yuba City CA, MSA	Sutter CA, Yuba CA	Yuba CA
Sacramento CA, PMSA	El Dorado CA, Placer CA, Sacramento CA	Sacramento CA	Boulder-Longmount CO, PMSA	Boulder CO	Boulder CO, Longmount CO
Salinas CA, MSA	Monterey CA	Monterey CA, Salinas CA	Colorado Springs CO, MSA	El Paso CO	Colorado Springs, CO

Table 1 (Cont.): Urban Area Definitions for the Western United States

1990 Metropolitan Area Name	1990 Counties in Metropolitan Area	1990 Central Places (Cities) in Metropolitan Area	1990 Metropolitan Area Name	1990 Counties in Metropolitan Area	1990 Central Places (Cities) in Metropolitan Area
Denver CO, PMSA	Adams CO, Arapahoe CO, Denver CO, Douglas CO, Jefferson CO	Denver CO	Salt Lake City-Ogden UT, MSA	Davis UT, Salt Lake UT, Weber UT	Salt Lake City UT, Ogden UT
Fort-Collins-Loveland CO, MSA	Larimer CO	Fort Collins CO	Bellingham WA, MSA	Whatcom WA	Bellingham WA
Grand Junction CO, MSA	Mesa CO	Grand Junction CO	Bremerton WA, PMSA	Kitsap WA	Bremerton WA
Greeley CO, MSA	Weld CO	Greeley CO	Olympia WA, PMSA	Thurston WA	Olympia WA
Pueblo CO, MSA	Pueblo CO	Pueblo CO	Richland-Kennewick-Pasco WA, MSA	Benton WA, Franklin WA	Kennewick WA, Pasco WA, Richland WA
Las Vegas NV & AZ, MSA	Clark NV, Mohave AZ, Nye NV	Las Vegas NV	Seattle-Bellevue-Everett WA, PMSA	Island WA, King WA, Snohomish WA	Auburn WA, Everett WA, Seattle WA
Reno NV, MSA	Washoe NV	Reno NV	Spokane WA, MSA	Spokane WA	Spokane WA
Albuquerque NM, MSA	Bernalillo NM, Sandoval NM, Valencia NM	Albuquerque NM	Tacoma WA, PMSA	Pierce WA	Tacoma WA
Las Cruces NM, MSA	Dona Ana NM	Las Cruces NM	Yakima WA, MSA	Yakima WA	Yakima WA
Santa Fe NM, MSA	Los Alamos NM, Santa Fe NM	Santa Fe NM			
Eugene-Springfield OR, MSA	Lane OR	Eugene OR, Springfield OR			
Medford-Ashland OR, MSA	Jackson OR	Medford OR			
Portland-Vancouver OR, PMSA	Clackamas OR, Columbia OR, Multnomah OR, Washington OR, Yamhill OR, Clark WA	Portland OR, Vancouver WA			
Salem OR, PMSA	Marion OR, Polk OR	Salem OR			
Provo-Orem UT, MSA	Utah UT	Provo UT, Orem UT			

Table 2: Population and Land Information for Central Places and Urbanized Areas in the Western United States

1990 Urbanized Area Name	1970 Central Place Population / Urban Population	1980 Central Place Population / Urban Population	1990 Central Place Population / Urban Population	1970 Central Place Land / Urban Land	1980 Central Place Land / Urban Land	1990 Central Place Land / Urban Land
United States average for urbanized areas	0.54	0.48	0.50	0.41	0.36	0.39
Arizona average for urbanized areas	0.78	0.69	0.62	0.70	0.62	0.66
California average for urbanized areas	0.59	0.61	0.67	0.53	0.55	0.59
Colorado average for urbanized areas	0.77	0.74	0.74	0.66	0.60	0.65
Nevada average for urbanized areas	0.63	0.50	0.50	0.62	0.36	0.44
New Mexico average for urbanized areas	0.82	0.85	0.81	0.72	0.73	0.71
Oregon average for urbanized areas	0.58	0.59	0.77	0.49	0.56	0.62
Utah average for urbanized areas	0.53	0.43	0.45	0.41	0.32	0.31
Washington average for urbanized areas	0.59	0.56	0.54	0.48	0.46	0.37
Phoenix-Mesa, AZ	0.67	0.56	0.77	0.64	0.51	0.64
Tucson, AZ	0.88	0.73	0.32	0.76	0.57	0.50
Yuma, AZ	na	0.78	0.77	na	0.78	0.83
Antioch-Pittsburg, CA	0.82	0.88	0.71	0.71	0.81	0.50
Bakersfield, CA	0.39	0.47	0.58	0.45	0.47	0.63
Chico, CA	na	0.51	0.56	na	0.56	0.69
Davis, CA	na	na	0.88	na	na	0.80
Fairfield, CA	na	0.84	0.77	na	0.84	0.88
Fresno, CA	0.63	0.66	0.78	0.53	0.65	0.75
Hemet-San Jacinto, CA	na	0.41	0.58	na	0.39	0.65
Hesperito-Apple Valley-Victorville, CA	na	na	0.89	na	na	0.89
Indio-Coachella, CA	na	na	0.95	na	na	0.99
Lancaster-Palmdale, CA	na	0.85	0.88	na	0.82	0.91
Lodi, CA	na	na	0.93	na	na	0.69
Lompoc, CA	na	na	0.67	na	na	0.27
Los Angeles-Long Beach, CA	0.43	0.35	0.42	0.38	0.28	0.33
Merced, CA	na	na	0.87	na	na	0.81
Modesto, CA	0.58	0.67	0.71	0.28	0.54	0.58
Napa, CA	na	0.86	0.91	na	0.84	0.83
Oxnard-Ventura, CA	0.67	0.69	0.49	0.63	0.63	0.29
Palm Springs, CA	na	0.49	0.31	na	0.41	0.29
Redding, CA	na	0.79	0.85	na	0.64	0.83
Riverside-San Bernardino, CA	0.42	0.41	0.33	0.37	0.35	0.29
Sacramento, CA	0.40	0.35	0.38	0.37	0.35	0.38
Salinas, CA	0.94	0.97	0.89	0.89	0.88	0.54
San Diego, CA	0.58	0.50	0.52	0.56	0.44	0.46
San Francisco-Oakland, CA	0.38	0.32	0.38	0.17	0.13	0.19
San Jose, CA	0.43	0.51	0.58	0.42	0.48	0.54
San Luis Obispo, CA	na	na	0.83	na	na	0.81
Santa Barbara, CA	0.54	0.50	0.47	0.57	0.42	0.39
Santa Cruz, CA	0.43	0.34	0.32	0.35	0.16	0.13
Santa Maria, CA	na	0.69	0.69	na	0.74	0.68
Santa Rosa, CA	0.67	0.61	0.58	0.52	0.52	0.50
Seaside-Monterey, CA	0.67	0.56	0.53	0.70	0.46	0.36
Simi Valley, CA	0.99	0.97	0.78	0.93	0.96	0.70
Stockton, CA	0.67	0.76	0.80	0.64	0.67	0.71
Vacaville, CA	na	na	1.00	na	na	0.99
Visalia, AC	na	0.84	0.90	na	0.84	0.85
Watsonville, CA	na	na	0.61	na	na	0.29
Yuba City , CA	na	0.31	0.36	na	0.19	0.25
Boulder, CO	0.97	0.94	0.84	0.92	0.83	0.70
Colorado Springs, CO	0.66	0.78	0.80	0.68	0.73	0.72
Denver, CO	0.49	0.36	0.31	0.33	0.25	0.24
Fort Collins, CO	na	0.83	0.83	na	0.63	0.76
Grand Junction, CO	na	0.50	0.40	na	0.31	0.27
Greeley, CO	na	0.85	0.84	na	0.70	0.75
Longmount, CO	na	na	0.98	na	na	0.95
Pueblo, CO	0.94	0.93	0.93	0.71	0.75	0.78
Las Vegas, NV & AZ	0.53	0.38	0.37	0.43	0.30	0.27
Reno, NV	0.73	0.62	0.63	0.81	0.43	0.62
Albuquerque, NM	0.82	0.79	0.77	0.72	0.56	0.59
Las Cruces, NM	na	0.82	0.76	na	0.71	0.66
Santa Fe, NM	na	0.94	0.89	na	0.91	0.90
Eugene-Springfield, OR	0.55	0.58	0.83	0.47	0.53	0.79
Medford, OR	na	0.75	0.70	na	0.71	0.62
Portland-Vancouver, OR & WA	0.46	0.36	0.86	0.33	0.30	0.36
Salem, OR	0.73	0.66	0.69	0.67	0.71	0.73
Logan , UT	na	na	0.65	na	na	0.46
Ogden, UT	0.46	0.31	0.25	0.34	0.20	0.17
Provo-Orem, UT	0.76	0.74	0.70	0.56	0.50	0.44
Salt Lake City, UT	0.37	0.24	0.20	0.32	0.25	0.15
Bellingham, WA	na	0.90	0.88	na	0.88	0.73
Bremerton, WA	na	0.56	0.34	na	0.54	0.15
Longview, WA & OR	na	0.56	0.55	na	0.36	0.34
Olympia, WA	na	0.40	0.35	na	0.40	0.29
Richland-Kennewick-Pasco, WA	0.58	0.61	0.81	0.57	0.51	0.53
Seattle, WA	0.47	0.39	0.36	0.27	0.35	0.23
Spokane, WA	0.74	0.64	0.64	0.65	0.49	0.49
Tacoma, WA	0.46	0.39	0.36	0.37	0.26	0.21
Yakima, WA	0.70	0.61	0.62	0.51	0.36	0.40

Table 3: 1980 to 1990 Change in Urbanized Area Population, Urban Fringe Land Area, and a Sprawl Index for the Western United States

1990	1980 to 1990	1980 to 1990	1980 to 1990
Urbanized Area	% Change in	% Change in	Measure of
Name	Urban Population	Urban Fringe Land	Sprawl Index
United States average for urbanized areas	13.7	12.5	0.91
Arizona average for urbanized areas	33.63	13.25	0.52
California average for urbanized areas	47.04	103.44	2.01
Colorado average for urbanized areas	19.30	36.88	2.17
Nevada average for urbanized areas	46.40	8.58	0.04
New Mexico average for urbanized areas	29.30	59.57	1.84
Oregon average for urbanized areas	15.31	3.14	-2.91
Utah average for urbanized areas	24.34	19.87	0.65
Washington average for urbanized areas	22.21	61.40	3.59
Phoenix-Mesa, AZ	42.4	-15.1	-0.36
Tucson, AZ	28.7	66.9	2.33
Yuma, AZ	29.8	-12.0	-0.40
Antioch-Pittsburg, CA	77.9	520.0	6.68
Bakersfield, CA	36.2	0.8	0.02
Chico, CA	38.4	-8.2	-0.21
Davis, CA	na	na	na
Fairfield, CA	44.3	-4.0	-0.09
Fresno, CA	36.7	-6.7	-0.18
Hemet-San Jacinto, Ca	64.2	-9.4	-0.15
Hesperito-Apple Valley-Victorville, CA	na	na	na
Indio-Coachella, CA	na	na	na
Lancaster-Palmdale, CA	232.3	-10.0	-0.04
Lodi, CA	na	na	na
Lompoc, CA	na	na	na
Los Angeles-Long Beach, CA	20.3	-0.1	0.00
Merced, CA	na	na	na
Modesto, CA	44.5	4.3	0.10
Napa, CA	14.8	20.0	1.35
Oxnard-Ventura, CA	27.2	120.0	4.41
Palm Springs, CA	94.2	73.0	0.77
Redding, CA	48.2	-35.6	-0.74
Riverside-San Bernardino, CA	65.9	39.9	0.60
Sacramento, CA	37.8	14.1	0.37
Salinas, CA	48.0	705.0	14.70
San Diego, CA	37.8	8.5	0.23
San Francisco-Oakland, CA	13.8	2.2	0.16
San Jose, CA	15.4	-8.2	-0.53
San Luis Obispo, CA	na	na	na
Santa Barbara, CA	21.3	15.0	0.70
Santa Cruz, CA	23.6	37.7	1.60
Santa Maria, CA	55.5	35.0	0.63
Santa Rosa, CA	42.0	34.0	0.81
Seaside-Monterey, CA	15.4	51.5	3.34
Simi Valley, CA	60.2	1290.0	21.42
Stockton, CA	33.0	6.0	0.18
Vacaville, CA	na	na	na
Visalia, CA	41.8	2.5	0.06
Watsonville, CA	na	na	na
Yuba City, CA	26.3	-1.0	-0.04
Boulder, CO	21.8	140.0	6.44
Colorado Springs, CO	27.5	24.9	0.90
Denver, CO	12.3	6.0	0.49
Fort Collins, CO	35.2	0.8	0.02
Grand Junction, CO	26.5	83.2	3.14
Greeley, CO	14.9	13.3	0.89
Longmont, CO	na	na	na
Pueblo, CO	-3.0	-10.0	3.33
Las Vegas, NV & AZ	61.1	30.1	0.49
Reno, NV	31.7	-12.9	-0.41
Albuquerque, NM	18.9	23.2	1.23
Las Cruces, NM	47.9	115.6	2.41
Santa Fe, NM	21.1	40.0	1.90
Eugene-Springfield, OR	3.7	-51.7	-14.09
Medford, OR	27.6	60.0	2.17
Portland-Vancouver, OR & WA	14.2	1.6	0.11
Salem, OR	15.7	2.7	0.17
Logan, UT	na	na	na
Ogden, UT	26.0	21.9	0.84
Provo-Orem, UT	30.0	43.3	1.45
Salt Lake City, UT	17.1	-5.7	-0.33
Bellingham, WA	16.3	166.7	10.26
Bremerton, WA	75.1	194.4	2.59
Longview, WA & OR	3.7	12.4	3.33
Olympia, WA	39.1	57.2	1.46
Richland-Kennewick-Pasco, WA	3.5	34.1	9.70
Seattle, WA	25.3	43.3	1.71
Spokane, WA	4.6	4.9	1.06
Tacoma, WA	23.7	32.9	1.39
Yakima, WA	8.6	6.7	0.78

Table 4: Farm Activity and Distribution of Population Changes for Metropolitan Areas in Western United States

1990	1987	1997	1987 to 1997 %	1990 Central Place	1998 Central Place	1990 to 1998 %
Metropolitan Area	Farm Land /	Farm Land /	Change in Farm Land	Population /	Population /	Change in Central
Name	Metropolitan Land	Metropolitan Land	/ Metropolitan Land	Metropolitan Pop	Metropolitan Pop	Place Pop / Metro Pop
Arizona average for MSAs	0.327	0.260	-20.49	0.604	0.615	1.64
California average for (P)MSAs	0.470	0.443	-9.41	0.402	0.402	0.21
Colorado average for (P)MSAs	0.417	0.389	-4.97	0.520	0.515	-0.47
Nevada average for MSAs	0.155	0.118	-31.58	0.414	0.413	0.04
New Mexico average for MSAs	0.343	0.390	12.13	0.531	0.516	-2.55
Oregon average for (P)MSAs	0.218	0.203	-10.52	0.396	0.400	0.96
Utah average for MSAs	0.395	0.274	-30.57	0.407	0.387	-5.85
Washington average for (P)MSAs	0.273	0.265	4.46	0.358	0.340	-6.12
Phoenix-Mesa MSA, AZ	0.359	0.216	-39.94	0.689	0.655	-4.94
Tucson MSA, AZ	0.543	0.496	-8.80	0.608	0.717	18.00
Yuma MSA, AZ	0.077	0.067	-12.72	0.514	0.472	-8.13
Bakersfield MSA, CA	0.583	0.547	-6.11	0.322	0.333	3.53
Chico-Paradise MSA, CA	0.471	0.385	-18.27	0.220	0.241	9.55
Fresno MSA, CA	0.527	0.487	-7.67	0.469	0.457	-2.43
LA-Long Beach PMSA, CA	0.108	0.050	-53.30	0.468	0.465	-0.60
Orange PMSA, CA	0.215	0.115	-46.63	0.278	0.271	-2.57
Riverside-San Bernardino PMSA, CA	0.125	0.082	-34.07	0.200	0.199	-0.53
Ventura PMSA, CA	0.278	0.293	5.26	0.138	0.134	-2.88
Merced MSA, CA	0.850	0.714	-15.97	0.315	0.300	-4.70
Modesta MSA, CA	0.753	0.766	1.79	0.558	0.543	-2.86
Redding MSA, CA	0.156	0.131	-16.06	0.452	0.474	4.92
Sacramento PMSA, CA	0.217	0.169	-22.33	0.276	0.264	-4.29
Yolo PMSA, CA	0.780	0.828	6.13	0.610	0.637	4.50
Salinas MSA, CA	0.651	0.726	11.51	0.396	0.417	5.50
San Diego MSA, CA	0.197	0.176	-10.39	0.499	0.492	-1.40
Oakland PMSA, CA	0.473	0.435	-8.06	0.265	0.238	-9.96
San Francisco PMSA, CA	0.356	0.299	-15.94	0.451	0.443	-1.86
San Jose PMSA, CA	0.421	0.386	-8.30	0.721	0.723	0.15
Santa Cruz-Watsonville PMSA, CA	0.194	0.249	28.82	0.349	0.355	1.70
Santa Rosa PMSA, CA	0.545	0.566	3.87	0.403	0.410	1.79
Vallejo-Fairfield-Napa PMSA, CA	0.572	0.567	-0.86	0.550	0.539	-1.96
Visalia-Tulare-Porterville MSA, CA	0.457	0.424	-7.14	0.444	0.467	5.18
SLO-Atasc-Paso Robles MSA, CA	0.683	0.616	-9.87	0.385	0.376	-2.31
San Barb-Santa Maria-Lom MSA, CA	0.496	0.466	-6.08	0.499	0.503	0.77
Stockton-Lodi MSA, CA	0.920	0.903	-1.81	0.547	0.538	-1.55
Yuba City MSA, CA	0.733	0.705	-3.79	0.224	0.241	7.62
Boulder-Longmont PMSA, CO	0.327	0.270	-17.58	0.599	0.571	-4.59
Colorado Springs MSA, CO	0.674	0.637	-5.54	0.708	0.704	-0.65
Denver PMSA, CO	0.545	0.544	-0.21	0.288	0.257	-10.65
Fort Collins-Loveland MSA, CO	0.345	0.326	-5.66	0.471	0.471	-0.10
Grand Junction MSA, CO	0.205	0.196	-4.63	0.312	0.366	17.27
Greeley MSA, CO	0.824	0.749	-9.10	0.459	0.442	-3.80
Pueblo MSA, CO	0.000	0.000	7.97	0.802	0.796	-0.75
Las Vegas NV & AZ, MSA	0.093	0.046	-50.81	0.303	0.306	1.00
Reno NV, MSA	0.217	0.190	-12.34	0.526	0.521	-0.92
Albuquerque MSA, NM	0.400	0.428	6.96	0.658	0.618	-6.12
Las Cruces MSA, NM	0.235	0.239	1.52	0.458	0.450	-1.87
Santa Fe MSA, NM	0.395	0.505	27.91	0.477	0.479	0.35
Eugene-Springfield MSA, OR	0.095	0.077	-19.11	0.556	0.570	2.43
Medford-Ashland MSA, OR	0.167	0.138	-17.55	0.321	0.330	2.94
Portland-Vancouver PMSA, OR	0.217	0.208	-4.30	0.319	0.317	-0.54
Salem PMSA, OR	0.392	0.387	-1.12	0.388	0.384	-1.00
Provo-Orem MSA, UT	0.386	0.293	-24.09	0.586	0.564	-3.68
Salt Lake City-Ogden MSA, UT	0.404	0.254	-37.06	0.229	0.210	-8.03
Bellingham MSA, WA	0.092	0.076	-16.90	0.408	0.395	-3.35
Bremerton PMSA, WA	0.038	0.075	99.76	0.201	0.170	-15.45
Olympia PMSA, WA	0.122	0.121	-0.88	0.210	0.194	-7.68
Richland-Kennewick-Pasco MSA, WA	0.692	0.624	-9.89	0.632	0.629	-0.42
Seattle-Bellevue-Everett PMSA, WA	0.055	0.042	-23.60	0.331	0.315	-4.71
Spokane MSA, WA	0.543	0.523	-3.79	0.490	0.450	-8.15
Tacoma PMSA, WA	0.055	0.047	-13.42	0.301	0.266	-11.80
Yakima MSA, WA	0.586	0.612	4.38	0.290	0.298	2.61

Table 5: Year that Type of Urban Containment Policy (UCP) Began in a Western Metropolitan Area

Western Metropolitan Areas with an Urban Containment Policy (UCP)	<u>Type of UCP</u>		
	Closed-Region Containment	Open-Region Containment	Isolated Containment
Yuma AZ, MSA			1996
Chico-Paradise CA, MSA			1983
Fresno CA, MSA			1984
Sacramento CA, MSA			1993
San Diego CA, MSA	1979		
San Jose CA, MSA			1972
Santa Rosa CA, PMSA			1996
Vallejo-Fairfield-Napa CA, PMSA			1980
Visalia-Tulare-Porterville CA, MSA			1974
San Luis Obispo-Atascadero-Paso Robles CA, MSA		1981	
Santa Barbara-Santa Mraia-Lompoc CA, MSA			1989
Yolo CA, PMSA			1987
Yuba City CA, MSA			1989
Boulder-Longmount CO, PMSA			1978
Fort Collins-Loveland CO, MSA			1980
Santa Fe NM, MSA		1991	
Eugene-Springfield OR, MSA	1982		
Medford-Ashland OR, MSA	1982		
Portland-Vancouver OR, PMSA	1979		
Salem OR, PMSA	1981		
Bellingham WA, MSA	1992		
Olympia WA, PMSA	1992		
Seattle-Bellevue-Everett WA, PMSA	1992		
Tacoma WA, PMSA	1992		
Yakima WA, MSA	1992		