Chapter 6

Growth and Change Florida Style: 1970 to 2000

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In response to development patterns leading to what may be termed "urban sprawl," several local, regional, and state governments in the United States have embarked on growth management or urban containment strategies. These strategies typically aim to synchronize key public facilities with urban development pressures, preserve open spaces, and facilitate development in ways that preserve public goods, minimize public costs, and account for development impacts by those who cause them (Nelson and Dawkins, 2002; Nelson and Duncan, 1995). We refer the reader to Nelson and Dawkins (2002) for a review of how growth management and urban containment work and how they vary in application across the United States.

One of the cornerstones of urban containment is limiting development beyond an urban containment boundary such as an urban growth boundary, urban service limit, or (in the UK) urban growth stopline (see Easley, 1992). Development is restricted in one of two principal ways. First and foremost in all containment schemes is preventing the extension of urban facilities into the rural countryside, especially wastewater treatment provided via sanitary sewers. This restriction is sometimes but not always extended to public water systems.

The second and more difficult way is restricting actual density. In the Twin Cities (Minneapolis-St. Paul, MN), minimum lot size restrictions do not discourage low density urban development since lot sizes can range from one to five acres on septic systems with or without public water. Such small acreage development is perhaps the most pernicious of all forms of urban sprawl because it consumes land at a very rapid pace, removes land from a variety of open space uses, signals to farmers impending conversion to development, and exacerbates inefficient provision of services (Nelson, 1999). These are generally considered "weak" containment programs. At the other extreme is metropolitan Portland, Oregon, where development outside urban growth boundaries occurs only in "exception" areas (areas excepted from strict application of farm and forest use policies because they are already built or committed to low density uses) or in farms and forests where needed to manage a commercial-scale operation (which can range from about 20 acres for high-intensity nurseries to 160 acres for timber production). Such efforts have been considered "strong" containment programs.

Urban containment can also occur because of natural conditions. Honolulu, HI comes to mind because the city has virtually nowhere to expand. On the mainland, perhaps Los Angeles is the best example of natural containment since an ocean,

mountain ranges, and federally-owned desert hem in development. Phoenix can also be considered naturally contained because individual water wells are not financially feasible and government agencies own a majority of the land around that metropolitan area.

The Florida Context

As one of the pioneering states in passing growth management legislation, Florida (along with Oregon) has influenced several other states in the design and implementation of growth management strategies (DeGrove, 1992). Managing growth effectively involves balancing competing values for resource protection and economic development with the overall aim of furthering the public's welfare. To do this, Florida's 1985 Growth Management Act (GMA) depends on three complementary policies: consistency, concurrency, and compact development (Ben-Zadok, 2005). While these three policies collectively aim to affect orderly urban development, the GMA's objective of compact development lends itself to evaluation more easily than either consistency or concurrency. The coordination of city and county land use plans (consistency) and timely provision of public services for new development (concurrency) do not directly manifest themselves through urban form as does compact development.

This evaluation will focus on the Florida GMA's compact development policy, using historical trends in residential development densities as an indicator of whether population growth has been absorbed as dense, contiguous, urban, or potentially in-fill type land uses. Compact development should be detectable at the census tract level, where urban land use densities have been achieved or increased over time compared to suburban or exurban land use densities. This analysis focuses on residential development because it is a significant determinant of urban form, especially at the urban fringes of rapidly growing regions. Evidence that substantial amounts of Florida's growth have resulted in urban land use densities is one indication that state, counties, and metropolitan areas have been successful at encouraging compact development.

Having implemented innovative land use regulation, growth management, and urban containment approaches, the State of Florida is seen as one of the growth management leaders among US states. Yet, little quantitative evidence exists to gauge the comparative success of Florida's strategies at the state or metropolitan scale that provides support for this assertion. This analysis intends to address this gap in the supportive literature by estimating the extent of urban development occurring within the State of Florida as well as its counties and metropolitan areas. To achieve this objective, the evaluation uses spatial analysis techniques within a geographic information system (GIS) to assess the location and extent of urban expansion (see Nelson and Sanchez, 2005). Using 1970, 1980, 1990, and 2000 census tract data, population density classifications were used to show changes in spatial patterns of urban, suburban, exurban, and rural settlement. The estimates for Florida MSAs are also compared with other selected US metropolitan areas to look at Florida's growth from a national perspective. The results are presented in both quantitative and graphic form. The following describes the methods used to generate the estimates of land use change.

Methods

We estimated land use change differently than prior work that measured changes in development patterns based on counties. The evaluation here requires a finer grain of geographic resolution; after all, many US counties contain a range of development densities from urban to suburban, exurban, and rural development. Our solution is to measure change in census tract population density over time, particularly change in urban classification status. To do this, we first classified all census tracts in Florida as urban, suburban, exurban, or rural based on certain residential density ranges. Density classifications were used to show patterns of urban (3,000+ persons/sq. mi.), suburban (1,000 to 3,000 persons/sq. mi.), exurban (300 to 1,000 persons/sq. mi.), and rural (<300 persons/sq. mi.). Based on prior conceptual work by Lang (1986) and Nelson (1992a, 1992b), classifications are relatively consistent with census criteria and practical observation. For example, we classify exurban census tracts as those with a residential density ranging from 300 to 1000 persons per square mile. At 2.5 persons per household, this implies 120 homes per square mile or an average of slightly more than 5 acres per home—clearly consistent with views on what constitutes urban-oriented rural residential densities (see also Daniels, 1999).

In order to model a realistic representation of urban form, the analysis interpolates population density information from census tracts, producing continuous value surfaces using GIS. There are several interpolation techniques available to do this within a GIS. To determine the most appropriate interpolation technique, we compared the three standard methods provided within ArcGIS 9.1 (Inverse Distance Weighting (IDW), Kriging, and Spline). Among these, the spline interpolation methodology[1] more effectively predicted changes in several test cases. This method was then used to predict the population density surface for the entire state of Florida and provide a descriptive analysis of land use change from 1970 to 2000. National or state parks, wetlands, or other protected lands were excluded from the land area and population density calculations. These areas were primarily in the Florida Managed Areas (FMA) program that the Florida Natural Areas Inventory (FNAI) has identified as having particular natural resource value and requiring protection or management for conservation purposes.[2] These areas represent approximately 20 percent of the total land area within Florida and have a significant impact on the amount of buildable land near urbanized areas in several counties.

Results

Using census tract data for 1970, 1980, 1990, and 2000, the analysis maps the locations of urban, suburban, exurban, and rural population densities and tabulates the square mileage for each of the four density categories for the entire state of Florida, the 19 metropolitan areas, and each of the 67 counties. Each section summarizes

1 More specifically, a spline-tension model was used. This surface produces a coarser surface with a better fit to data control points.

2 See the Florida Natural Areas Inventory web site at: http://www.fnai.org/ for more details on the program.

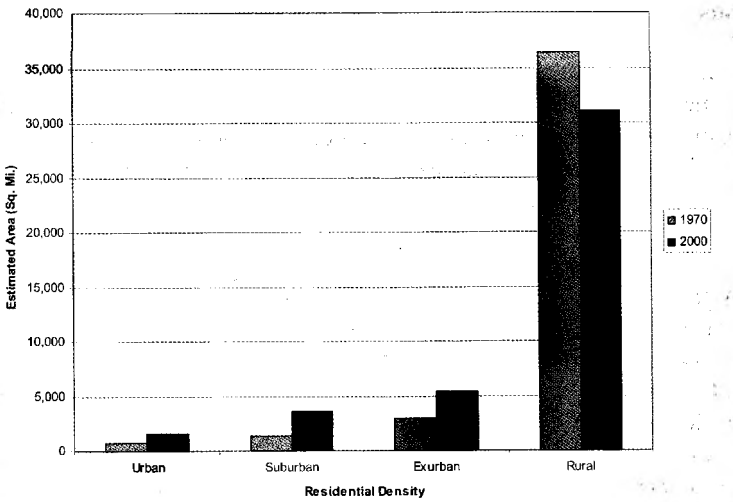

Figure 6.1 Florida land use/urban form change, 1970–2000

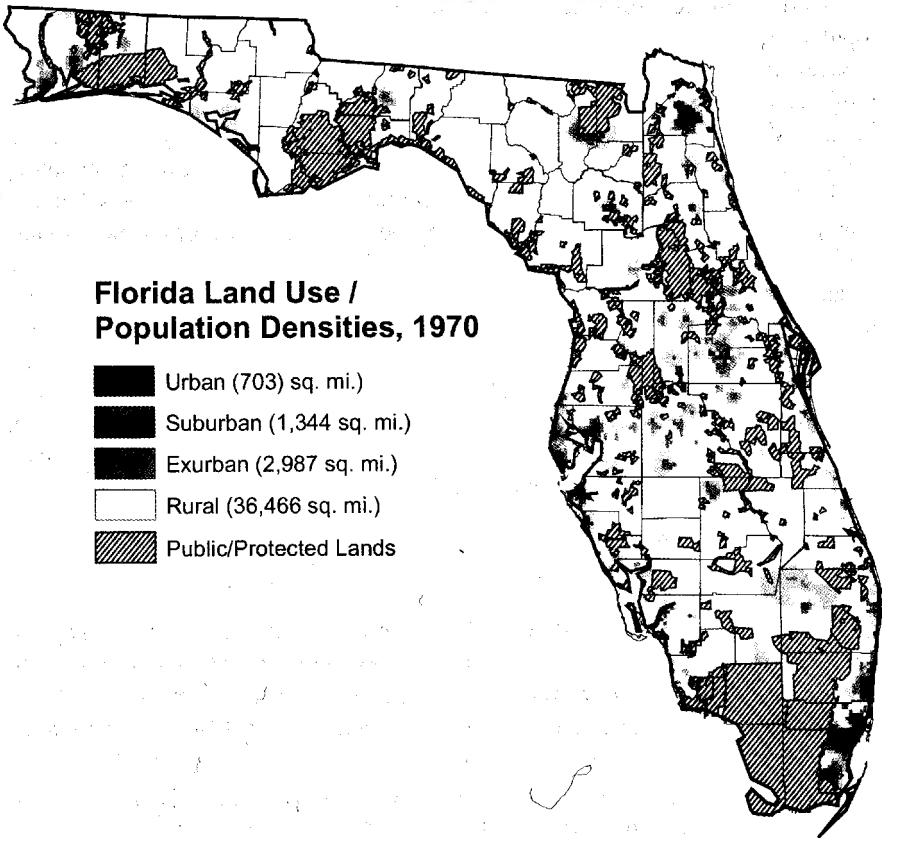

Figure 6.2 Florida population density, 1970

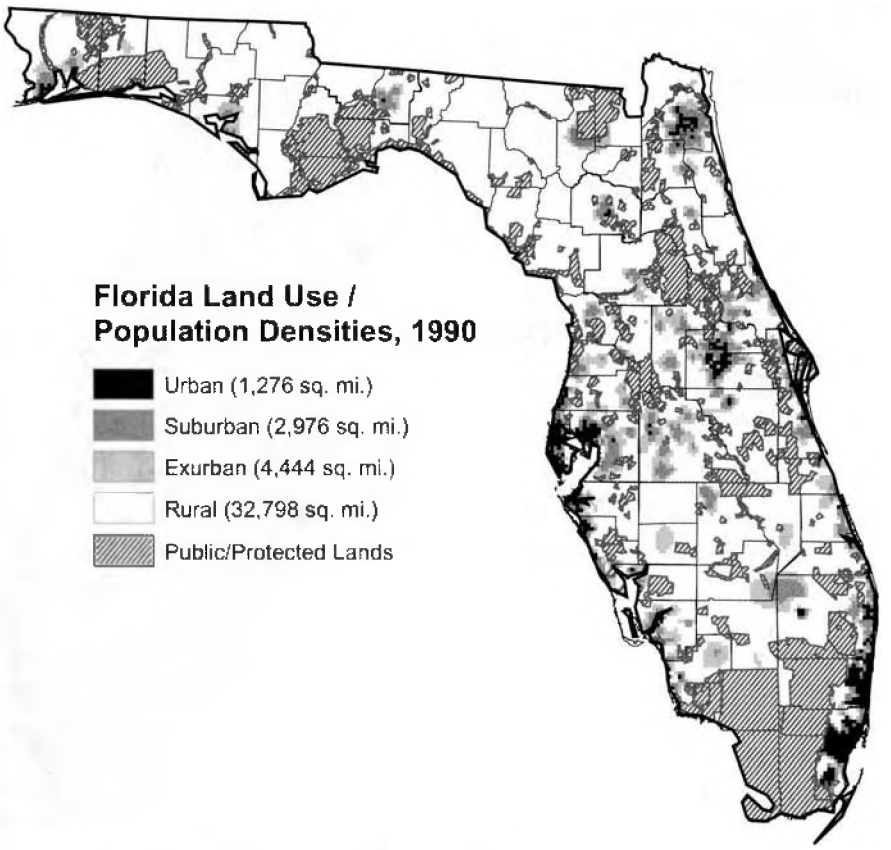

Figure 6.3 Florida population density, 1990

the estimates of land use change to report trends and also illustrates variable growth rates across the state.

Summary of Statewide Trends

Florida experienced very rapid population growth between 1970 and 2000. According to the US Census, the state had a population of 6,789,437 in 1970 and 15,982,824 in 2000 (a 135 percent increase), while the nation grew from 203,302,000 in 1970 to 281,422,000 in 2000 (a 38 percent increase). Five counties had population growth of over 500 percent during the 30 year period: They were Flagler (1018 percent), Hernando (669 percent), Osceola (583 percent), Collier (561 percent), and Citrus (515 percent). The slowest growing counties in the state were Franklin (39 percent), Madison (39 percent), Jackson (36 percent), and Gadsden (15 percent), which are all in the northern part of the state and were at or below the growth rate experienced by the United States. Overall the state has also experienced rapid growth in racial/ethnic minorities as well as relatively high rates of growth in persons of retirement age.

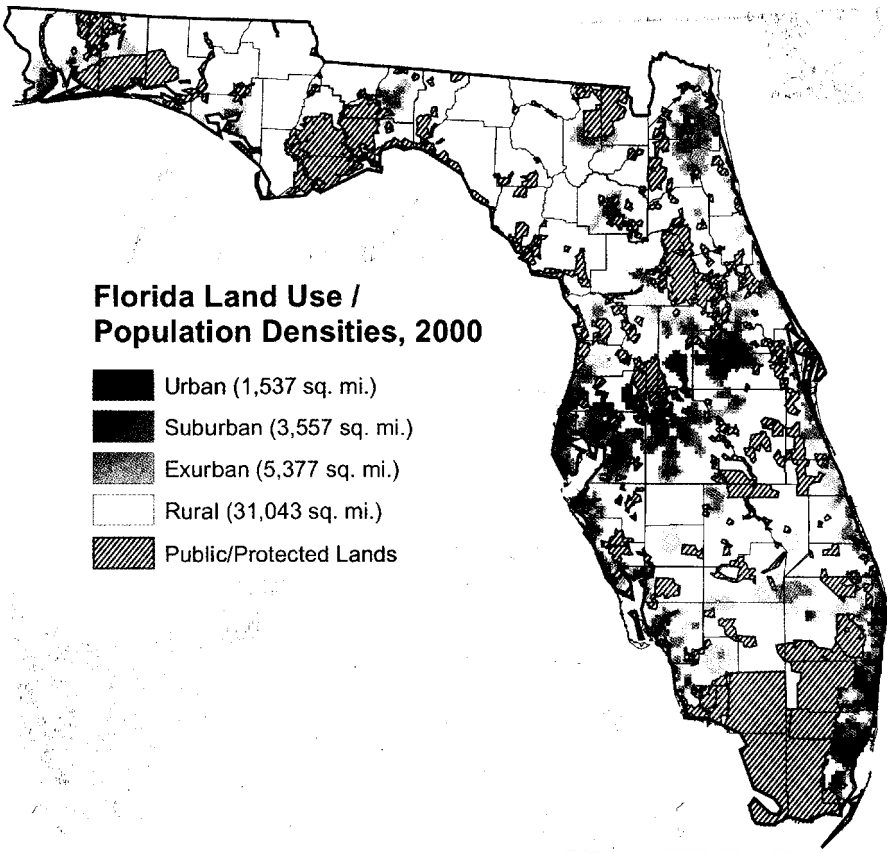

Figure 6.4 Florida population density, 2000

To accommodate this population growth, the amount of land at urban, suburban, and exurban densities increased 119 percent (834 square miles), 165 percent (2,213 square miles), and 80 percent (2,389 square miles), respectively. At the same time, Florida lost approximately 5,423 square miles (or 15 percent) of land at rural population densities.

For the purposes of this summary, the changes that occurred between 1970 and 1990 and between 1990 and 2000 were compared. The extent and location of high population densities (urban) and low densities (suburban and exurban combined) were compared. The period from 1970 to 1990 generally represents a pre-growth management (GM) urban containment stage and 1990 to 2000 represents a post-GM stage. High density land uses in the state grew by 4.1 percent annually[3] from 1970 to 1990 compared to 2.0 percent from 1990 to 2000. Low density areas grew by 3.6 percent annually from 1970 to 1990 compared to 2.0 percent from 1990 to 2000 (see Figures 6.2, 6.3, and 6.4). Significant growth occurred throughout Central Florida as well as along the southwest and southeast coastal areas, which are separated by the

3 Calculated as an average annual rate.

Table 6.1 High density land use rankings

Top 10 1970 to 1990 Annual High Density Change					*Top 10 1990 to 2000 Annual High Density Change*				
COUNTY	70–90 High	70–90 Rank	90–00 High	90–00 Rank	COUNTY	70–90 High	70–90 Rank	90–00 High	90–00 Rank
Sarasota	39.8%	1	0.0%	20	Leon	0.0%	15	20.0%	1
Okaloosa	21.5%	2	1.6%	16	Osceola	0.0%	15	15.0%	2
Manatee	20.4%	3	1.0%	18	Collier	0.0%	15	13.6%	3
Lee	13.6%	4	5.5%	8	Charlotte	0.0%	15	10.0%	4
Pinellas	9.6%	5	1.2%	17	Martin	0.0%	15	9.2%	5
Palm Beach	7.7%	6	7.2%	7	St. Lucie	0.0%	15	8.7%	6
Orange	5.7%	7	2.4%	12	Palm Beach	7.7%	6	7.2%	7
Polk	5.0%	8	0.0%	20	Lee	13.6%	4	5.5%	8
Broward	4.9%	9	2.2%	14	Volusia	3.1%	11	4.5%	9
Hillsborough	4.5%	10	2.3%	13	Seminole	0.0%	15	3.8%	10

Everglades National Park, the Big Cypress National Preserve, and the Everglades and Francis S. Taylor Wildlife Management Area.

Summary of County Trends

From 1970 to 1990, 15 of 67 counties added high density development more rapidly than they added low density development. By comparison, slightly more counties (18) added high density areas more rapidly than they added low density areas from 1990 to 2000. Nearly two-thirds of the counties had little estimated change in urban land uses in either period. The performance of counties between the periods from 1970 to 1990 and 1990 to 2000 was generally mixed: Counties that added high and low density land use at the fastest rates from 1970 to 1990 did not all continue the trend through 2000 (see Tables 6.1 and 6.2). Only Lee and Palm Beach counties

Table 6.2 Low density land use rankings

Top 10 1970 to 1990 Annual Low Density Change					*Top 10 1990 to 2000 Annual Low Density Change*				
COUNTY	70–90 Low	70–90 Rank	90–00 Low	90–00 Rank	COUNTY	70–90 Low	70–90 Rank	90–00 Low	90–00 Rank
Okeechobee	250.1%	1	0.6%	31	Walton	-4.9%	41	1732.4%	1
Monroe	135.5%	2	0.0%	34	Hardee	6.0%	17	144.5%	2
Hernando	84.4%	3	1.6%	25	Flagler	0.0%	33	30.9%	3
Collier	36.8%	4	2.7%	18	Wakulla	0.0%	33	24.2%	4
Pasco	20.0%	5	3.0%	15	Nassau	0.0%	33	12.7%	5
Martin	18.4%	6	0.3%	33	Sumter	3.5%	22	10.9%	6
St. Lucie	18.0%	7	1.6%	25	Alachua	7.5%	14	7.1%	7
Lee	15.7%	8	2.9%	16	Marion	13.6%	9	6.3%	8
Marion	13.6%	9	6.3%	8	Hendry	-1.3%	37	6.1%	9
Charlotte	10.3%	10	3.1%	14	St. Johns	7.9%	12	4.9%	10

Table 6.3 Florida metro areas—1970 to 1990 high density change

	70–90	90–00	*Containment Type*			
METRO	**High**	**High**	**Regional**	**Subregional**	**SA***	**SR***
Sarasota-Bradenton	29.9%	0.7%	X		X	
Fort Walton Beach	15.5%	1.4%		X		X
Fort Myers-Cape Coral	14.1%	5.8%		X	X	
Orlando	10.8%	3.4%		X	X	
Tampa-St. Petersburg-Clearwater	9.8%	1.4%		X	X	
West Palm Beach-Boca Raton	6.8%	6.6%	X		X	
Lakeland-Winter Haven	5.0%	0.0%				
Fort Lauderdale	4.6%	2.2%	X		X	
Daytona Beach	3.0%	4.4%				
Gainesville	2.6%	3.4%	X		X	
Miami	1.4%	0.1%	X		X	
Melbourne-Titusville-Palm Bay	0.9%	-1.2%	X		X	
Jacksonville	0.0%	1.7%		X	X	
Tallahassee	0.0%	20.0%		X	X	
Fort Pierce-Port St. Lucie	0.0%	9.9%	X		X	
Naples	0.0%	12.5%	X		X	
Ocala	0.0%	0.0%	X		X	
Punta Gorda	0.0%	10.0%				
Pensacola	0.0%	-1.7%			X	
ALL	4.1%	2.1%				

SA = strong accommodating, SR = strong restrictive (see Nelson and Dawkins, 2004)

were among the top counties for increasing high density land area during the periods from 1970 to 1990 and 1990 to 2000. On the other hand, only Marion County was among the leaders for increases in low density land uses during both time periods.

Summary of Metro Area Trends

From 1970 to 1990, eight of 19 metropolitan areas in Florida experienced higher rates of high density development compared to low density development (see Tables 6.3 and 6.4). On average, Florida metros added more high density area annually compared to low density development from 1970 to 1990 (4.1 percent versus 3.6 percent). From 1990 to 2000, high and low density development occurred at approximately the same annual rates (2.1 percent and 2.0 percent, respectively). This suggests that development during the 30-year period (1970 to 2000) was only slightly more likely to occur at urban densities, but also that the rates of high and low density development declined by about one-half from 1970 to 1990 and 1990 to 2000.

There was no evident relationship between the rates and types of growth and the types of existing growth management policies for each of the metros. We compared urban containment programs in terms of having regional (i.e., metro-wide) or subregional (i.e., county or local) focus. Regional programs are intended to

Table 6.4 Florida metro areas—1970 to 1990 low density change

	70–90	90–00	*Containment Type*			
METRO	**Low**	**Low**	**Regional**	**Subregional**	**SA***	**SR***
Naples	35.1%	2.8%	X		X	
Fort Pierce-Port St. Lucie	17.9%	1.2%	X		X	
Fort Myers-Cape Coral	16.2%	2.9%		X	X	
Ocala	13.4%	6.1%	X		X	
Punta Gorda	10.8%	2.7%				
Daytona Beach	10.5%	2.3%				
Gainesville	7.6%	7.3%	X		X	
Tallahassee	7.3%	1.3%		X	X	
Tampa-St. Petersburg-Clearwater	5.6%	1.9%		X	X	
Jacksonville	5.5%	1.7%		X	X	
Melbourne-Titusville-Palm Bay	4.5%	1.7%	X		X	
Lakeland-Winter Haven	3.5%	1.5%				
Sarasota-Bradenton	2.8%	2.4%	X		X	
Orlando	2.0%	0.8%		X	X	
Pensacola	1.3%	2.7%				
West Palm Beach-Boca Raton	0.9%	1.2%	X		X	
Fort Walton Beach	0.4%	4.5%		X		X
Fort Lauderdale	-0.9%	2.2%	X		X	
Miami	-1.4%	0.0%	X		X	
ALL	3.6%	2.0%				

SA = strong accommodating, SR = strong restrictive (see Nelson and Dawkins, 2004)

be more geographically comprehensive compared to more localized programs (see Nelson and Dawkins, 2004, for more detail on program types). Neither regional nor subregional policies distinguished metro growth patterns. In addition, the perceived strength of urban containment programs (accommodating versus restrictive) also did not distinguish metros, as there was only one metro (Fort Walton Beach) with a strong-restrictive program. That metropolitan area, however, experienced relatively higher rates of high density growth and almost the lowest rates of low density growth, suggesting the impact of a strong-restrictive program on promoting higher density development and discouraging low density growth.

The rates and types of growth for the 19 Florida metros were also compared to the patterns of growth experienced by 46 large metros across the United States. As might be expected, several Florida metros experienced rapid urban development equivalent to some of the fastest growing large metros around the nation. In fact, the Naples metro ranked second behind booming Las Vegas in terms of urban development and land consumption. Others ranking very high included Fort Myers-Cape Coral, Sarasota-Bradenton, Fort Pierce-Port St. Lucie, and Tallahassee. On the opposite end of the spectrum, Miami and Pensacola ranked at the bottom with Northeastern metros such as Rochester, Providence, Hartford, Buffalo, and Pittsburgh (see Table 6.5).

Table 6.5 Florida metro comparisons to other US metros (average annual change)

*Metropolitan Area**	1970–1990	1990–2000	1970–1990	1990–2000
	High Density		Low Density	
Las Vegas-Paradise, NV	15.7%	48.7%	9.1%	6.5%
NAPLES, FL	**0.0%**	**12.5%**	**35.1%**	**2.8%**
FORT MYERS-CAPE CORAL, FL	**14.1%**	**5.8%**	**16.2%**	**2.9%**
Riverside-San Bernardino-Ontario, CA	32.9%	4.1%	1.6%	0.0%
SARASOTA-BRADENTON, FL	**29.9%**	**0.7%**	**2.8%**	**2.4%**
FORT PIERCE-PORT ST. LUCIE, FL	**0.0%**	**9.9%**	**17.9%**	**1.2%**
TALLAHASSEE, FL	**0.0%**	**20.0%**	**7.3%**	**1.3%**
Phoenix-Mesa-Scottsdale, AZ	6.7%	6.6%	6.9%	7.4%
PUNTA GORDA, FL	**0.0%**	**10.0%**	**10.8%**	**2.7%**
Sacramento--Arden-Arcade--Roseville, CA	18.8%	2.8%	1.5%	0.2%
FORT WALTON BEACH, FL	**15.5%**	**1.4%**	**0.4%**	**4.5%**
GAINESVILLE, FL	**2.6%**	**3.4%**	**7.6%**	**7.3%**
Denver-Aurora, CO	4.8%	4.8%	8.1%	3.1%
DAYTONA BEACH, FL	**3.0%**	**4.4%**	**10.5%**	**2.3%**
OCALA, FL	**0.0%**	**0.0%**	**13.4%**	**6.1%**
TAMPA-ST. PETE-CLEARWATER, FL	**9.8%**	**1.4%**	**5.6%**	**1.9%**
Austin-Round Rock, TX	6.0%	4.5%	4.7%	2.9%
Atlanta-Sandy Springs-Marietta, GA	1.4%	5.6%	7.6%	3.6%
ORLANDO, FL	**10.8%**	**3.4%**	**2.0%**	**0.8%**
WEST PALM BCH-BOCA RATON, FL	**6.8%**	**6.6%**	**0.9%**	**1.2%**
Seattle-Tacoma-Bellevue, WA	3.6%	3.2%	4.4%	3.3%
San Diego-Carlsbad-San Marcos, CA	7.6%	2.4%	2.6%	-0.3%
Portland-Vancouver-Beaverton, OR-WA	3.3%	5.6%	2.0%	1.0%
San Antonio, TX	3.1%	3.9%	3.0%	1.8%
Dallas-Fort Worth-Arlington, TX	4.3%	3.6%	2.3%	1.3%
Houston-Baytown-Sugar Land, TX	3.2%	3.1%	4.0%	0.7%
Salt Lake City, UT	5.9%	4.1%	0.6%	0.1%
Washington-Arlgtn-Alxnd, DC-VA-MD-WV	2.8%	2.7%	3.7%	1.0%
LAKELAND-WINTER HAVEN, FL	**5.0%**	**0.0%**	**3.5%**	**1.5%**
San Jose-Sunnyvale-Santa Clara, CA	5.2%	3.7%	0.9%	-0.7%
JACKSONVILLE, FL	**0.0%**	**1.7%**	**5.5%**	**1.7%**
FORT LAUDERDALE, FL	**4.6%**	**2.2%**	**-0.9%**	**2.2%**
Nashville-Davidson--Murfreesboro, TN	0.5%	2.6%	2.9%	1.8%
Charlotte-Gastonia-Concord, NC-SC	0.4%	2.8%	2.6%	1.9%
New Orleans-Metairie-Kenner, LA	3.8%	0.4%	1.7%	0.7%
Minneapolis-St. Paul-Bloomington, MN-WI	1.2%	0.7%	2.7%	1.6%
Virginia Bch-Nrflk-Newport News, VA-NC	2.3%	1.7%	1.6%	0.5%
MELBOURNE-TITUS.-PALM BAY, FL	**0.9%**	**-1.2%**	**4.5%**	**1.7%**
Baltimore-Towson, MD	1.6%	1.5%	1.7%	0.6%
Richmond, VA	0.3%	1.0%	2.5%	1.7%
Los Angeles-Long Beach-Santa Ana, CA	1.6%	1.3%	2.0%	0.0%
Oklahoma City, OK	1.0%	2.3%	1.2%	0.3%
Kansas City, MO-KS	-0.3%	0.7%	2.6%	1.6%
Columbus, OH	1.6%	1.2%	0.9%	0.7%
Detroit-Warren-Livonia, MI	0.6%	0.4%	2.0%	1.0%
Memphis, TN-MS-AR	-0.9%	-1.6%	3.4%	2.5%
Chicago-Naperville-Joliet, IL-IN-WI	2.4%	-0.1%	0.1%	0.8%

Table 6.5 Continued

	1970–1990	1990–2000	1970–1990	1990–2000
Metropolitan Area*	**High Density**		**Low Density**	
Cincinnati-Middletown, OH-KY-IN	0.5%	0.0%	1.4%	0.9%
San Francisco-Oakland-Fremont, CA	2.1%	1.7%	-0.3%	-0.8%
Indianapolis, IN	0.1%	1.4%	0.9%	0.5%
Boston-Cambridge-Quincy, MA-NH	0.2%	0.3%	1.7%	0.3%
PENSACOLA, FL	**0.0%**	**-1.7%**	**1.3%**	**2.7%**
Louisville, KY-IN	-0.3%	0.1%	1.2%	1.3%
New York-Newark-Edison, NY-NJ-PA	0.4%	0.6%	0.9%	0.1%
St. Louis, MO-IL	-0.5%	-0.4%	1.5%	1.1%
Milwaukee-Waukesha-West Allis, WI	0.0%	0.5%	0.8%	0.3%
Birmingham-Hoover, AL	-1.9%	-1.6%	3.3%	1.7%
Cleveland-Elyria-Mentor, OH	-0.2%	0.0%	0.9%	0.6%
Phil-Camden-Wilmington, PA-NJ-DE-MD	-0.1%	0.2%	0.6%	0.3%
Rochester, NY	0.5%	-0.4%	0.6%	0.0%
Providence-New Bedford-Fall River, RI-MA	0.0%	-0.2%	0.5%	0.3%
MIAMI, FL	**1.4%**	**0.1%**	**-1.4%**	**0.0%**
Hartford-West Hartford-East Hartford, CT	-0.6%	-0.6%	0.9%	0.3%
Buffalo-Cheektowaga-Tonawanda, NY	-0.4%	-0.8%	0.1%	-0.2%
Pittsburgh, PA	-1.6%	-1.2%	0.2%	0.1%

* Ranked by overall growth from 1970 to 2000.

Conclusions and Implications

This chapter briefly summarizes urban development trends from 1970 to 2000 for the state of Florida. Although the analysis is primarily descriptive, it does highlight the trends in population density and land consumption patterns as a test for compact development outcomes. Urban, suburban, exurban, and rural density classifications were generated using surface interpolation methods within GIS. Estimates of geographic area within each class were compared over time to show the location and extent of development, with estimates broken out by county and metropolitan area to provide additional detail at sub-state level geography. While modeling errors are inevitable, it is suspected that errors were consistent across the state, thus making county and metro level comparisons reasonable. Further empirical testing is needed to find the best fitting surface models, which could produce more accurate estimates of historic land use consumption patterns. However, it is expected that the overall results and trends reported here will likely be unchanged.

Significant amounts of population growth from 1970 to 2000 were expected to be reflected in land consumption patterns across Florida counties. Strong, positive correlations between proportional increases in population sizes and low density land use development should indicate steady outward expansion. Conversely, negative (or no) correlations might indicate densification in urban or suburban areas, rather than in exurban or rural densities. From 1970 to 1990, the correlations (Pearson coefficients) between percent population change for counties and percent high density residential development and between percent population change and percent low density development were not statistically significant. From 1990 to 2000, the correlation for percent population change for counties and percent high density development

Table 6.6 Population and development change

	Pop. Change		*High Density*		*Low Density*	
County	**1970–1990**	**1990–2000**	**1970–1990**	**1990–2000**	**1970–1990**	**1990–2000**
Alachua	3.7%	2.0%	2.6%	3.4%	7.5%	7.1%
Baker	5.0%	2.0%	0.0%	0.0%	-1.3%	-1.4%
Bay	3.4%	1.7%	0.0%	0.0%	3.0%	2.2%
Bradford	2.7%	1.6%	0.0%	0.0%	0.0%	0.0%
Brevard	3.7%	1.9%	1.2%	-1.3%	4.4%	1.6%
Broward	5.1%	2.9%	4.9%	2.2%	-0.9%	2.3%
Calhoun	2.2%	1.8%	0.0%	0.0%	0.0%	0.0%
Charlotte	15.1%	2.8%	0.0%	10.0%	10.3%	3.1%
Citrus	19.4%	2.6%	0.0%	0.0%	0.0%	2.3%
Clay	11.5%	3.3%	0.0%	0.0%	6.8%	2.8%
Collier	15.0%	6.5%	0.0%	13.6%	36.8%	2.7%
Columbia	3.4%	3.3%	-5.0%	0.0%	-0.1%	0.6%
DeSoto	4.1%	3.5%	1.4%	0.1%	-1.4%	0.0%
Dixie	4.7%	3.1%	0.0%	0.0%	7.6%	1.9%
Duval	1.4%	1.6%	0.0%	0.0%	0.0%	0.0%
Escambia	1.4%	1.2%	0.0%	1.7%	3.9%	-0.3%
Flagler	27.2%	7.4%	0.0%	-1.5%	1.6%	3.0%
Franklin	1.4%	1.0%	0.0%	0.0%	0.0%	30.9%
Gadsden	0.3%	1.0%	0.0%	0.0%	0.0%	0.0%
Gilchrist	8.6%	4.9%	0.0%	0.0%	0.0%	0.0%
Glades	5.3%	3.9%	0.0%	0.0%	0.0%	0.0%
Gulf	0.7%	2.7%	0.0%	0.0%	2.5%	3.7%
Hamilton	2.0%	2.2%	0.0%	0.0%	0.0%	0.0%
Hardee	1.6%	3.8%	0.0%	0.0%	0.0%	0.0%
Hendry	5.9%	4.1%	0.0%	0.0%	6.0%	144.5%
Hernando	24.7%	2.9%	0.0%	0.0%	-1.3%	6.1%
Highlands	6.6%	2.8%	0.0%	0.0%	84.4%	1.6%
Hillsborough	3.5%	2.0%	0.0%	0.0%	1.7%	1.0%
Holmes	2.4%	1.8%	4.5%	2.3%	4.5%	1.7%
Indian River	7.5%	2.5%	0.0%	0.0%	0.0%	0.0%
Jackson	1.0%	1.3%	0.0%	0.0%	6.0%	3.7%
Jefferson	1.4%	1.4%	0.0%	0.0%	0.0%	0.0%
Lafayette	4.7%	2.6%	0.0%	0.0%	0.0%	0.0%
Lake	6.0%	3.8%	0.0%	0.0%	0.0%	0.0%
Lee	10.9%	3.2%	0.0%	0.0%	3.8%	1.8%
Leon	4.3%	2.4%	13.6%	5.5%	15.7%	2.9%
Levy	5.2%	3.3%	0.0%	20.0%	7.3%	1.3%
Liberty	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
Madison	1.1%	1.3%	0.0%	0.0%	0.0%	0.0%
Manatee	5.9%	2.5%	0.0%	0.0%	0.0%	0.0%
Marion	9.1%	3.3%	20.4%	1.0%	4.4%	3.5%
Martin	13.0%	2.6%	0.0%	0.0%	13.6%	6.3%
Miami-Dade	2.6%	1.6%	0.0%	9.2%	18.4%	0.3%
Monroe	2.4%	0.2%	0.0%	0.0%	135.5%	0.0%
Nassau	5.7%	3.1%	0.0%	0.0%	0.0%	12.7%
Okaloosa	3.2%	1.9%	21.5%	1.6%	0.4%	4.6%
Okeechobee	8.2%	2.1%	0.0%	0.0%	250.1%	0.6%
Orange	4.8%	3.2%	5.7%	2.4%	2.2%	-0.1%

Table 6.6 Continued

	Pop. Change		*High Density*		*Low Density*	
County	**1970–1990**	**1990–2000**	**1970–1990**	**1990–2000**	**1970–1990**	**1990–2000**
Osceola	16.3%	6.0%	0.0%	15.0%	-0.8%	0.6%
Palm Beach	7.4%	3.1%	7.7%	7.2%	0.9%	1.2%
Pasco	13.5%	2.3%	0.0%	0.0%	20.0%	3.0%
Pinellas	3.2%	0.8%	9.6%	1.2%	-1.6%	0.3%
Polk	3.9%	1.9%	5.0%	0.0%	3.5%	1.5%
Putnam	4.0%	0.8%	0.0%	0.0%	0.4%	-0.7%
Santa Rosa	5.8%	4.4%	0.0%	0.0%	1.4%	2.5%
Sarasota	6.5%	1.7%	39.8%	0.0%	1.8%	1.8%
Seminole	12.2%	2.7%	0.0%	3.8%	2.8%	1.1%
St. Johns	8.6%	4.7%	-5.0%	0.0%	7.9%	4.9%
St. Lucie	9.8%	2.8%	0.0%	8.7%	18.0%	1.6%
Sumter	5.6%	6.9%	0.0%	0.0%	3.5%	10.9%
Suwannee	3.6%	3.0%	0.0%	0.0%	0.0%	0.0%
Taylor	1.3%	1.3%	0.0%	0.0%	0.0%	0.0%
Union	1.3%	3.1%	0.0%	0.0%	-1.9%	-0.2%
Volusia	5.9%	2.0%	3.1%	4.5%	9.6%	0.6%
Wakulla	6.3%	6.1%	0.0%	0.0%	0.0%	24.3%
Walton	3.6%	4.6%	0.0%	0.0%	-4.9%	1732.4%
Washington	2.4%	2.4%	0.0%	0.0%	0.0%	0.0%

was 0.20 and that for percent population change and percent low density growth was not significant (see Table 6.6). This suggests that despite high rates of population growth from 1970 to 2000, there were no clear trends in how development within Florida counties was absorbed. Only a weak, positive correlation existed between the amount of high density development and the rate of population change. Because there was no detectable trend between high density development and population change from 1970 to 1990, this significant correlation for the post-GM period could suggest that more growth is occurring at urban densities compared to the pre-GM period.

So what does this tell us about the Florida growth management experiment? Is there any evidence that growth management has succeeded in limiting sprawl or promoting compact urban development? A simple comparison of Florida metropolitan areas with other selected US metros (see Table 6.7) shows some interesting results. For high density land use change in Florida metro areas, the annual average rate of increase rose from 2.8 percent in the pre-GM period to 4.2 percent in the post-GM era. Although this makes it appear that the advent of growth management had increased the pace of higher density development, Table 6.7 further shows that non-Florida metropolitan areas also experienced an increase in the rate of high density land use change, from 1.5 percent to 2.7 percent. We cannot conclude, therefore, that the faster pace of urban land growth in Florida was attributable to the 1985 GMA.

On the other hand, it appears that the Growth Management Act may have slowed the rate at which low density land use increased. Table 6.7 shows that the average annual increase in low density land use in Florida metropolitan areas slowed from 3.8 percent in the pre-GM period to 2.5 percent in the post-GM period. At the same

Table 6.7 Florida metro comparisons to other US metros (average annual percentage change)

	High Density Land Use Change		Low Density Land Use Change	
	1970–1990	1990–2000	1970–1990	1990–2000
Florida Metros	2.8%	4.2%	3.8%	2.5%
Non-Florida Metros	1.5%	2.7%	1.2%	1.2%

time, there was virtually no change in the rate of increase in low density land use in non-Florida metropolitan areas.

Overall, it appears that growth management has not encouraged Florida's metropolitan areas to increase the rate of development at densities of greater than 3,000 persons per square mile, but that growth management may have been the cause of the decline in the rate of development densities between 300 and 3,000 persons per square mile. At the same time, however, Table 6.7 reveals that Florida's rate of increase in low density land is significantly higher than the average for the 46 non-Florida metropolitan areas (2.5 percent versus 1.2 percent average annual increase, 1990–2000). These findings suggest, therefore, that while Florida's growth management laws may have contributed to a decrease in the rate of low density developments often associated with sprawl, the pace of growth in such densities is still much higher in Florida than in non-Florida metropolitan areas.

Growth management in Florida appears to have had an impact on sprawl, but nevertheless sprawl continues to be of greater significance in Florida's metropolitan areas than in non-Florida metropolitan areas. The growth of sprawl appears slowed, but not stopped, by growth management.

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