



**A report on quantifying the
role of the state's population boom**

Presented at CAPS 2000 Conference—*Waking from the Dream:
Population and the Environment at the Millennial Edge*

**August 13, 2000
University of Southern California**

by Leon Kolankiewicz and Roy Beck

About the Authors

Leon Kolankiewicz and Roy Beck are co-authors of

“The Environmental Movement's Retreat from Advocating U.S. Population Stabilization (1970-1998): A First Draft of History,” *Journal of Policy History*, Vol.12, No.1, 2000 (Pennsylvania State University Press).

LEON KOLANKIEWICZ is a national environmental/natural resource planner and a former planner with the Orange County (CA) Environmental Management Agency. He has a B.S. in forestry and wildlife management from Virginia Tech and an M.S. in environmental planning and natural resources management from the University of British Columbia. He has worked as an environmental professional for more than two decades, including stints with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Environmental Conservation, Alaska Department of Fish and Game, University of Washington, University of New Mexico, and as a national parks technical advisor with the Peace Corps in Central America. He has written more than 70 articles and reports and is the author of *Where the Salmon Come to Die: An Autumn on Alaska's Raincoast* (Boulder, Colorado: Pruett, 1993).

ROY BECK is a Washington D.C. public policy analyst and the director of NumbersUSA.com, an Internet organization that tracks the role of each Member of Congress in forcing or reducing U.S. population growth. He is the author of four books on U.S. population, the environment, ethics and politics. His articles have appeared in scores of academic books and publications such as the *Atlantic Monthly*. A graduate of the University of Missouri School of Journalism, he was one of the nation's first environment-beat newspaper reporters in the 1960s. As Chief Washington Correspondent of the Booth Newspapers chain in the 1980s, he covered some of the decisions by Congress to speed up U.S. population growth. For the past decade, U.S. population issues have been his primary focus of research, writing, and speaking.

Copyright © 2000 by NumbersUSA.com
Fourth Printing

Table of Contents

Executive Summary	4
1. Introduction	10
1.1 Biodiversity hotspot.....	10
1.2 Anti-sprawl effectiveness depends on correct targeting.....	11
1.3 No need for abstract debate.....	11
2. Defining and measuring ‘Overall Sprawl’	12
2.1 Quality vs. Quantity Measurements.....	12
2.2 Census Bureau’s ‘Urbanized Areas’.....	12
2.3 Period of study.....	13
3. ‘Per Capita Sprawl’ alone cannot explain Overall Sprawl	14
3.1 Many reasons for Per Capita Sprawl.....	14
3.2 Per capita land consumption growth falls far short of total land growth percentage.....	16
4. The population growth factor and limits of forced density	17
4.1 Comparing population growth with per capita consumption growth.....	18
4.2 California’s extraordinary population growth.....	20
4.3 Population growth without sprawl would still enlarge ecological footprint.....	20
5. Analyzing the data	21
6. California Findings	22
6.1 Population growth related to 100% of sprawl in most cities.....	22
6.2 Los Angeles suggests limits of ‘the denser the better’ approach...	24
7. Conclusion	26
8. Appendix A: California Urbanized Areas raw data	28
Appendix B: The Census Bureau’s Urbanized Areas data.....	30
Appendix C: Calculating per capita land consumption.....	31
Appendix D: The Holdren apportioning methodology.....	32
Appendix E: Accounting for distortions by aggregate data.....	37
Appendix F: Population growth without sprawl.....	40
Endnotes	41

Sprawl in California

Executive Summary

KEY OVERALL FINDINGS

While there has been scattered debate about whether rising consumption or population growth is primarily responsible for California's urban sprawl, this study breaks new ground by actually attempting to quantify the role of each.

The study found that:

- California's population boom has been the No. 1 factor in the state's relentless urban sprawl, even though most anti-sprawl efforts exclusively target consumption factors.
- The supposedly gluttonous appetite of California citizens for more and more urban space per resident has in fact played little role in the sprawl. In most Urbanized Areas, land per resident did not grow at all – and it usually shrank in both the central city and in the suburbs. Thus, the average Californian was consuming land in an increasingly environmentally responsible way; but there were so many more Californians each year that sprawl marched ever outward.
- The volatile growth of California's population far outweighed the sprawl effect of all other factors combined.

[The period of study was the most recent two decades for which comprehensive government data are available (1970-90).]

WHY THIS STUDY IS IMPORTANT

As governmental agencies, public officials, think tanks, corporations and advocacy groups devote more and more resources to taming California's sprawl, the success of their efforts depends on their accurately assessing why the state's sprawl occurs.

The authors embarked upon this study after a literature search found that media stories, advocacy programs, governmental reports and political statements about sprawl (1) have rarely stated that California's population growth is a significant factor in sprawl and (2) have virtually ignored the possibility that slowing – or stopping – population growth might be an important tool in combating sprawl.

Thus, the finding by this study that population growth was the overwhelming factor in the state's sprawl challenges the strategy of the anti-sprawl movement. And it points anti-sprawl advocates toward a new tool that if wielded successfully, would help their efforts to be more effective.

Effectively taming sprawl is of utmost importance to the future of California's natural environment and human quality of life. For most urban Californians, continuing sprawl results in a direct personal cost of ever-worsening traffic congestion and gridlock. Aggravated traffic congestion alone has the potential to make Californians miserable enough to consider fleeing the state for some semblance of "greener pastures" in other less crowded western states. The greener pastures of Oregon, Washington and Colorado, and the brown deserts of Nevada and Arizona, are rapidly being paved over to accommodate the crush of ex-Californians.

Inside California, the population build-up not only makes life more miserable for human residents but it is having a devastating effect on the state's natural resources. The "ecological footprint" of each Californian includes not only the rural land on the edges of cities that gets urbanized but also far-removed rural lands and habitats that provide for each new Californian's food, fiber, minerals, energy and other resources. Thus, the urban sprawl and spreading ecological footprints of millions of additional Californians have turned the state into one of the Earth's "biodiversity hotspots." That is, comparatively speaking, a very high fraction of the state's unique and endemic plant and animal species – and the living communities and ecosystems they comprise – are imperiled by human activity and development associated with Californians' vast numbers and colossal consumption.¹

WHAT WAS MEASURED

Sprawl occurs when cities and suburbs expand beyond their boundaries and urbanize rural land at their edges. Each recent decade, California sprawl has degraded hundreds of square miles of some of the most scenic, fertile and biologically rich land in the country.

To determine how that has happened, the authors solely relied on the U.S. Bureau of Census's painstaking calculations for each Urbanized Area of more than 50,000 residents. This is done only once a decade, a couple of years after the national census.

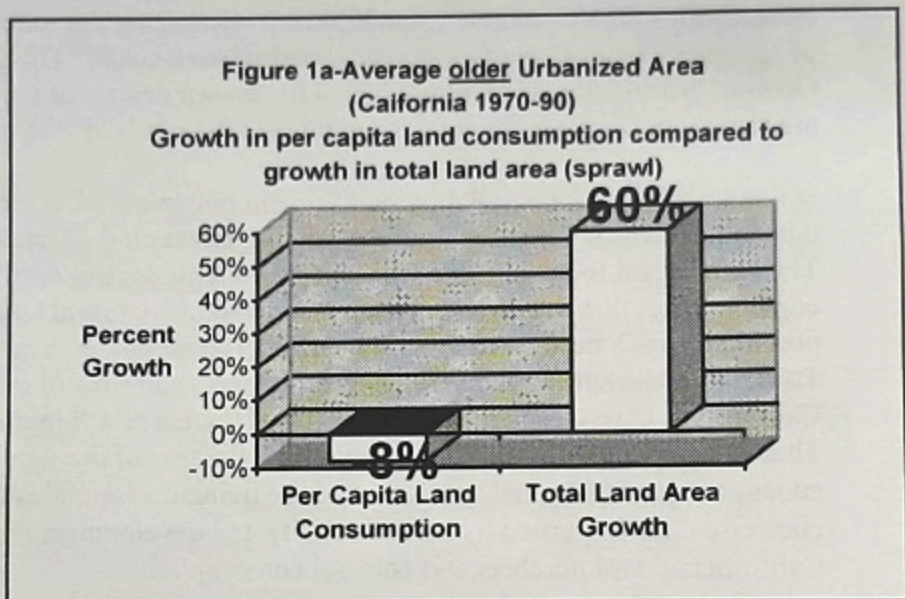
This study – a part of a larger national study that will be released later this year – examined the 28 Urbanized Areas in California for which there were at least 10 years of data.

In each case, the study divided the overall sprawl between that which was related to growth in per capita land consumption and that which was related to population growth.

PER CAPITA CONSUMPTION FACTORS CAN'T EXPLAIN OVERALL SPRAWL

The study first checked to see if the data support the apparent assumption of most anti-sprawl efforts that per capita consumption factors are responsible for all or most sprawl.

The combined effect of all urban planning, development, transportation, business and consumer decisions that influence consumption shows up in the statistic that tells us how much urban land is



used on average for each resident. If that amount of land grows, a city has "Per Capita Sprawl." A city can have no population growth at all, and still have considerable Overall Sprawl if the amount of land per resident is growing.

If Per Capita Sprawl were the sole factor in Overall Sprawl in California, the percentage growth of one would be the same for the other; for example, if per capita land consumption grew by 13%, total land consumption would also grow by 13%. Or if per capita land consumption growth were the overwhelming factor, its percentage growth would at least be close to that of Overall Sprawl.

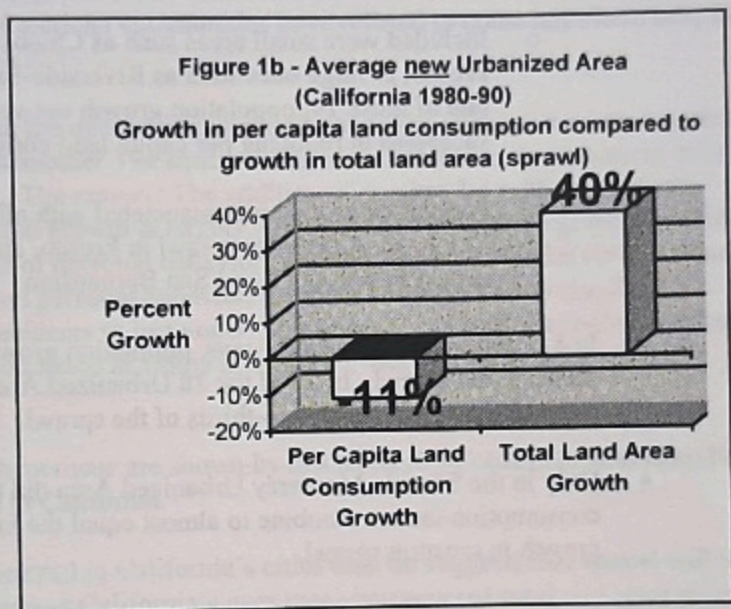
But when we found these two percentages in Census Bureau data and placed them side by side [see Tables 1a and 1b], we learned:

- Not a single one of California's 28 Urbanized Areas had a Per Capita Sprawl percentage that was even close to being as high as the Overall Sprawl percentage.

- On average, the older Urbanized Areas had no per capita consumption growth. Per capita land consumption actually declined by 8%. Despite that, the average older area sprawled (increased its total land area) by 60% over the two decades of study. [See Figure 1a.]
- The average new Urbanized Area also reduced the amount of land per resident (by 11%) while the total land area expanded by 40% over a single decade. [See Figure 1b.]

This simple comparison of U.S. Census Bureau data starkly reveals why Smart Growth efforts in California are likely to fail to stop sprawl if they focus virtually entirely on factors that cause per capita land consumption growth.

It is not that Smart Growth efforts are focused on the wrong factors but that many of them are focused too narrowly. Obviously, there is another factor involved in sprawl, and that factor is population growth.



SPRAWL AND 28 CALIFORNIA URBANIZED AREAS

When we compared population growth with growth in per capita land consumption in each Urbanized Area, we discovered the following:

- In 19 of the 28 Urbanized Areas of the state, growth in per capita land consumption did not appear to be related to *any* of the sprawl – because there *was* no growth in consumption by the average resident. It was population growth that propelled the sprawl.
 - For example, average land consumption in the San Diego Urbanized Area fell from 0.203 acre (about one-fifth of an acre) to 0.188 acre (about one-sixth of an acre) per resident. But San

Diego still devoured another 309.5 square miles of adjoining rural land as it added 1.1 million residents.

- Although residents of Palm Springs remained some of the largest urban land consumers in the nation, average land consumption plummeted from 0.607 acre in 1970 to 0.445 acre in 1990. Nonetheless, Palm Springs still sprawled by more than 40% — because of a burgeoning population.
- With no growth in per capita consumption, population growth was the factor related to 100% of the sprawl in those 19 Urbanized Areas.
 - Included were small areas such as Chico, to medium ones such as Fresno, to large ones such as Riverside-San Bernardino. In every one of those 19, population growth outweighed all Smart Growth successes in reducing per capita land consumption.
 - Population growth was associated with all of the 29% sprawl in Chico, all of the 68% sprawl in Fresno, and all of the nearly 50% sprawl in Riverside and San Bernardino.
- In 8 of the other Urbanized Areas, population growth was the dominant factor in the sprawl. In 27 of the 28 Urbanized Areas, population growth was related to more than two-thirds of the sprawl.
- Only in the Seaside-Monterey Urbanized Area did the some two dozen consumption factors combine to almost equal the influence of population growth in creating sprawl.
- Looking at the combined sprawl of all 28 of the California Urbanized Areas, the standard apportioning formula we used indicated that 95% of the sprawl was related to population growth.

Only 5% of the sprawl was related to growth in the per capita land consumption which is the focus of nearly all anti-sprawl efforts.

IMPLICATIONS

That population growth is correlated with 100% of sprawl for so many California cities is a sign of some victory in the pursuit of the “densification” goals of conventional anti-sprawl efforts. It means that, for whatever reason, every one of those Urbanized Areas succeeded in stopping increases in per capita land consumption.

Of course, it is theoretically possible for a while to have population growth and no sprawl by forcing all new and old residents to remain within the confines of current urban land boundaries. But no American community anywhere has shown an inclination to do that.

Exhibit A of the limits to how far Americans will go in cramming additional people into their neighborhoods is Los Angeles. No city in America may be a better model of the Smart Growth goal of attempting to restrain sprawl by channeling population growth into ever-denser urban settlements. Between 1970 and 1990, per capita land consumption fell until the Los Angeles Urbanized Area was the most densely populated in the country. No other urban area provided so little land per resident (0.110 acre). Most American communities have refused to come anywhere near the L.A. densities.

Yet despite accepting the densest living conditions in the country, the Los Angeles area sprawled across another 394 square miles of orchards, farmland, natural habitat and other rural land. The reason? The addition of another 3.1 million residents. California's population growth is largely a function of federal immigration policies and national patterns of personal behavior, including fertility. Under current trends in federal policies and personal behavior, California is projected to rise from its current 35 million residents to just under 50 million in 2025. At that point, California will be as densely populated as China is now, and with no end in sight to rapid population growth.²

These population phenomena are shown by this study to be central to understanding the future of sprawl in California.

Nothing that has occurred in California's cities thus far suggests that sprawl will not continue its march across California's ever-more beleaguered rural and open spaces. In the process, the state's environment and quality of life for residents will pay an ever-higher price for the nation's unwillingness to stabilize its population.

This study has provided quantitative evidence in support of the common sense perception: Population growth is a significant factor in California's deplorable sprawl problem.

Studies and plans from state commissions, think tanks, universities and advocacy groups that purport to offer blueprints for combating sprawl without dealing with population growth look either naïve, foolish or deceptive in light of the findings of this study.

Sprawl in California

A report on quantifying the role of the state's population boom

1. INTRODUCTION

Urban sprawl in California continues to destroy and threaten some of the most important ecological, agricultural and scenic land in the world.

In recent decades, the state's urbanized areas burst outward in an explosion of sprawl that consumed countryside at a breakneck pace. Thousands of square miles of orchards, rangeland, farmland and natural habitats were covered by concrete, asphalt and the structures they underlie.

This has occurred at the same time California's population has expanded from around 10 million in 1950, to 20 million in 1970, to 30 million in 1990, to 35 million in 2000, with no end in sight.

Were the two California phenomena – massive population growth and massive sprawl – related? Or was it primarily coincidental that they have occurred at the same time?

Coincidental, say many anti-sprawl enthusiasts. They argue that it is the increasingly gluttonous appetite of individual Californians for bigger houses, bigger lots, more cars, more parking lots and more roads that is the main culprit behind the sprawl.

Others argue that simple common sense suggests that population is a major factor in sprawl. After all, those new subdivisions spreading like wildfire across much of California are not being built just for the heck of it but to house more people – roughly half a million additional people each year and five million each decade.

1.1. Biodiversity hotspot

Regardless of the cause, urban sprawl has made California one of the Earth's "biodiversity hotspots." A frighteningly high fraction of the state's unique and endemic plant and animal species – and the living communities and ecosystems they comprise – are imperiled by human activity and development associated with Californians' vast numbers and colossal consumption.³

Despite some of the nation's strongest efforts to tame sprawl, hundreds of additional square miles of the state's rural land are churned under by the forces of urbanization each decade. The ecological as well as the quality-of-life future of California depends on efforts to protect the state's land resources.

1.2. Anti-sprawl effectiveness depends on correct targeting

But to be effective, anti-sprawl efforts must be targeted at the factors that are most responsible for the encroachment on open spaces, natural habitats and farmland.

Approximately two dozen major factors have been suggested as culprits in sprawl:

1. One factor is population growth.
2. All the other factors combine to create growth in per capita land consumption – in other words, an increase in the average amount of urbanized land used by each resident of a city.

The relative contributions of the population factor and the combined consumption factors must be understood if anti-sprawl resources are to be used efficiently and effectively. And understanding is difficult without quantification.

The present report attempts to quantify the relative contributions of items (1) and (2) during the most recent 20-year period for which reliable and comprehensive data are available (1970-90).

1.3. No need for abstract debate

The authors embarked upon this study after a literature search found that media stories, advocacy programs and political statements about sprawl in the last few years have contained very few references to population growth as a significant factor. Nearly all public anti-sprawl efforts have been aimed at the factors that increase per capita land consumption.

Does growth in per capita land use explain virtually all of California's sprawl, as conventional anti-sprawl efforts suggest? Or, rather, is population growth a significant – even dominant – factor?

While there has been little public discussion of this question, acrimonious debate has sometimes ensued when the question has been raised. Arguments on all sides have tended to involve either abstract assertions or non-contextual anecdotes.

This kind of debate is needless, for it is quite possible to quantify the relative roles of population growth and of the combined per capita consumption factors.

2. DEFINING AND MEASURING 'OVERALL SPRAWL'

To begin this process of quantification, we must know what we are measuring when we speak of sprawl.

2.1. Quality vs. Quantity Measurements

Sprawl can be measured for both quality and quantity (amount). Measures for the quality of urban expansion include:

- 1) its low-density character, in contrast to compact urban cores;
- 2) its chaotic, or unplanned nature;
- 3) its dependence on the automobile; and
- 4) its connection with the decay of inner cities.

This study of California's urban areas, though, limits itself to measuring the amount of urban sprawl.

We use the term "Overall Sprawl" to refer to the increase of the total size of the land area of a city and its suburbs. If an urban area covered 10 square miles previously and now covers 12 square miles, we say that the city and its suburbs over that period of time have "sprawled 2 square miles."

Overall Sprawl is the loss of rural land at the periphery of a city. This involves the conversion of open space or rural land into built-up, developed, or urbanized land over time, no matter the quality of that conversion.

We believe this measurement by amount most closely resembles the common American understanding of sprawl. If 25 square miles of open spaces around a city are urbanized, most Americans would consider that to be 25 square miles of sprawl, regardless of whether it was developed tastefully or not. They might be more offended by the sprawl if it included ugly development, but the amount of sprawl – and the number of rural acres lost – would be the same. Thus, using this measure, it is possible to have well-planned sprawl or chaotic sprawl, to have high-density or low-density sprawl, to have auto-dependent or mass-transit-oriented sprawl. But regardless of the quality of the sprawl, the amount of sprawl is measured by the square miles of rural land eliminated by urban development.

2.2. Census Bureau's 'Urbanized Areas'

Fortunately, it is easy to measure the amount of Overall Sprawl because of a painstaking process conducted by the U.S. Bureau of the Census for a half-century.

Our study relies solely on Census data on Urbanized Areas of the United States to measure Overall Sprawl.⁴

The Census Bureau uses a rather complicated but consistent set of conditions to measure the spread of cities into surrounding rural land. The Bureau calls the contiguous developed land of the central city and its suburbs an "Urbanized Area." It is possible to measure sprawl from decade to decade by noting the change in overall acreage of a specific Urbanized Area.

The Bureau introduced the Urbanized Area concept in the 1950 Census as part of its efforts to differentiate the urban and rural portions of the nation's population. It recognized 405 Urbanized Areas in the United States as of the 1990 Census.

[For further explanations of the Census Bureau's methods in measuring Urbanized Areas, see Appendix B]

Nearly every organization that addresses sprawl relies on these Urbanized Area data as the foundation of any quantification of total sprawl. What they haven't done is use those same data to quantify the relative roles of population growth and land consumption in generation of that sprawl.

As of 1990, there were 37 Urbanized Areas in California. Of those:

- 9 were designated for the first time in the 1990 Census. Prior to that, none of them met the Census Bureau's minimum threshold of 50,000 population. Because they were not Urbanized Areas during previous censuses and thus had no previously quantified land mass for comparison purposes, they were not included in this study.
- 12 became Urbanized Areas in 1980, when they first had enough population to qualify. [We call these "new Urbanized Areas."]
- 16 already were Urbanized Areas in 1970 at the beginning of the period examined by this study. [We call these "older Urbanized Areas."]

This study looks at all 28 of California's Urbanized Areas for which at least one decade of data exists.

2.3. Period of study

This study measures sprawl over the most recent two decades for which comprehensive government data are available (1970-90). But 12 of the 1980

Urbanized Areas were not large enough in 1970 to be counted as such. The data for those 12 cover only the 1980 to 1990 period.

Urbanized Area data are calculated only once every 10 years. Thus, our study can assess the march of sprawl only through 1990. The calculations from the 2000 Census will not be available for a couple of years, at which time we will update this report. Although it may be tempting to try to estimate sprawl for the 1990s, the authors feel the Census Bureau's Urbanized Area data are so superior to all other sources that the use of other sources to estimate sprawl would compromise the reliability of this study. An exception would be a regular land survey by the Natural Resources Conservation Service of the U.S. Department of Agriculture which is expected to report again in early 2001 for development from 1992 through 1997. This survey—the National Resources Inventory—does not look at specific Urbanized Areas but surveys the conversion of rural land into development throughout whole states, providing a useful comparison for the urban-only data of the Census Bureau. We will include this data in subsequent reports, including a forthcoming one that looks at sprawl nationwide.

3. 'PER CAPITA SPRAWL' ALONE CANNOT EXPLAIN OVERALL SPRAWL

3.1. Many reasons for Per Capita Sprawl

Per capita urban land consumption is not limited to the size of a person's house lot or to a person's proportion of the land covered by an apartment complex. It also includes a portion of all the other land that has been converted from rural to urban use to provide for jobs, recreation and entertainment, shopping, parking, transportation, storage, government services, religious and cultural opportunities, waste handling, and education.

So the level of per capita land consumption is based both on direct individual decisions and behavior, and on collective decisions made through the government and the marketplace. The effect of all urban planning, development and transportation decisions shows up in the per capita land consumption figure.

In the end, per capita land consumption is calculated by dividing the total urban land area by the total number of residents. The resulting per capita figure provides a net result view of at least two dozen major factors that have been suggested as causes of consumption changes.

[See Appendix C for more on calculating per capita land consumption.]

For several decades, per capita land consumption in most U.S. cities has been growing. At least two dozen factors have been advanced as being among the reasons more and more urban land is required for each resident. The factors include:

- price of gasoline,
- inadequate urban planning and zoning,
- local and federal tax incentives and subsidies,
- crime and quality of schools in the central cities,
- mortgage interest tax deductions,
- racial and ethnic tensions,
- the Interstate Highway system and other transportation decisions,
- developer preferences,
- declining size of households caused by factors such as increased divorce rate, lowered marriage rate, later marriages, increased independence of young adults, increased longevity for women,
- consumer preferences for larger houses and yards, and
- affluence.

A nationwide "Smart Growth" movement has emerged to fight sprawl by going after some of those many causes of Per Capita Sprawl. It is composed of a broad-based collection of urban planners, environmentalists, charitable foundations, historic preservationists, "new urbanists," affordable housing advocates, local, state and federal government agencies and elected officials, churches, local growth control activists, and even some of the home building industry. Many variations can be found among their proposals but all advocate tools that would stop the increase in per capita land consumption.

It is very difficult to measure precise effects of trying to change each of the planning, consumption and other behavioral factors mentioned above. But we can know the overall effect of all those factors together by looking at the simple statistic of the average amount of urban land per resident in an Urbanized Area. If that per capita land consumption figure goes up markedly, then we know that Smart Growth efforts related to the above factors are failing to achieve their desired result. But if the per capita figure grows only slightly, or remains the same, and especially if it goes down, the above factors are collectively moving in the direction desired by the anti-sprawl leaders. It is difficult to know whether their efforts made the difference, but we do know in such cases that per capita land consumption patterns are being brought under control.

The per capita consumption figure is a crucial gauge of the nature of sprawl in any Urbanized Area.

3.2. Per capita land consumption growth falls far short of total land growth percentage

When we look at Per Capita Sprawl figures for California's cities, we find that – for whatever reasons – the goal of anti-sprawl programs to stop per capita growth has been substantially met. Most Urbanized Areas had no per capita consumption growth at all.

But Overall Sprawl in California's Urbanized Areas continued at a raging pace – consuming more than 1,600 square miles of rural land during the period of study.

It appears that anti-Per Capita Sprawl efforts in California have been largely successful. But anti-Overall Sprawl efforts have been an abysmal failure.

If Per Capita Sprawl were the sole cause of Overall Sprawl, the percentage growth would be the same for both. For example, if per capita land consumption grew by 38%, total land consumption would also grow by 38%.

But in the Seaside-Monterrey Urbanized Area, per capita land consumption grew by 38% while the total land in the urban area grew by the far larger 97%. Where there was Per Capita Sprawl in California, it usually explained very little of the Overall Sprawl:

- The average older Urbanized Area had an 8% decrease in per capita land consumption but had Overall Sprawl of 60% (1970-90).
- The average new Urbanized Area had an 11% decrease in per capita land consumption but had Overall Sprawl of 40% (1980-90).
- Not a single one of California's 28 Urbanized Areas had a Per Capita Sprawl percentage that was even close to the Overall Sprawl percentage.

These facts starkly reveal why nearly all Smart Growth efforts are failing – and will continue to fail – to stop sprawl as long as they focus virtually entirely on factors that cause per capita land consumption growth.

It is not that Smart Growth efforts are focused on the wrong factors but that they are focused too narrowly. Obviously, there is another factor involved in sprawl. Without addressing that factor, Smart Growth programs as currently envisioned are designed to fall short of protecting the agricultural land and natural habitats surrounding cities.

4. THE POPULATION GROWTH FACTOR AND LIMITS OF FORCED DENSITY

For some reason, many otherwise intelligent observers seem to have a mental block that keeps them from understanding that the other factor in sprawl is population growth. The only factor that can make Overall Sprawl grow at a faster rate than the increase in per capita land consumption is population growth.

Despite the considerable complexity of sprawl in an urban area, nearly all of the complexity can be boiled down into what end up being two rather simple factors in an equation: The amount of Overall Sprawl in an area is equal to the change in per

**Table 1a – Older Urbanized Areas in California
Growth in Population, Per Capita Land Consumption,
and Total Land Area (1970 to 1990) ***

Urbanized Area	% Growth in Population	% Growth in Per Capita Land Consumption	% Growth in Land Area (Sprawl)
Bakersfield	72%	0%	72%
Fresno	72%	-3%	68%
Los Angeles	37%	-8%	25%
Modesto	117%	-30%	52%
Oxnard-Ventura	96%	-28%	41%
Riverside-San Bernardino	101%	-26%	49%
Sacramento	73%	-21%	42%
Salinas	96%	18%	131%
San Diego	96%	-7%	81%
San Francisco-Oakland	21%	6%	28%
San Jose	40%	-13%	22%
Santa Barbara	40%	-6%	32%
Santa Rosa	159%	-32%	76%
Seaside-Monterrey	43%	38%	97%
Simi Valley	125%	-16%	89%
Stockton	63%	-3%	58%
Mean of percentages **	78%	-8%	60%
Weighted average***	46%	-6%	38%

* The Census Bureau classified these as Urbanized Areas in 1970 or earlier.

** Mean of the percentages.

*** For "% Growth in Population," is the % change in total population of all 16 cities; "% Growth in Per Capita Land Consumption," is the % change in total area of all 16 cities divided by the total population; "% Growth in Total Land Area" is the % change in the sum of all land areas between 1970 and 1990.

capita land consumption multiplied by the change in population. In most American cities, growth has occurred in both factors.

4.1. Comparing population growth with per capita consumption growth

We can learn a lot about the relative importance of each of these factors in California's sprawl by lining up the growth percentages side by side. Fortunately, both the per capita land consumption change and the population change for each California Urbanized Area are readily available from the Census Bureau.

An observer doesn't have to be a mathematician to see that population growth has been a far greater factor in California's Urbanized Areas than has been per capita land consumption growth.

**Table 1b –New Urbanized Areas in California
Growth in Population, Per Capita Land Consumption,
and Total Land Area (1980 to 1990) ***

Urbanized Area	% Growth in Population	% Growth in Per Capita Land Consumption	% Growth in Land Area (Sprawl)
Antioch-Pittsburg	78%	33%	137%
Chico	38%	-6%	30%
Fairfield	44%	-12%	27%
Hemet-San Jacinto	64%	-5%	56%
Lancaster-Palmdale	232%	-45%	84%
Napa	15%	-4%	11%
Palm Springs	94%	-27%	42%
Redding	48%	-8%	37%
Santa Cruz	24%	8%	33%
Santa Maria	55%	-29%	10%
Visalia	42%	-22%	10%
Yuba City	26%	-16%	7%
Mean of percentages	63%	-11%	40%
Weighted average**	60%	-11%	42%

* The Census Bureau classified these as Urbanized Areas in 1980.

** Mean of the percentages.

*** For "% Growth in Population," is the % change in total population of all 12 towns; "% Growth in Per Capita Land Consumption," is the % change in total area of all 12 towns divided by the total population; "% Growth in Total Land Area" is the % change in the sum of all land areas between 1980 and 1990.

In Tables 1a and 1b, we can compare the growth in the left column (population) with the growth in the middle column (per capita consumption) and see the huge disparity between the two in all but Seaside-Monterrey where the two factors contributing to Overall Sprawl are roughly equal.

When comparing the two growth factors, it becomes apparent that any successful effort in California to reduce the percentage growth in the right column (Overall Sprawl) must place a major emphasis on slowing population growth.

Figures 2a and 2b look at the average older and new Urbanized Area in terms of the two factors that combine to cause Overall Sprawl. By themselves,

the planning, zoning and all other ingredients that affect the amount of urban land per resident should not have created any Overall Sprawl. Per capita land consumption in both older and new areas, on average, declined – by 8% and 11% respectively.

But the population in the average older Urbanized Area grew by 78% over two decades. Population grew by 63% over a single decade in the average new area.

