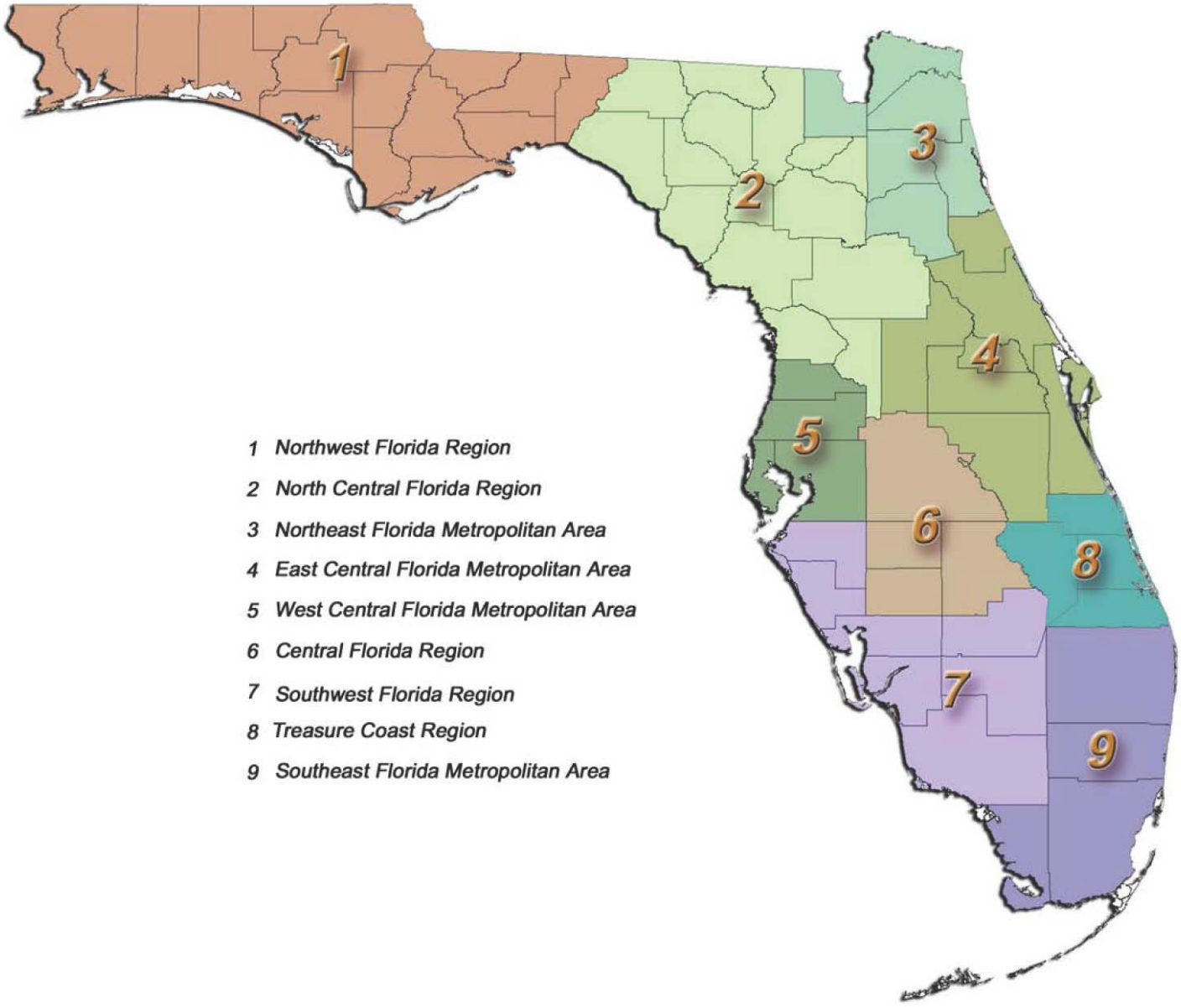
Florida Aviation System Plan

2012 *Statewide Overview*

STATE OF FLORIDA • DEPARTMENT OF TRANSPORTATION

Continuing Florida Aviation System Planning Process (CFASPP) Regions



Florida Aviation System Plan

PURPOSE

This paper presents an overview of the role played by airports in the economy and lifestyle of Florida. In addition to providing information to the public about the history and economy of the State and how the aviation system is supporting the demands and needs in the State, the analysis is intended to aid local, regional, and state policymakers by identifying aviation system needs which are necessary to support the projected growth across the State. The research was conducted in cooperation with the Continuing Florida Aviation System Planning Process (CFASPP).

For detailed data and in-depth discussion of technical issues, please see the Florida Aviation System Plan 2025 which is available online at http://www.dot.state.fl.us/aviation/FASP_details.shtm. Information on the origins and purpose of CFASPP is online at http://www.cfaspp.com/.

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INTRODUCTION

Florida stands at the threshold of an exciting new era in aviation, an era full of promise, but also with many potential pitfalls. Over the course of the next three decades, technological advances in aircraft design and computer-assisted navigation are expected to make air travel and transport cheaper, safer, and much more convenient.[1] Tourists from around the world will fly to Florida on modern, long range, fuel efficient planes that will be able to cross the globe quickly and without refueling. Once here, visitors will join Florida residents in using a flexible network of general aviation airports hosting small, quiet jets with routes and schedules tailored to the needs of individual travelers. The transportation of the future is aviation, which will give all Floridians fast, safe, and convenient access to every area of the state.

In the short term, however, airports and commercial air carriers will face a variety of problems and uncertainties.[2] In this dynamic context of challenge and change, undoubtedly the most important requirement for policymakers is to maintain the capacity, safety, and convenience of Florida's existing aviation system. Florida's airports are among the most valuable economic resources the state possesses. The state's commercial service airports serve an estimated 139 million passengers each year. This is seven times the amount of the state's entire population of permanent residents. It is, on average, 380,000 passengers every day.

Although the bulk of airline passengers who are coming in and out of the state are handled by a small number of very large, commercial service airports, the smaller commercial service airports are also very important to the system because they are located to accommodate overflows and bottlenecks at the largest airports. For their part, general aviation airports support corporate flights, military refueling, pilot training, and much more. The value of all of these components of Florida's aviation system combined is greater than the sum of the value of its individual parts, because the combination makes the system and each airport within it more adaptable and resilient. The scale, diversity, and geographic coverage of Florida's aviation systems allow it to respond rapidly to changing conditions.

As state policymakers work to steer Florida aviation toward the very convenient system of the future, they will be confronted by a number of interrelated problems and issues. One difficulty will be keeping airports and aviation services current with Florida's population growth, which, although slowed by the Great Recession, is expected to rebound as the economy improves. [3]

[1] For a discussion of aviation trends specific to Florida, see Finotti (2002). For a discussion of global trends, see Klesius (2003).
[2] The nation's top scientists say that U.S. aviation is a "system in peril." See National Research Council, (2003).
[3] The Great Recession began in December 2007 and ended in the third quarter of 2009. Lasting 19 months, it was the longest economic contraction since the Great Depression. For the starting and ending dates of U.S. economic cycles, see the National Bureau of Economic Research (NBER) at http://www.nber.org/cycles.html. The NBER is officially responsible for determining the duration of economic expansions and contractions. It has not yet declared the Great Recession to be over, but on October 29, 2009, the U.S. Department of Commerce announced that the nation's gross domestic product expanded at an annual rate of 3.5 percent in the quarter that ended in September 2009 (Bureau of Economic Analysis news release BEA 09-47).

Florida's population in 2011 was estimated to be 18.9 million. Projections anticipate a net gain of 6.9 million new residents by 2040.[4] Moreover, aviation travel in Florida is driven not only by population but by business and tourism, so even when population growth slows, demand for air travel and transport may continue to rise. Some of the capacity problems at Florida's commercial service airports were temporarily delayed by the severe 2007-2009 economic contraction, but many of these airports now face, or will soon face, looming capacity constraints as demand for air travel and air shipping reaccelerates.

Another task will be adapting existing facilities and services to changing demands and opportunities. As Florida continues to urbanize, many airports will need to expand or to specialize on distinct markets, or both. Airports in urbanizing areas will also need to be protected from encroachment by incompatible land uses. To allow for future expansion of Florida's airports, land-use planning and regulation need to protect airspace and keep residential development well away from airport facilities and flight paths. Buildings, antennas, towers, overhead wires, and other tall structures can significantly impact navigable airspace around an airport and restrict aircraft operations. Recent or anticipated changes to Florida's land use laws, comprehensive planning process, and compensation requirements for condemnation could have far-ranging implications for land use around airports. These developments will need to be carefully monitored and incorporated into airport planning and decision-making.

Yet another challenge will be supporting military bases in Florida while at the same time maintaining flexible-response capabilities in the event of base reductions or closures, Military bases and operations are vitally important to Florida's economy, which benefits from direct military-base expenditures, spending by military personnel, and spinoff business opportunities. Many of Florida's airports benefit directly from military operations and fuel purchases at their facilities. However, the potential for base closures exists now and will continue for the foreseeable future. Decisions about whether or not to close a given base often depend on the infrastructure and community support available from the surrounding area. Therefore, it is very important for Florida to protect bases' airspace, maintain excellent road and highway access, and in other ways be a supportive host to military facilities and personnel.

Still other issues may be posed by unstable consumer demand, airline industry restructuring, the war on terror, the price of aviation fuel, and in changes in the age and composition of the airlines' fleets. With respect to the latter, for example, the airplanes used by some U.S. commercial carriers are fairly old, but the airlines are reluctant to invest in new aircraft, especially regional jets with fewer than 50 seats. Many regional jets now in use are being retired because of their age. If they are not replaced, which appears likely, Florida's in-state air service will become increasingly limited, as will flights from Florida's smaller commercial airports to regional hubs outside the state. At the same time, the high cost of retrofitting existing aircrafts with Next Generation avionics is discouraging adoption of this technology among both air

[4] The 2011 population estimate and the 2040 population projection are from the Bureau of Economic and Business Research, Florida Population Studies 2012, Population Study 162, for population estimates for 2011 and projections at five-year intervals from 2015 to 2040.

carriers and General Aviation flyers. Eventually, market forces are likely to resolve these impediments to fleet modernization and Next Generation avionics, but for at least the next decade or two, fleet age and composition are likely to impact Florida aviation adversely.

Thus Florida's airports are among it's most valuable economic assets, and new aviation technology is expected to open up an even more exciting future in which air travel will be increasingly individualized, flexible, and comfortable. However, for the state's world-class airport system to maintain its quality of service and fulfill the long-term promise of aviation, aviation policymakers must first navigate these and other near-term difficulties. This paper discusses the future of aviation in relation to Florida's population growth and economic development. Although the analysis has implications for many areas of aviation policy, the emphasis is on the role played by state government in funding airport construction and maintenance. The question confronting Florida's aviation policymakers is how to use limited state resources and authority to foster a system of air travel and transport that is not only safe, reliable, and affordable, but that also contributes to economic growth, uses airport facilities efficiently, and positions Florida to take advantage of new aviation technologies already visible on the horizon.

The paper begins by summarizing Florida's population trends and analyzing the urbanization process fueling growth. The second section examines the role of aviation and other forms of transportation in this developmental process, highlighting how transportation needs evolve as population grows. The third section assesses aviation's contributions to Florida's economy. The paper concludes by considering how Florida aviation may be affected by ongoing trends, how policymakers can best defend against known threats, and what preparations are required if Florida is to take advantage of anticipated opportunities.

Florida's Urban Development

For over four decades, Florida has been one of the fastest growing large states in the nation.[5] Its population more than doubled between 1970 and 2000, and it is projected to increase another 36 percent by 2040.[6] Every day, Florida gains on average almost 800 new residents, none of whom bring their roads, airports, or other transportation facilities with them, but all of whom depend on such facilities immediately upon their arrival. Growth slowed significantly during the 2007-2009 recession, but it reaccelerated as the recession ended, and its pace is expected to eventually return to near what it was prior to the economic contraction. The main impediment to the very rapid growth of recent decades is the weak housing market left over from the surge and then decline in housing prices that accompanied the economic expansion and subsequent recession in the 2000s. Areas of Florida where homebuilding rose to record highs in the 2000s are likely to experience a slower recovery than the rest of the state, but even in these areas growth is returning. Moreover, once homebuyers conclude that home prices and mortgage

[5] Colburn and deHaven-Smith (2010). Between 2000 and 2007, the rate of growth (population change as a percentage of total population) was greater in Arizona (22 percent) and Georgia (16 percent) than in Florida (14 percent), but the population base of these states is less than half the size of Florida, so a smaller amount of growth yields a higher growth rate. Florida has historically been the fastest growing state with a population of at least 10 million. In recent years, Texas, which has a population of 25 million, has had roughly the same rate of growth as Florida. See Table 25.01, Florida Statistical Abstract for various years.

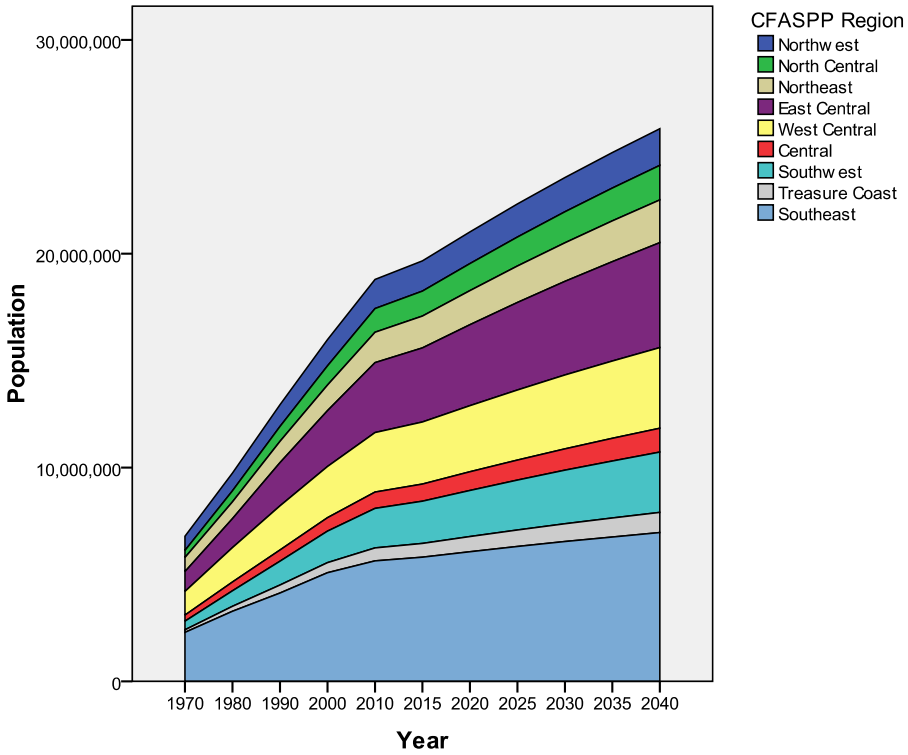
[6] Smith and Nogle (2003, p.2, 72). The most recent figure is 772 per day based on an increase of 2.8 million between 2010 and 2000, which is 281,900 per year. Daily rate calculated by dividing yearly figure by 365,

interest rates have hit bottom and are headed upward, they will quickly enter and reinvigorate the market, Already, Miami has experienced a surge in real estate purchases by foreign buyers who recognize that current prices are a bargain.

A Growing Challenge

Over the course of the next 30 years, population growth will continue to be the most significant factor shaping Florida's circumstances, but the location and character of growth are expected to change dramatically and to pose much more difficult challenges than those experienced in preceding decades. The Bureau of Economic and Business Research (BEBR) at the University of Florida has issued population forecasts by age group and county through 2040.[7] Figure 1 depicts state population data from 1970 through 2010 along with projections at ten-year intervals through 2040. If growth continues as expected, in 2040 Florida will have 25.8 million residents.

FIGURE 1
Florida Population, Actual and Projected: 1970-2040



Source: U.S. Census data as reported in various editions of the Florida Statistical Abstract for population at ten-year intervals from 1970 to 2010, and Bureau of Economic and Business Research, Florida Population Studies 2012, Population Study 162, for population projections at five-year intervals from 2015 to 2040.

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[7] Bureau of Economic and Business Research, Florida Population Studies2012, Bureau of Economic and Business Research, Florida Population Studies 2012, Population Study 162, for population projections at five-year intervals from 2015 to 2040.

Growth is projected to occur in every region of the state. Figure 1 breaks out the share of total state population contributed by each of the Continuing Florida Aviation System Planning Process (CFASPP) regions. Today, the three largest regions are the Southeast, the East Central, and the West Central. Together, they account for almost two-thirds (62%) of Florida's total population. They are also the regions projected to gain the largest number of additional residents in future years, (3.8 million combined from 2011 to 2040), although Southwest Florida alone is projected to grow by one million net new residents, and North Central and Northeast Florida are projected to add over a half-million each. In fact, the key observation about growth for the next 30 years is that no region will be bypassed, and by the end of the period, all regions are anticipated to have at least a million residents or very close to it (the Treasure Coast is projected to reach 944,000 by 2040).

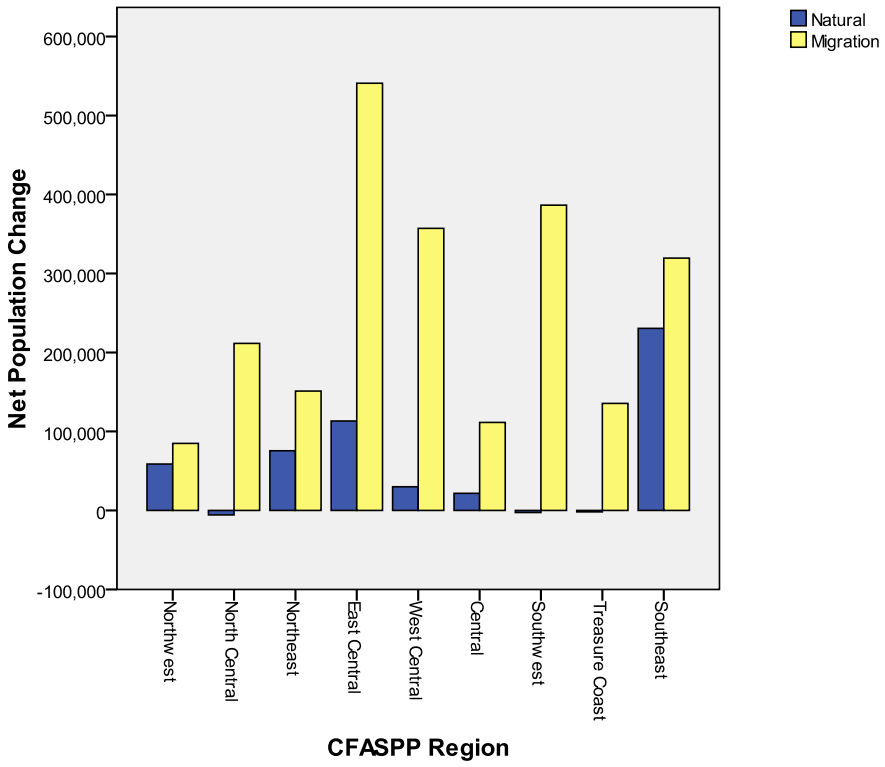
In fact, Florida's urbanization is likely to be more geographically diffuse than even the current projections indicate. This is because the county-by-county forecasts are based on prior growth trends and usually do not take into account that developable land in a given county gradually becomes scarce and development is pushed to nearby jurisdictions that are more rural. In 2006, the GeoPlan Center at the University of Florida (Zwick, and Carr, 2006) concluded in a study of urbanization in the I-4 corridor that population growth will sprawl across central Florida after 2020. The GeoPlan Center took BEBR's county-level projections up to 2030, extended BEBR's estimates forward to 2060, and added land use and urban development patterns to predict where the expanding population will locate as urbanized counties reach saturation. The research revealed that the large urban counties along the southwest coast and across the I-4 corridor do not have enough land suitable for urban development to accommodate the population growth forecast after 2020. The likelihood that growth will become increasingly sprawling in Florida because of build-out heightens the importance of protecting airports from incompatible land uses around them. It also reinforces the importance of keeping airports accessible by ground transportation for commercial airline passengers and cargo haulers. Cargo presents special challenges because, geographically, much of Florida is a very long peninsula and most air cargo is going through Miami International Airport. This raises the question of how to keep truck traffic moving up and down the full length of the peninsula as urbanization sprawls outward, local traffic is added to regional highways and interstate systems, and land acquisition for road expansion becomes enormously expensive.

In addition to being rapid and geographically diffuse, the population increase anticipated between now and 2040 will mainly be from in-migration rather than births. Figure 2 compares natural population changes (births minus deaths) between 2000 and 2010 to in-migration for each CFASPP region. In-migration was responsible for at least two-thirds of the growth in all but two of the regions, and in the latter (Northwest and Southeast Florida) the figures were 59 and 58 percent respectively. Statewide, there were about 519,000 more births than deaths during the ten-year period, while the net gain from in-migration—almost 2.3 million--was more than four times that number. Other things equal, the high proportion of growth from people moving into the state leaves settlement patterns less anchored by ties of family and friendship, and fosters a population that is politically and culturally somewhat detached from the state's past and future. The basic facts are that Florida had less than three million residents in 1950, but had almost 7 million by 1970, and almost 19 million today. Only about a third of Floridians are native born, in contrast to settled states like Pennsylvania where the figure is about 80 percent. Thus, Florida's population growth brings major economic opportunities and benefits, but it also

presents major policy challenges while at the same time working against popular political cohesion and cultural attachment helpful to political problem solving.

An obvious strategy for avoiding or at least minimizing bottlenecks in Florida's transportation system as the state urbanizes is to plan ahead; focus on high-priority centers of intermodal connectivity where a bottleneck in one modal component can cause cascading disruptions in multiple systems; acquire land and right-of-ways for expanding the transportation system considered as an integrated whole commensurate with population growth; avoid having to buy land after prices have skyrocketed from urbanization; and eventually develop the administrative capacity to use transportation facilities to steer and shape growth so that it is less expensive to serve with transportation facilities and other public services. The good news in transportation policy is that planning procedures are well developed, funding is generally earmarked and sequestered in trust funds, and skilled professionals are in place to handle ongoing planning and administration. Nevertheless, it will take all the skills of aviation policymakers to navigate through this era of scarce funds, changing technology, and continued population growth.

FIGURE 2
Source of Growth, 2000 to 2010, by CFASPP Region



Source: Florida Statistical Abstract 2011, Table 1.72.

The Great Recession

The Great Recession was caused largely by a housing bubble, and Florida's housing market participated in both the boom and the bust. Housing starts rose rapidly beginning in the late 1990s and reached unprecedented levels by the mid-2000s as rising home prices, speculation, and easy access to home mortgages fueled demand (see Figure 3). However, housing starts in Florida turned sharply downward in 2006 and continued to decline to record lows in subsequent years. The housing boom and bust were experienced in every region of the state, but the fastest growing regions tended to see the highest peaks in new construction during the expansion years and therefore also the most precipitous declines when the market contracted. The greatest swing between boom and bust occurred in the Treasure Coast and Southwest Florida, where new home starts dropped 94 percent and 91 percent respectively between 2005 and 2010 (see Figure 4).

Employment in Florida has been hurt both by the decline in construction and by the downturn in economic activity nationally. During the economic contraction, Florida gained a total of about 100,000 private sector jobs in a few parts of the economy while it lost about 800,000 jobs in other sectors, leaving the state with a net loss of about 700,000 positions between 2006 and 2010. The gains were mainly in healthcare, education, entertainment, and accommodations. Taking as the overall amount of losses the figure of 800,000 jobs, about two/thirds of the lost jobs were concentrated in a few areas of the economy: Construction and real estate accounted for 42 percent of lost private sector employment. Other high loss sectors were professional, financial, and information services (12%); and administration and support (20%).

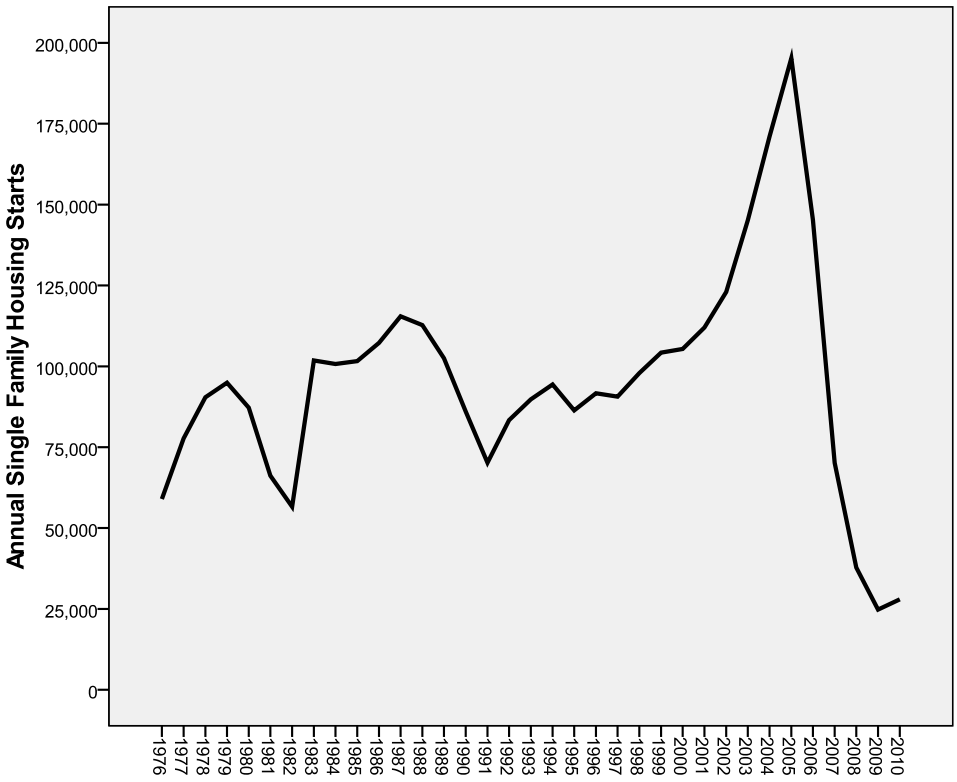
All counties and regions have jobs in the high-loss sectors, but some parts of the state have more of these jobs than others. This variation in economic mix resulted in differential employment impacts across jurisdictions. Generally speaking, areas with diversified economies and also areas with high amounts of tourism fared considerably better than bedroom communities with employment concentrated in construction and various services. As shown in Figure 5, job losses between 2006 and 2010 as a percentage of 2006 employment were greatest in the Southwest (18.6%) and West Central (14.1%) regions.

However, it is important to keep these employment losses in perspective, and to prepare for the future and not the immediate past. If state and local public policies are once again successful in supporting population growth and economic expansion, as the national economy rebounds the number Florida jobs lost in the recession will be more than replaced by subsequent job gains. Between 2006 and 2010, total private employment in Florida fell from 6.6 million to 5.9 million, for a loss of over 700,000 jobs (10.6 percent of total private sector employment.) However, in the four years preceding this period of economic contraction, total private employment in Florida rose from 5.4 million in 2002, to 6.6 million in 2006, an increase of 1.1 million jobs. Looking at the eight years between 2002 and 2010 in their entirety, years which include the severe loss of employment since 2006, the state nevertheless gained, overall, 426,730 private-sector jobs. The important consideration now is that the recession has ended and recovery has begun. History suggests that Florida will add over 1 million new private-sector jobs by 2016, that is, it will add these jobs if the state expands its aviation infrastructure and other public facilities and services to support rapid growth. Failure to expand aviation and other

infrastructure could create bottlenecks that constrain tourism, cargo delivery, business travel, and other critical ingredients to Florida's continued economic development.

Florida's experience in the Great Recession highlights the importance of diversifying the state's economy so that it becomes less vulnerable to volatility in construction, real estate, and associated industries. Future employment growth is expected to be concentrated in tourism and services to retirees. Tourism will be boosted by globalization and economic advances in developing nations. Demand for retiree-oriented services will increase as large numbers of Americans born in the aftermath of World War II enter retirement. Florida's future economic prosperity depends on attracting affluent retirees, expanding tourism and international trade, and promoting growth in industries that export goods and services.[8] Absolutely essential to all of these developments is a reliable, affordable, and convenient network of airports and air services.

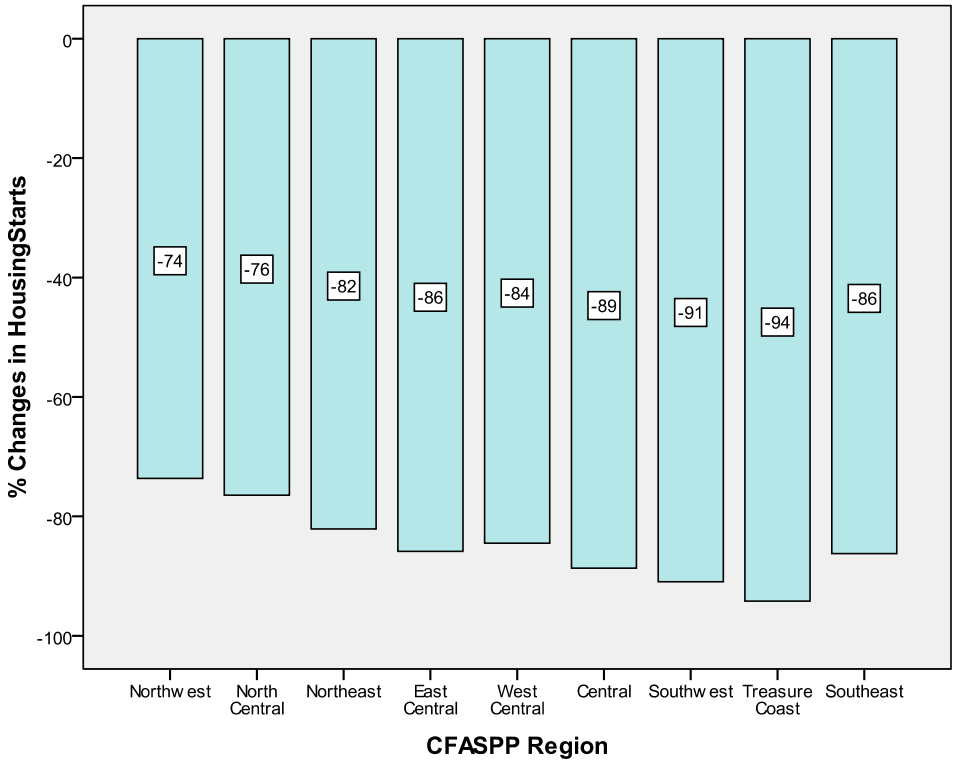
FIGURE 3
Annual Housing Starts (Single Family), 1976-2010



Source:. US Census Bureau, New Residential Construction Survey, historical data compiled by the Bureau of Economic and Business research at the University of Florida. Data for 2007 forward are from Table 11.05 in the Florida Statistical Abstracts of 2009 and 2011.

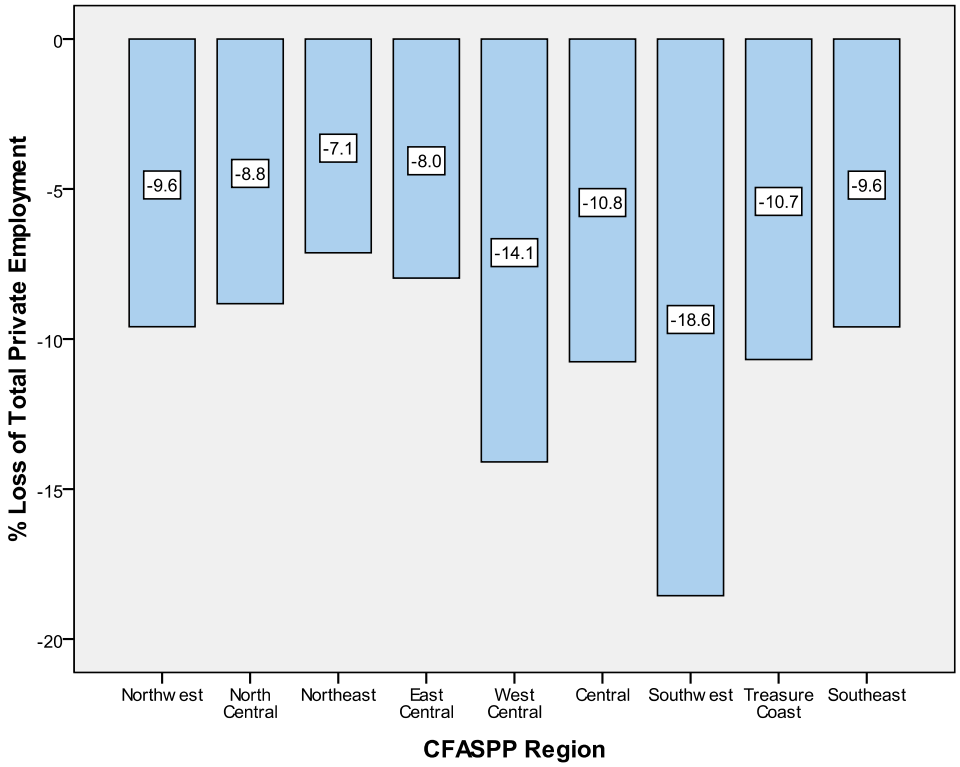
[8] This economic-development strategy has been advocated by David Denslow (2009), the former Director of the Bureau of Economic and Business Research at the University of Florida.

FIGURE 4
Percent Decline in Annual Housing Starts (Single Family), 2005-2010



Source: US Census Bureau, New Residential Construction Survey, historical data compiled by the Bureau of Economic and Business research at the University of Florida. Data for 2007 forward are from Table 11.05 in the Florida Statistical Abstracts of 2009 and 2011.

FIGURE 5
Percentage Change in Total Private Employment, 2006-2010



Source: Data for 2006 are from the 2008 Florida Statistical Abstract, Table 6.06. Data for 2010 are from the 2011 Florida Statistical Abstract, Table 6.06. Regional figures are produced by aggregating county-level data and calculating percentages with regional totals.

The Coming "Age Wave"

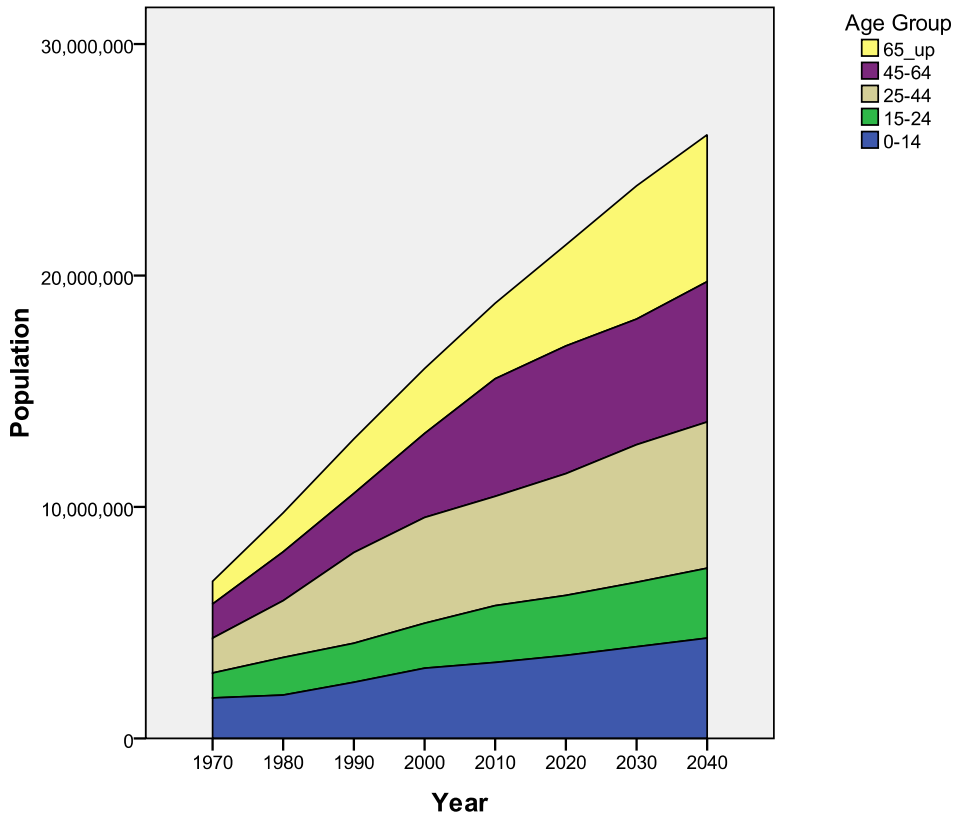
Florida's population will become markedly older and more racially and ethnically diverse in upcoming decades.[9] With respect to race and ethnicity, today Florida is about 37 percent minority – 15 percent non-Hispanic black and 22.5 percent Hispanic.[10] By 2025, minorities are expected to be 40 percent of the state population, with blacks making up about 17 percent and Hispanics 23 percent.

At the same time, Florida's population will become steadily older as the large generation born between 1946 and 1964--the so-called Baby Boom generation--enters retirement. Figure 6 graphs the age composition of Florida's population from 1970 through 2040. Significantly, a third of the projected population increase between now and 2040 will be accounted for by the senior age group. Today, about 17.3 percent of Floridians are 65 years old or older. This is already one of the highest percentages for any state in the nation and is higher than that of all

[9] These are two of the mega-trends impacting Florida that were identified by Colburn and deHaven-Smith (2010).

but three nations in the world.[11] However, by 2040 the figure is projected by BEBR to increase to 26.9 percent.[12]

FIGURE 6
Age Group Trends and Projections: 1970 to 2040

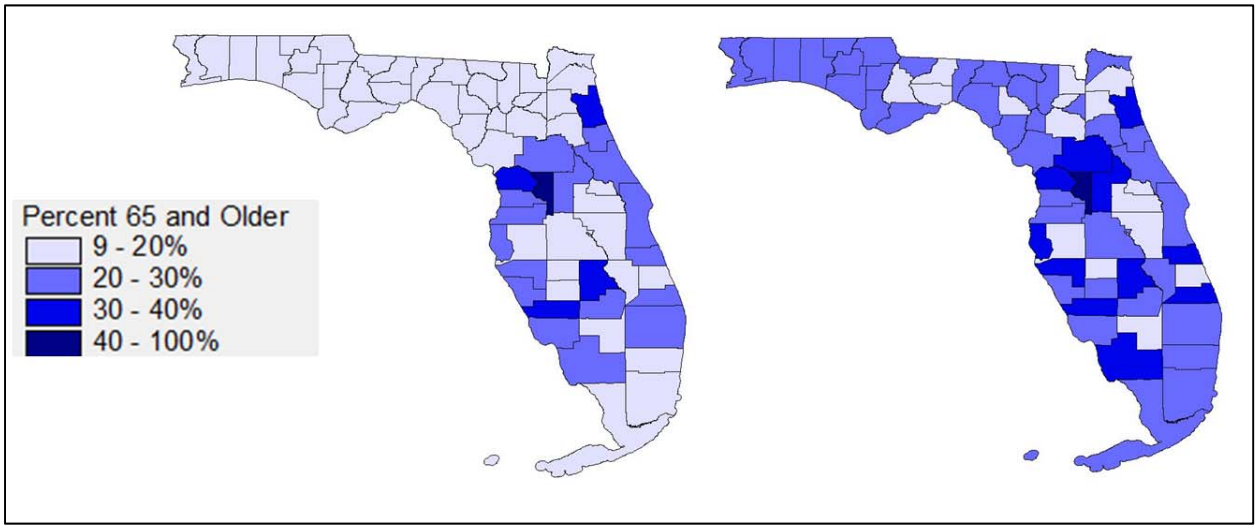


Source: Florida Statistical Abstract (1970-2010 data) and (2011 estimate and projections to 2040) Stanley K. Smith and Stefan Rayer, :Population Projections by Age, Sex, Race, and Hispanic Origin for Florida and Its Counties, 2015-2040, with Estimates for 2011," Florida Population Studies, Bulletin 163, June 2012. Bureau of Economic and Business Research, University of Florida, Gainesville, Florida.

The expected influx of Baby Boomer retirees will exert a powerful influence on the rate, character, and location of Florida's urbanization, because retirees can choose a residential location without concern for their place of employment.[13] As shown in Figure 7, which is a map shaded according to the percentage of each county's population that is at least 65 years old, seniors frequently opt to reside on the fringe of major employment centers, where they can be close to urban amenities while avoiding the noise, traffic, crime, and higher taxes of the inner cities. Because retirees will dominate Florida's population growth for the next 30 years, they will significantly influence regional settlement patterns.

[11] International comparisons can be found in Table 26.02 of Bureau of Economic and Business Research (2011).
[12] Computed from the statewide table on page 75 in Smith and Rayer, 2012.
[13] This was first pointed out in deHaven-Smith (1989).

FIGURE 7
Percent Age 65 and Above, 2011 and 2040



Source: Stanley K. Smith and Stefan Rayer, :Population Projections by Age, Sex, Race, and Hispanic Origin for Florida and Its Counties, 2015-2040, with Estimates for 2011," Florida Population Studies, Bulletin 163, June 2012. Bureau of Economic and Business Research, University of Florida, Gainesville, Florida.

Four Stages of Urbanization

Many Florida counties experience a four-stage process of urbanization as retirees take up residence along the urban fringe and then, a decade or so later, relocate when city-like development reaches them.[14] In the first stage, retirees move into rural areas that are adjacent to communities with good urban services. In stage two, young people arrive behind the retirees to provide healthcare, recreational venues, and other goods and services to the senior population. In stage three, the community expands as businesses form or enter the area to offer goods and services to the young adults as well as the seniors. In stage four, the retirement population begins to shift to the next county out because of mounting urban congestion. As this happens, the community becomes younger and also more racially and ethnically diverse.

The southeast coast of Florida provides a clear example of this regional settlement pattern. In the 1970s, Miami Beach was thought of internationally as a Jewish retirement community. In the 1980s, retirees moved north, Miami-Dade became increasingly Hispanic, and Broward County became the region's new center of retiree settlement.[15] Towering high-rise condominiums sprang up along the Broward coast, and self-contained retirement communities were built inland on what had previously been farms and ranches. Many younger people then moved in to provide seniors with various services, and new businesses emerged to serve the seniors and the young adults.

Beginning in the 1990s, however, Broward's retirement population started to shift northward into Palm Beach County, just as it had previously shifted from Miami-Dade to Broward. By 2000, the percentage of Broward residents who are 65 years old or older had fallen to 16 percent, which is 2 percentage points below the state average. No longer a magnet for retirees, Broward

[14] For a discussion of the challenges posed for state and local governments, see deHaven-Smith (1991b, 1998).
[15] These trends are discussed in Mohl (1990).

is becoming increasingly Hispanic and is also attracting more African American and Caribbean blacks than any other county in the state.[16] In turn, the same pattern experienced by Broward in the 1980s and 1990s is now beginning to unfold in its neighboring county to the north, Palm Beach.

Population and Employment

As regions move through these stages of urbanization, major changes occur not only in their demographic composition but also in their economy, land use, and transportation.[17] Table 1 summarizes the changes that occur at each step in the developmental process. In general, urbanization is accompanied by increasing specialization of form and function on all of these dimensions. Just as the population becomes segmented into distinct age groups, ethnic communities, and racial groupings, the regional economy becomes diversified. Initially limited to agriculture and suburban development, land uses proliferate to include high-rise office buildings and condominiums, industrial parks, gated communities, neo-traditional downtowns, regional malls, outlying commercial nodes, and more. Naturally, the transportation system becomes similarly specialized both spatially and functionally.

No doubt, causal relationships between these dimensions of socioeconomic change are complex and shifting, but for purposes of forecasting and analysis, population can be treated as the principal factor driving the others. This assumption is warranted by the developmental pattern, which is led by rapid changes in the number and location of retirees in each urbanizing region. Although retirement growth does not cause all of the other changes associated with urbanization, it initiates the pattern, and once other urbanization factors (land use, employment, and transportation) gain independent momentum, population remains a reasonable basis for forecasting other developments, because all factors become mutually interdependent.

[16] This statement is based on county population comparisons from the 1990 and 2000 censuses. The figures from the 1990 census can be found in Bureau of Economic and Business Research (1993). For comparable data for the 2000 census, see Table 1.30 in Bureau of Economic and Business Research (2003).

[17] Borchert (1967) and McGovern (1976).

TABLE 1
Stages of Urban Development in Florida

	Population	Economy	Land Use	Roads	Airports
Stage 1	Relatively even distribution across age groups	Agriculture	Rural	Cars and trucks distributed more-or less evenly across grid of roads and highways	A few general aviation airports
Stage 2	Rapid increase in the senior age group	Growth in retail trade and in services related to health and recreation	Low-density suburban	Increasing development and use of collector roads, declining use of roads in isolated parts of the county grid	Initial development of a regional airport
Stage 3	Bimodal age-group mix of seniors and economically active young adults	Decline of agriculture, continued growth of services and retail trade, expansion of wholesale trade, some manufacturing	Increasing density	Increasing development and use of major arterials	Commercial air travel and associated development of primary airport and/or one or more reliever airports
Stage 4	Rapid decline in proportion senior and rapid increase in Hispanics, African Americans, and/or Caribbean blacks	Full mix of economic sectors, with services and trade dominant	Highly urban, with suburban enclaves and edge cities	Full mix of collectors and arterials, ongoing development and expansion of interstates and turnpikes	Full mix of airport roles (general aviation, reliever, and primary)

As the initial wave of growth in a given region brings large numbers of seniors, who are major consumers of recreational activities and health care, regional employment shifts away from mining, forestry, and agriculture, and towards services. Employment opportunities in other sectors also increase, although not as fast as in services. As urbanization continues, employment in construction, wholesale trade, transportation, and utilities accelerates, while employment in manufacturing stabilizes at a slow, but steady growth rate. At the same time, urbanization spreads outward, and land uses become distinct and diverse.

FLORIDA AVIATION

Airports and aviation services play a critical role in Florida's economic and community development.[18] This is true not only for tourism, which is highly dependent on air travel, but also for most other parts of the state's economy. Manufacturing, retail and wholesale trade, management and professional services, health care, and other economic sectors use air travel and air shipping to obtain production inputs, visit markets and customers, distribute inventories to outlets, and transport products to distributors or directly to consumers.[19] Although aviation may not be a prerequisite for particular business activities, the availability of aviation services often reduces costs, saves travel time, and expedites marketing and product delivery. Consequently, airports are engines of business growth and job creation.

Florida's Aviation Assets

Florida is a national and international leader in aviation. The state's climate and terrain are ideal for flying. In part, this is why Florida was the site of much flight training for World War II, and today is home to some of the nation's largest and most significant military airbases. For similar reasons, Florida is the world's leader in flight training. Twenty percent of the world's flight training occurs in Florida. Of course, Florida is also America's main launching point for space exploration, cargo, and transportation, and is the epicenter of research for space-related technologies. America's early achievements in space exploration, which culminated in a manned flight to the moon in 1969, originated in Florida, and this tradition continues today in the development of the international space station, in future unmanned flights to other planets, in the infant space tourism industry, and in commercial space activities.

Florida's leadership role in aviation is an enormous asset that took decades to earn. The challenge now is to maintain and strengthen this position. Florida must take advantage of its climate, geography, and other aviation strengths to continue to develop an aviation system that enhances the state's economy and quality of life.

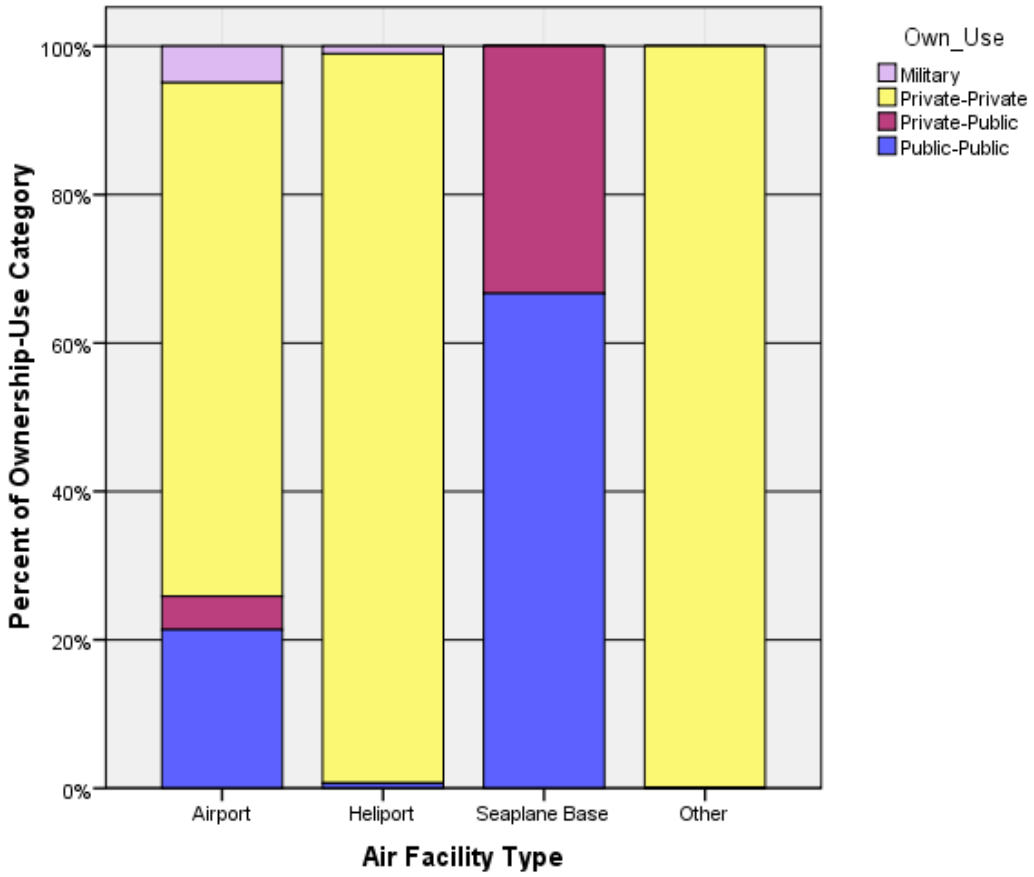
Airports and Other Aviation Facilities

As of 2012, Florida has a total of 781 air facilities. More than half (62%) are airports, and another one-third (37%) are heliports. As shown in Figure 8, ownership and use varies. Approximately one-sixth of the state's airports, and two-thirds of seaplane bases, are in public use, whereas public use of heliports and other facilities is quite rare.

Although the mix varies from one area of the state to another, all CFASPP regions have a variety of facility types. Figure 9 is a graph of the breakdown by region. The comparatively high proportion of heliports in the Southeast and West Central regions reflects the maturity of these regions in terms of urbanization and their greater reliance on helicopters for short-distance business travel, emergency medical transport, and similar purposes where urban road congestion needs to be avoided.

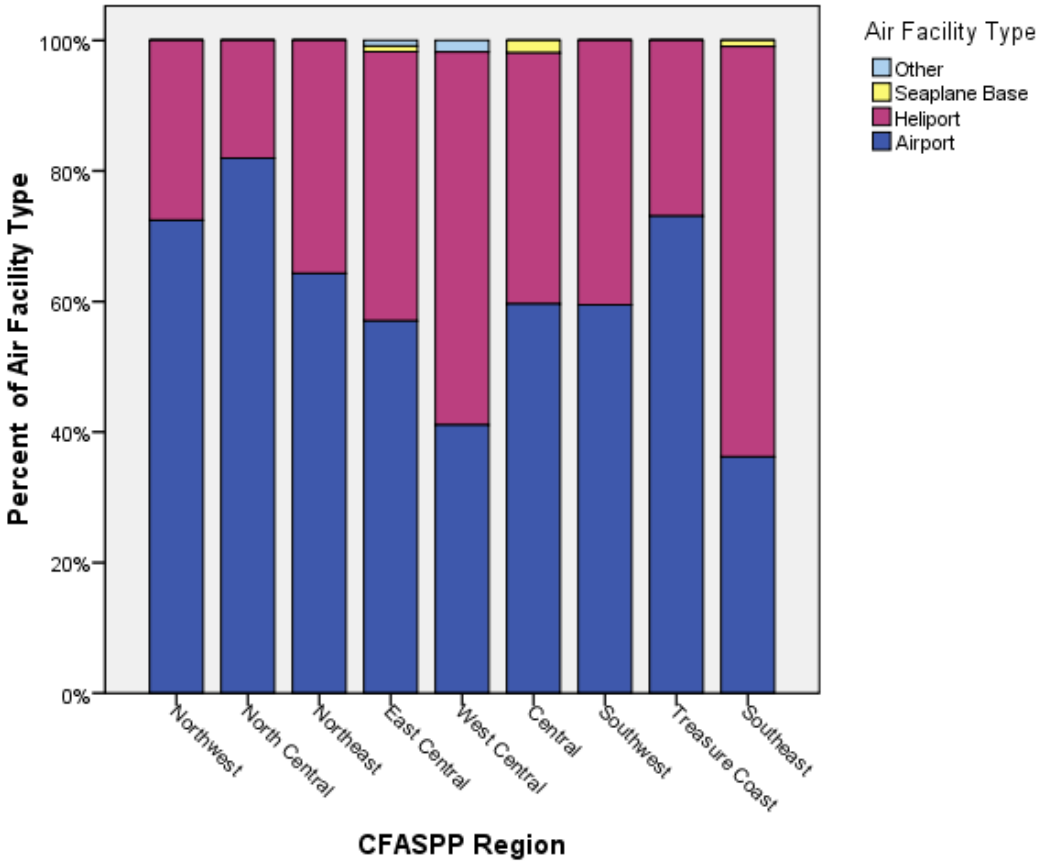
[18] The lingering impacts on Florida tourism of post-9/11 reductions in air travel were evident in the 2003 survey of Florida CEOs conducted by Florida Trend Magazine. See deHaven-Smith (2004).
[19] The importance of aviation to economic development since the 1940s is analyzed in Borchert (1967).

FIGURE 8
Air Facilities by Type, Ownership, and Use



Source: Florida Aviation Database, 2012.

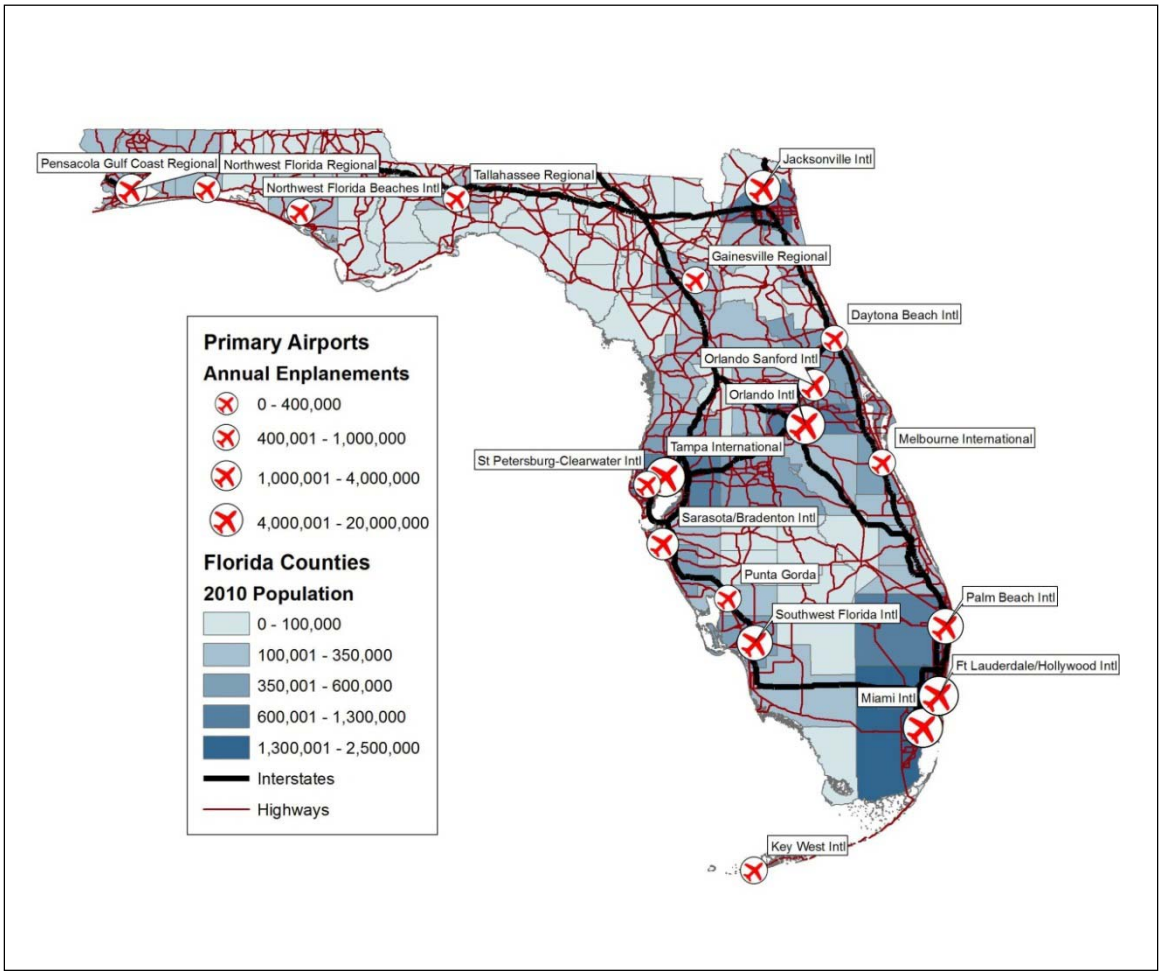
FIGURE 9
Types of Air Facilities by CFASPP Regions



Source: Florida Aviation Database, 2012.

Florida has 19 airports that are classified as "primary commercial service" by the FAA in the National Plan of Integrated Airport Systems (NPIAS) 2013-2017. Figure 10 shows the locations of those 19 airports in relation to population, railroads, and interstates. Counties are shaded according to population in 2010, with the most populated counties shaded the darkest. The airport location symbols are scaled to reflect each airport's total number of enplanements in 2011. In general, Florida's primary airports are located in major population centers and are near expressways and rail lines.

FIGURE 10
Primary Commercial Service Airports in Florida



Note: Airport symbols are scaled to reflect annual enplanements for 2011 as reported in the Florida Aviation Database.

Another 21 public-use airports in Florida are classified by the FAA NPIAS 2013-2017 as reliever airports. With few exceptions, all of Florida's reliever airports are situated near primary airports. A reliever airport is meant to absorb the general aviation operations from busy commercial service airports. Relievers typically have large numbers of based aircraft and high levels of annual operations.

Florida also has an additional 89 public-use facilities that function as general aviation airports providing general aviation services. Many of Florida's general aviation airports are located near expressways and rail lines, but in areas of the state that have not yet experienced much urbanization.

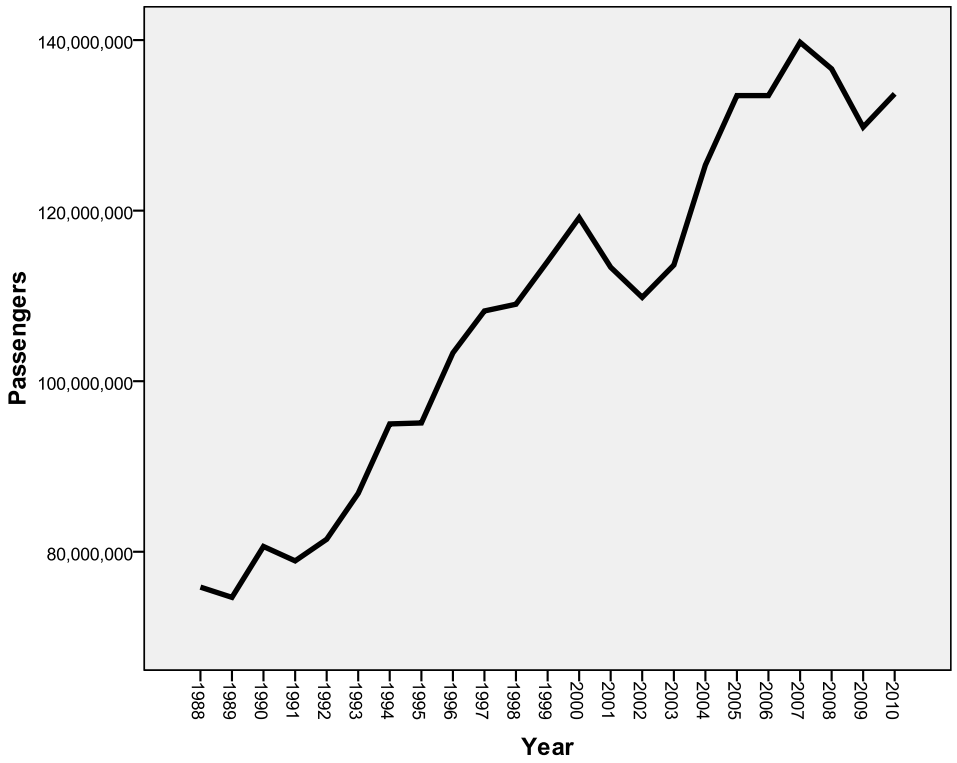
General aviation airports provide a substantial economic impact (both tangible and intangible) to the areas in which they are located. General aviation airports which can handle large corporate jets have proved to be a necessity for larger companies looking to relocate or expand facilities in a community. In a way, these airports become as important as any "main street" corridor into a community for attracting and retaining new business.

Growth in Air Travel

Florida's aviation system is absolutely critical to the state's economic prosperity and quality of life. In addition to linking residents to the rest of the world, aviation is a prerequisite for two of Florida's most important industries: tourism and international trade.

Tourism depends on the availability and frequency of commercial air service. About half of all visitors to the state arrive by air. Similarly, international trade relies on aviation for transporting clients, employees, production inputs, and final products. Figure 11 graphs total Florida passengers per year from 1988 to 2010. Counting resident travelers as well as visitors, Florida's commercial service airports serve an estimated 139 million passengers each year.

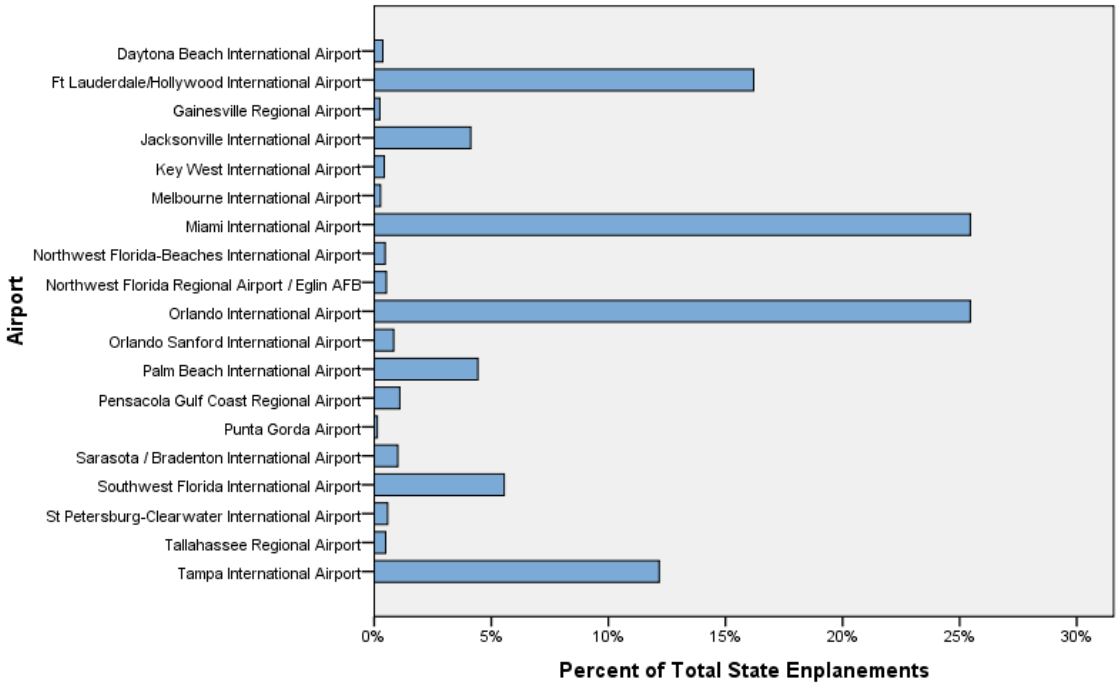
FIGURE 11
Total Florida Commercial Passengers: 1988 to 2010



Source: Florida Aviation Database, .June 2012.
Note: Total passengers are calculated by doubling the number of enplanements each year.

The bulk of commercial air travel in Florida is handled by just a few airports (see Figure 12). Together, Miami and Orlando account for about half of all passenger enplanements in the state. In 2010 Orlando International led Florida with 25 percent of enplanements, while Miami followed closely behind at 23 percent. Another 29 percent of passengers went into and out of Fort Lauderdale (16%) and Tampa (13%). Several other airports handle smaller, yet still significant amounts of commercial air travel. Palm Beach, Jacksonville, and Southwest Florida each account for about 5 percent of the state's enplanements.

FIGURE 12
Total Scheduled Enplanements by Airport, Percent of State Total: 2010



Source: Florida Aviation Database, July 2012. .

Prior to 2001, it appeared that annual operational demand at dozens of Florida airports would soon exceed capacity. Post 9/11, however, Florida airports experienced decreases in all segments of demand. This lag provided "breathing room" for some airports that needed to tackle capacity-improvement projects. Now, however, as general aviation and commercial operations continue to rebound, the need for operational capacity improvements at these airports is increasingly apparent. FDOT must reinvigorate its efforts to increase capacity at Florida's busiest airports.

Trends in Service Availability and Routes

In addition to long-term growth and short-term declines after 9/11, another trend in the commercial aviation passenger market nationally and in Florida is a shift in demand across different categories of air carriers.[20] During the era of airline regulation (circa 1930-1980), a

[20] GAO (2003) and Geotz and Sutton (1997). See also Transportation Research Board (1991), pp. 118-128.

number of large airlines provided service to far-flung networks of destinations that provided more or less equivalent service at comparable prices to small and large communities. The regulatory framework in place at the time required airlines to underwrite service to small communities, which are more expensive to serve, by subsidizing this service with the higher profits they earned from the most popular routes. The intent of regulation was to assure that the overall transportation system included a balanced mix of modes and that all modes were reasonably accessible in rural and urban locations.

Deregulation brought an end to this system of cross-subsidization. The aim of deregulation has been to increase total system carrying capacity and to lower the aggregate cost to consumers. The "legacy network carriers," as they are now referred to, gradually reduced or eliminated service to small communities, concentrated their operations in a few, very large cities, and established numerous round-trip routes both between these operation centers and from these centers to other metropolitan areas in the region. This routing strategy is typically described as a "hub and spoke" system. Its main advantage for consumers is that it achieves economies of scale and leads to low prices for travel to those destinations for which passenger demand is high. Of course, this advantage is achieved at the expense of small communities, which, if they have not lost service altogether, now pay higher prices and have fewer optional routes.

The hub-and-spoke routing system is undergoing two significant changes, both of which are impacting Florida. One is the emergence of commuter airlines that are allied with legacy air carriers to provide service on small planes to more small and medium-sized communities. This partnership between legacy airlines and regional/commuter carriers is a natural consequence of market forces, which, by demanding efficient use of aircraft, encourage carriers to deploy small planes to serve the smaller number of passengers traveling between a given hub and each of its spokes.

The second major development in air passenger service in recent years is the formation of new airlines to provide non-stop service at comparatively low prices for flights between communities that are spokes in the legacy networks and that the legacy carriers serve in multiple legs. These "low-cost carriers" have prospered by attracting customers away from the legacy carriers, which are increasingly left with routes in the hub-and-spoke system that are either less popular or produce lower profits, or both. Nationally, experts predict that low-cost carriers and regional/commuters will handle more than half of all domestic passengers by the end of 2015.

For Florida, the implications of these trends are mixed. On the one hand, the price of travel between Florida and other states and nations is being pushed downward, which helps tourism and also makes Florida more competitive in national and international commerce. On the other hand, air travel within the state has become more expensive. Furthermore, a number of Florida's small communities have experienced declining service or have lost air service entirely.

Florida Air Cargo Trends

Aviation is a lynchpin of international commerce and wholesale trade, both of which are extremely important to efforts by state policymakers to diversify Florida's economy.

Historically, Florida's economy has been dominated by tourism and agriculture.[21] While these sectors will always be major parts of the state's economy, the jobs they offer are often seasonal and pay comparatively low wages. For at least two decades, Florida policymakers have been working to stimulate job creation in economic sectors that offer stable employment with high wages, good benefits, and opportunities for advancement.

Aviation is essential to international trade and wholesale commerce because these sectors of the economy rely on air shipping services. Annually, Florida's aviation system transports over 2.7 million tons of cargo. Although this represents only about 2 percent of Florida's total freight tonnage, it is a high-value part of the state's cargo. This is because air shipping is used primarily to transport items that are fragile, valuable, or needed quickly. The value of Florida air cargo is estimated to be $46 billion annually.[22]

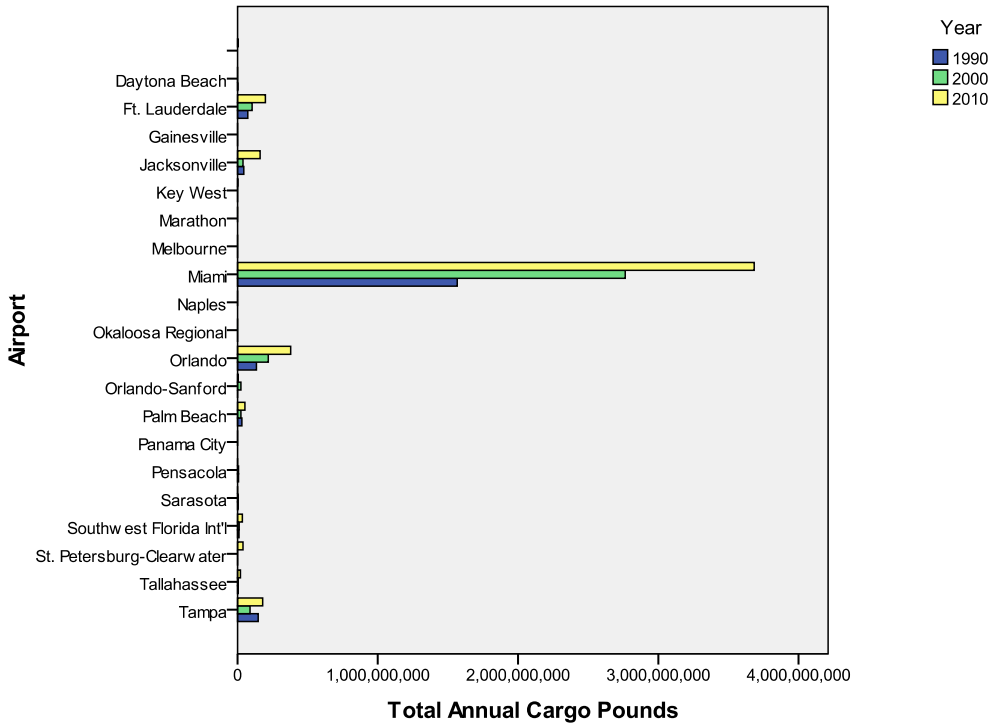
An important characteristic of Florida's air cargo delivery system is its high degree of centralization. Regularly scheduled air cargo services are offered at 20 of Florida's airports. Nonetheless, Florida's air cargo activity is heavily concentrated at Miami International Airport which accounts for 77 percent of the State's 2010 total air cargo volume. Figure 13 graphs the total cargo pounds handled by each airport in 1990, 2000, and 2010. Other airports with a significant share of air cargo statewide in 2010 include Orlando (with 8% of the state's air cargo weight), Fort Lauderdale (4%), Tampa (4%), and Jacksonville (3%).

Miami's leadership position in air shipping extends beyond Florida. Miami International Airport is the fourth largest air cargo airport in the United States and the sixth largest in the world. Miami's high ranking nationally and internationally in air cargo is a reflection of Florida's growing economic and cultural connection to Latin America, Mexico, and the Caribbean.

Florida's air cargo system is fed by other states and nations. Seventy percent of Florida's air cargo is transit cargo, that is, it originates from outside the state and is sent to another state or country. Much of this transit cargo is hauled by trucks down the entire length of the state for air shipping from Miami International. Cargo is hauled rather than flown to Miami, because trucking is much less expensive. The upshot for policymakers is that, when it comes to national and international trade, Florida's economy relies on a multimodal transportation system that requires smoothly flowing expressways statewide with easy access to a few commercial airports, of which the most heavily utilized is Miami International.

[21] For details of these sectors and their contribution to the total state economy, see Denslow and Shermyen (1990) and Scoggins and Pierce (1995).
[22] CDM Smith (2009).

FIGURE 13
Total Scheduled Cargo Pounds by Airport and Year, 1990, 2000, and 2010



Source: Bureau of Transportation Statistics, Table: T-100 Market, Database: Air Carrier Statistics (Form 41 Traffic)-All Carriers. This table (Table T-100 Market) combines domestic and international market data reported by U.S. and foreign air carriers, and contains market data by carrier, origin and destination, and service class for enplaned passengers, freight, and mail.

Air cargo services are expected to remain centralized in Miami for the foreseeable future or even to become more so. New federal security regulations for air cargo will make it more difficult to combine air shipping with passenger transport, which is the form taken by much of the air shipping at smaller airports. The regulations will also offer advantages to air cargo companies that have more or less complete control over their cargo from the point of receipt from the customer to the point of delivery to the intended recipient. Such companies tend to centralize their cargo routing processes at one or a few airports. Consequently, as these companies benefit from the new, more rigorous regulatory environment, and as they take a larger and larger share of the air cargo market, proportionately less cargo will enter the system through small shipping companies using airports other than Miami, while proportionately more will come through the airports chosen by the shipping companies.

Trends in General Aviation

In addition to commercial air passenger service and air shipping, Florida's airports also offer a wide range of general aviation services with significant importance to the state's economy. When disaster strikes, Florida's general aviation airports are on hand to serve in time of need. In many areas, general aviation airports are the staging sites and communication centers that coordinate logistics among the State and Community Emergency Response Teams, first responders, utility workers, emergency medical teams, local National Guard units, insurance

adjusters, and Red Cross employees and volunteers during recovery. These sites serve as pipelines for the distribution of food, water, ice, and emergency medical supplies. In addition, they are logistical centers used by the Community Response Teams in providing lifesaving interventions, performing basic search and rescue operations, and assisting in damage assessment, evacuation and rapid sheltering services for residents in the areas hit by disaster.

By using small aircraft and small local airports, tens of thousands of cancer patients, burn victims, and sick or injured children have been able to fly to world-class medical centers in major cities, even when these patients live hundreds of miles away in outlying areas or rural communities. Thousands of private pilots and businesses of all sizes have donated the use of their own aircraft to transport people who need specialized medical care, but who are not served by or cannot afford to pay for commercial flights.

It's not just Fortune 500 companies that use private aircraft for business. Tens of thousands of small- and medium-sized businesses in offices and industrial parks throughout Florida use general aviation for travel. Many local business people find it faster and easier to reach their customers and key business partners when they use a small local airport for their regional transportation needs. In many cases, these people have been able to expand their businesses to serve new customers, or to work with suppliers from other states by using general aviation as a routine form of transportation for their sales representatives, executives, and other employees.

Local weather forecasts come straight out of the forecasting system that was created to serve America's pilots. Every time you look at a weather map on TV, the temperatures, cloud cover, precipitation and winds are being reported to you from weather stations located at thousands of airports across our nation. Also, when a child is lost, or an elderly person with Alzheimer's wanders away, or a hiker fails to turn up at base camp, general aviation's search and rescue network kicks into high gear to help with the search.

As the raging wildfire accelerates toward the cluster of homes nestled along a forest, a converted cargo plane swoops in and drops thousands of gallons of water and fire retardant on the flames to halt their progress. Water bombers and bucket helicopters play a critical role in slowing or stopping the spread of wildfires that annually inflict hundreds of millions of dollars in damage, destroy homes, and can displace thousands of people. General aviation aircraft are also used to drop emergency supplies and are used to survey large areas while evaluating the level of fire threat and fire damage.

New technologies are being developed that will make air travel and transport much less expensive and much more comfortable and convenient. One such promising development is the FAA's NextGen program. NextGen is a comprehensive overhaul of our National Airspace System to make air travel more convenient and dependable, while ensuring flights are as safe, secure and hassle-free as possible. In a continuous roll-out of improvements and upgrades, the FAA is building the capability to guide and track air traffic more precisely and efficiently using satellite-based technology. This new technology will help to save fuel and reduce noise and pollution. One such element is the Automatic Dependent Surveillance-Broadcast (ADS-B), FAA's successor to radar. ADS-B uses a combination of satellites and ground-based stations to provide accurate tracking of properly equipped aircraft. The system provides more coverage than traditional

radar systems that are limited by line of sight and terrestrial locations. The ADS-B system can also provide weather and traffic information to aircraft.

Florida and the Gulf region have been at the forefront of this technological upgrade. Due to its large volume of aviation activity and geographical location, Florida was selected as one of the test areas for the ADS-B system. The FAA began testing this new system in Florida beginning in 2008.

The FAA also implemented ADS-B in the Gulf of Mexico, where extensive helicopter operations and lack of radar coverage make ADS-B a significant improvement to safety and efficiency. ADS-B became operational in the Gulf of Mexico in 2010. Traditional radar coverage for air traffic control services could not extend much beyond the coastline due to the limits of where radar antenna sites can be located. ADS-B provides greater coverage, both in range and altitude, through the use of the GPS system and the installation of surveillance and communication equipment on offshore oil platforms.

When ADS-B became operational over the Gulf, air traffic controllers had access to better situational awareness and were able to compress more aircraft operations into the same airspace. Where they previously had to impose 100-mile separation requirements between aircraft to maintain safety, ADS-B allowed them to safely shrink that separation requirement to as little as five miles in certain situations. Additionally, the precise position information that all ADS-B aircraft provide enhances safety by making search and rescue operations more effective should an accident occur. Optional ADS-B services such as traffic alerts and weather updates provide added safety benefits.

Aircraft planning to use air traffic control services are required to be outfitted with ADS-B equipment no later than 2020, so not all aircraft are benefitting from the new system. However, the benefits provided to low-altitude helicopters, such as receiving air traffic services direct to their destinations instead of old-fashioned fixed navigation points, have stimulated companies that provide transportation to oil rigs to invest in ADS-B equipment. With as many as 9,000 daily helicopter operations to oil platforms, the oil and gas industry is expected to leverage the efficiencies provided by ADS-B and expand operations. As the rest of the GA fleet in Florida and around the U.S. switch over to ADS-B equipment, the benefits of NextGen will follow.

Table 2 lists examples of contributions made by general aviation to business, government, healthcare, and other areas of society. General aviation services include emergency medical services, corporate aviation, pilot training, personal transportation, recreational flying, and all other aviation services except those carried out by commercial air carriers and the military.

TABLE 2
Contributions of General Aviation Services

GOVERNMENT	
Disaster Relief	**Firefighting**
Forecasting and Surveying	Water Bombing
First Responders	Forecasting and Surveying
Support Personnel	First Responders
Emergency Supplies	Support Personnel
Damage Assessment	Emergency Supplies
Evacuation	Damage Assessment
Search and Rescue Teams	High Altitude and Rooftop Rescues
Forecasting and Surveying	Evacuation
First Responders	**Environmental Protection**
Support Personnel	Surveying and Surveillance
Emergency Supplies	Atmospheric Sampling and Research
Damage Assessment	Damage Assessment
Evacuation	Evidence Gathering
Traffic Control and Safety	Coastal Border Patrol
Traffic Reporting	**Wildlife Management**
Traffic Management and Flow Control	Territory Surveys
Aggressive Driver Surveillance	Range Tracking
Medevac	Population Counts
Law Enforcement	Relocation
Airborne Law Enforcement	Evacuation
Narcotics Interdiction	**Military**
Disaster Relief	Training
Mail	Border Patrol
Air Express Mail	Homeland Security
Air Express Packages	
VOLUNTEER	
Angel Flight	Red Cross
Coast Guard	Private Companies
Civil Air Patrol	
EDUCATION	
Pilot Careers	**Airline/Airport Operations**
Agricultural Pilot	Airport Manager
Air Traffic Reporting Pilot	Fixed Base Operator Manager
Major/National Airline Pilot	Lineperson
Regional Airline Pilot	Station Manager
Helicopter Pilot	Scheduling Coordinator
Corporate Pilot	Flight Dispatcher
Air Taxi Pilot	Air Traffic Controller
Flight Instructor	Safety Inspector
Military Pilot	Concession Worker
Astronaut	Aircraft Rescue and Firefighting (ARFF)

TABLE 2, continued
Contributions of General Aviation Services

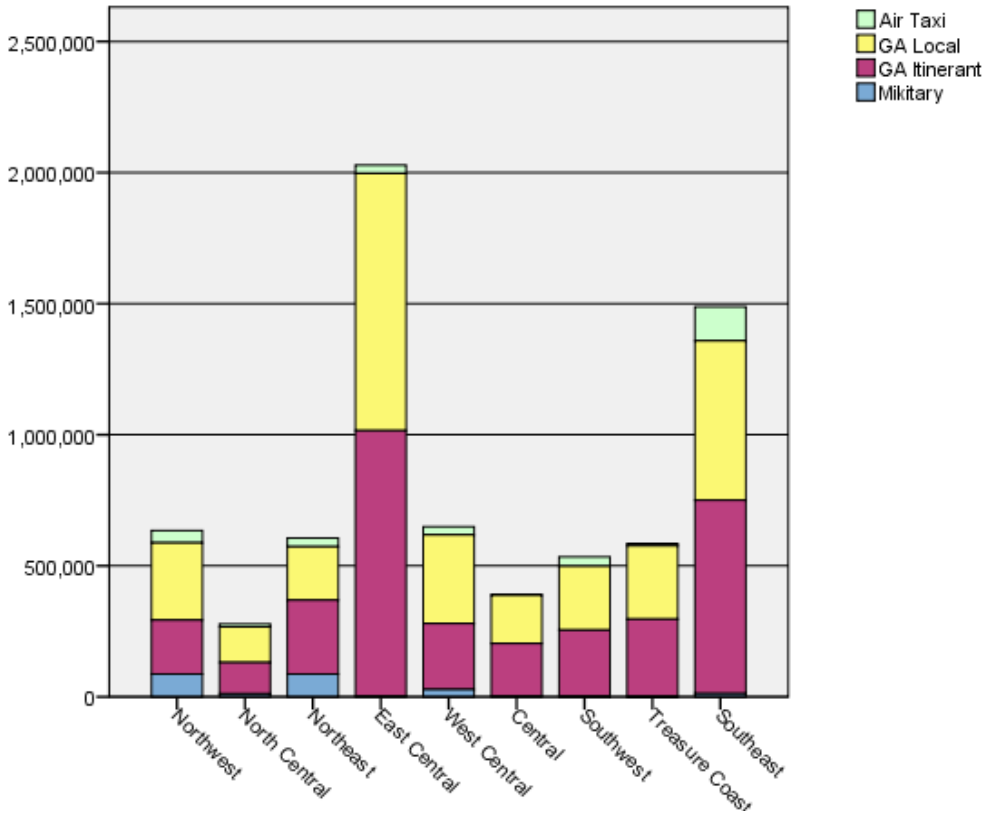
Aviation-Related Careers	Ground Attendant
Aircraft Manufacturing	Ramp Service Personnel
Manufacturing Engineer	Aviation Maintenance Technician
Electrical Installers & Technician	Ramp Planner
Tool, Jig and Fixture Maker	**Aircraft and Systems Maintenance**
Machine Tool Operator	Airframe and Powerplant Mechanic
Aircraft Manufacturer	Avionics Technician
Sheet Metal Fabricator	**Airline and Airport Services**
Assemblers & Installer	Customer Service Representative
Quality Control Technician	Ticket Agent
Scientific and Technical Services	Reservations Sales Agent
Engineers (Aeronautical, Aerospace, Civil, Electrical, Mechanical)	Flight Attendant
Meteorologist	Baggage Handler
Cartographer	Sky Cap
Architect	Cargo Handler
Technicians (Electronics, Radar, Navigation)	Air Freight/Cargo Agent
Aviation Planner	Passenger Service Agent
BUSINESS	
Energy & Mining	**Construction**
Remote Access to Drilling Platforms & Sites	Remote Access (for Management and Crews)
Remote Access to Mining Sites	Surveying
Powerline Construction, Patrols & Maintenance	Delivery of Supplies
Pipeline Construction, Patrols & Maintenance	Antenna Installations
Geophysical Surveying	Tower and Powerline Installations
Environmental Protection & Response	HVAC Unit Installations
Emergency Response Teams	Elevated Concrete Pouring
Crews, Equipment, Supplies	**Banking & Finance**
Medevac	Overnight Return of Cancelled Checks
Security	Surveying & Monitoring of Financed Projects
Medical	Transportation for Meetings
Air Ambulance	Access to Businesses in Outlying Areas and Remote Locations
Organ/Tissue Transport	Movement of Staff Between Bank Facilities Spread throughout Large Regions
Medical Team Transport	**Telecommunications**
Medical Supplies Transport	Cell Phone Tower Installations
Agriculture	Radio Tower Installations & Maintenance
Aerial Planting	Antenna Installations & Maintenance
Aerial Fertilizer Applications	Cable Installations & Maintenance
GPS Controlled Crop Dusting	Long Duration and High Altitude Communications Relay Platform (Proteus)
Product Distribution	**Aircraft Maintenance**
Pest Control	Maintenance Service
Fire Fighting	Aircraft Parts
Controlled Burns	Aviation Electrician

TABLE 2, continued
Contributions of General Aviation Services

Ranching	**Advertising and Marketing**
Animal Food Drops	Banner Towing
Animal Rescue	Sky Writing
Weather Forecasting	Airships/Blimps
Surveying	Balloons
Livestock Management	Television and Print Ads
Pest Control	**Aerial Photography**
Fire Fighting	Documentary Photographs for Business and Industry
Controlled Burns	Photographs Used to Monitor Environmental Conditions
Forestry	Infrared Images for Law Enforcement
Aerial Harvesting of Mature Trees	Photographs of Ancient Archeological Ruins
Eliminates Clear Cutting	**Media and Entertainment**
Eliminates Logging Roads	Television News
Surveying	Television Shows
Land Management	Newspapers
Aerial Planting	Magazines
Crop Management	Public Information Videos
Pest Control	Movies and Film
Fire Fighting	**Mail and Package Delivery Services**
Controlled Burns	Air Mail
Environmentally Friendly Harvesting	Air Packages
	Air Freight
RECREATION	
Recreational Flying and Air Shows	**Boaters and Fishermen**
Sightseeing Rides	Spot Fish
Thrill Rides	Stock Ponds
Aerial Combat Simulation Rides	Reach Lakes
Balloon Rides	**Hikers and Sportsman**
Hang Gliding	Remote Access to Wilderness Areas
Soaring	Search & Rescue
Parachute Jumping	Medevac
Sky Diving & Surfing	Wildlife Management Program

While dozens of locations can be reached via Florida's commercial airports, hundreds more are accessible through the state's system of general aviation airports. In Florida, general aviation airports handle almost 80 percent of all annual aircraft operations. General aviation airports provide a wide range of services in every region of the state. Figure 14 shows the total number of each type of operation provided by all of the general aviation airports within each CFASPP region in 2011. In general, the number of operations across regions reflects the population distribution. The state's largest regions in terms of population are the East Central and the Southeast, and these regions have the largest number of operations. Conversely, the mix of operations within regions reflects regional business activities. For example, the number of general aviation operations for local aircraft is very high in the East Central region because this region is a national and international leader in pilot training.

FIGURE 14
Operations by Type at Florida's General Aviation Airports, 2011



Source: Florida Aviation Database as of November 2012.

Florida's airports are among the busiest in the nation. They house almost 14,000 based aircraft, which is more than 6 percent of the nation's entire general aviation fleet. They also bring an estimated 3.7 million vacation or business travelers to the state each year. Florida's communities accommodate 7 million annual takeoffs and landings, ranking the state second in the nation for the number of general aviation operations it serves. General aviation airports are major employment sites and centers of business and economic activity. General aviation airports in Florida employ over 15,922 workers and have a payroll of $693 million. The state's general aviation airports are also critical to the aviation industry nationally. They support one of

the world's largest flight training programs and produce many of the country's future commercial airline pilots. Indeed, one in every five pilots worldwide is trained in Florida.

QUANTITATIVE ESTIMATES OF AVIATION'S CONTRIBUTION TO FLORIDA'S ECONOMY

In financial terms alone, aviation services and facilities make an enormous contribution to Florida's economy. The benefits can be grouped into four categories: direct economic impacts, indirect economic impacts, multiplier effects, and impacts on economic development. All four are significant, but economic development impacts are by far the largest and are increasingly important to Florida policymakers when deciding where to invest state dollars in airport improvements.

Final Demand Impacts and Multiplier Effects

In airport impact analysis, direct economic impacts are defined as expenditures at or near an airport by the airport owner and by firms involved in delivering aviation services. Included in the calculation of these impacts are expenditures for payrolls, fixed capital and equipment, and operations. Indirect impacts are expenditures within Florida by airport users. Among these are air carrier visitor expenditures, general aviation visitor expenditures, and travel agency expenditures.

Together, direct and indirect impacts are referred to as final demand impacts. Multiplier effects are expenditures that follow from final demand impacts as the initial expenditures circulate in the local economy.

For the state as a whole, public-use airports annually generate nearly $98.0 billion in final demand impacts and multiplier effects.[23] Approximately 40 percent of this is for wages and other earnings paid to over 1.1 million employees. When military air facilities are taken into account, the figure for final demand impacts and multiplier effects rises to more than $108 billion per year. Additional aviation-related activities associated with the United States Postal Service, the FAA, aviation schools, and aviation-related business bring the total economic impact of Florida aviation to over $114 billion.

Airports and Economic Development

Today, transportation planners and historians argue that the industrialized world has entered a new transportation era, the Age of Aviation. Certainly this is evident in Florida. The availability of safe, comfortable, and affordable air carrier service has allowed Florida to become one of the most popular tourist destinations in the world. Florida is also home to the nation's main launching pad for space exploration.

Airports are now as vital to a region's growth and development as a central business district. According to John Kasarda, an aviation expert and Director of the Kenan Institute of Private Enterprise at the University of North Carolina, "Airports will shape business location and urban development in this century as much as highways did in the 20th, railroads in the 19th and

[23] All figures for direct and indirect economic impacts are from CDM Smith (2009)

seaports did in the 18th centuries." Kasarda says, "The three 'A's'—accessibility, accessibility, accessibility—will replace the three 'L's'—location, location, location."

The increasing importance of airports is visible in the urban landscape. Commercial and residential centers radiate from airports, and companies, increasingly reliant on air transportation to move people and goods quickly in a global economy, locate nearby. Almost 54 percent of U.S. exports (by value) move by air, up from 42 percent in 1990. High-tech companies have a 50 percent higher demand for air transportation than smokestack industries. With conference centers, hotels, music, shopping malls, office space, wineries and tasting rooms, art galleries, and nearby housing for airport employees, some airports are taking over the traditional role of downtowns as the main center of urban life.

Economic Development Impacts

The economic development impacts of Florida's airports can be estimated by studying the statistical relationship between airports and employment in different parts of the state.[24] Table 3 summarizes the results of a regression analysis that assessed the extent to which employment in each Florida county is related to itinerant air taxi operations performed by the county's airports. Employment was examined within each sector as defined by SIC codes at the two-digit level. Air taxi operations were selected to be the predictor variable for both theoretical and statistical reasons. Statistically speaking, air taxi operations proved to be the single best predictor of sector-specific employment. This makes sense theoretically, because air taxi services are typically used by businesses.

The figures in Table 3 show that employment in a given county and within a given sector of the economy can be predicted with reasonable accuracy simply by knowing how many itinerant air taxi operations were made by airports located in that county. The numbers in the R-Squared column reflect the percentage of variation in employment from one county to the next that can be explained statistically by the corresponding, inter-county variation in the number of air taxi operations. With the exception of agriculture, mining, and utilities employment, air taxi operations explain at least half of the variation in employment across counties in each economic sector and more often between 60 and 80 percent.

A simple way to estimate the number of jobs in a given sector that have been made possible by or are associated with airports is to multiply the number of itinerant air taxi operations by the Standardized Standard Error (SSE). In statistics, the SSE is interpreted as the increase or decrease in the number of units in a dependent variable (e.g., employment) that follow from a one-unit increase in an explanatory variable (e.g., air taxi operations). In the present analysis, the SSE can be thought of simply as an economic-development multiplier that estimates the number of jobs made possible by airport operations. By the same token, it is also appropriate to

[24] For a discussion of methods for estimating regional economic-development impacts, see Isserman (1980) and Isserman and Merrifield (1987). The analysis reported here is based on a cross-sectional data from a single year. The connections between airports and employment are observed by, in effect, ranking counties according to their number of airport operations and then comparing this ranking to rankings based on employment numbers in each sector. To the extent that the employment rankings correspond to the airport-operations rankings, employment is assumed to depend on airports. A weakness of this approach is that observed relationships between employment numbers and airport operations could be due to some unknown third factor that causes both employment and airport operations to vary similarly. An approach that would overcome this weakness would be to use longitudinal data and employ event-history analysis or pooled time series analysis to observe the direction and amount of change that occurs in employment in each county as changes occur in airport operations in the same county. However, time and resources for the research precluded this approach.

assume that the larger the SSE, the more a sector needs and benefits from the availability of aviation services.

TABLE 3
Regression Analysis of Employment by Sector

Sector	R Square	Standardized Standard Error	Significance
Agriculture	.368	.1370	.000
Mining	.576	.0028	.000
Utilities	.270	.0096	.000
Construction	.763	.6316	.000
Manufacturing	.633	.5760	.000
Wholesale trade	.875	.5678	.000
Retail trade	.854	1.7236	.000
Transportation	.769	.3618	.000
Information	.753	.2714	.000
Finance	.731	.5954	.000
Real estate	.792	.2944	.000
Prof services	.824	.8378	.000
Management Companies	.537	.1164	.000
Admin services	.747	.9747	.000
Education	.869	.2520	.000
Healthcare	.827	1.7255	.000
Entertainment	.292	.3569	.000
Accommodations	.787	1.4693	.000
Other	.908	.4559	.000
Unclassified	.101	.0001	.000

Note: The analysis combines data on airport operations with county-level employment data by sector. Airport operations data is from the FAA's Terminal Area Forecast for 2010. Employment data are for 2010 and are from the Florida Statistical Abstract 2011, Table 6.06. The significance of ".000" in the last column in the table means that all of the relationships between airport operations and employment were statistically significant at greater than .001, which is to say that the odds of getting these relationships by chance are less than 1 in 1000.

In 2010, Florida airports carried out 365,143 itinerant air taxi operations. Table 4 shows the resulting figures when the economic development multiplier for each sector is applied to this number. Altogether, Florida's airports were associated with nearly 4.2 million jobs in 2010, when total state private employment was 5.9 million. This means that more than two-thirds (69%) of all jobs in Florida are supported by Florida airports. Moreover, airport-supported jobs are in sectors critical to Florida's economic diversification, e.g., manufacturing, wholesale trade, finance, professional services, administrative services, and health and social services.

TABLE 4
Employment by Sector in 2006 Associated with Florida Airports

Sector	Jobs per Operation	Jobs "Created"
Agriculture	0.137	50,037
Construction	0.0028	1,012
Mining	0.0096	3,524
Manufacturing	0.6316	230,634
Utilities	0.576	210,327
Transportation	0.5678	207,333
Wholesale Trade	1.7236	629,344
Retail Trade	0.3618	132,098
Finance	0.2714	99,114
Information	0.5954	217,401
Real Estate	0.2944	107,493
Professional Services	0.8378	305,903
Waste Management	0.1164	42,507
Management Services	0.9747	355,919
Education Services	0.252	92,005
Health Services	1.7255	630,062
Arts	0.3569	130,321
Accommodations	1.4693	536,496
Other Services	0.4559	166,476
Unclassified	0.0001	40
Total		**4,148,046**

Note: The analysis combines data on airport operations with county-level employment data by sector. Airport operations data is from the FAA's Terminal Area Forecast for 2010. Employment data are for 2010 and are from the Florida Statistical Abstract 2011, Table 6.06.

Airports are also associated with employment opportunities in every area of the state. Table 5 shows the economic development impacts of airports in each CFASPP region. The regional estimates of aviation-supported jobs in each sector of the economy were determined by applying the economic development multipliers to the aggregate number of itinerant air taxi operations performed by all airports in each region.

TABLE 5
Regional Jobs Made Possible by Airports, by Region, 2010

Sector	Northwest	North Central	Northeast	East Central	West Central	Central	Southwest	Treasure Coast	Southeast
Agriculture	367	765	439	5,551	13,596	5,644	8,286	4,331	11,057
Mining	103	12	49	85	354	0	12	12	383
Utilities	48	50	284	900	162	266	239	22	1,552
Construction	14,908	4,388	25,264	40,318	38,398	4,242	32,282	8,723	62,110
Manufacturing	9,098	4,657	26,508	45,957	39,927	7,285	15,079	5,727	56,089
Wholesale	7,800	2,373	11,302	36,672	37,119	4,478	11,583	3,534	92,471
Retail	36,416	13,793	58,862	110,921	97,500	11,997	67,790	21,657	210,406
Transportation	4,130	1,940	14,112	15,660	18,026	5,556	5,107	2,258	65,309
Information	5,587	1,502	3,789	24,326	23,686	906	6,172	1,800	31,345
Finance	11,434	3,758	17,826	31,068	58,893	4,730	13,569	3,890	72,232
Real	4,871	2,150	8,113	24,076	15,409	3,151	10,862	2,419	36,441
Prof	18,102	5,611	17,397	65,716	66,875	2,671	19,715	5,865	103,950
Management	1,111	261	3,230	4,638	13,638	1,618	2,326	398	15,287
Admin	15,648	3,870	30,790	89,318	68,866	5,800	27,354	6,851	107,422
Education	4,070	1,555	7,848	17,684	14,285	1,408	5,639	1,228	38,288
Healthcare	42,552	19,833	68,659	104,426	108,013	2,498	57,689	22,955	203,437
Entertainment	3,401	1,954	6,444	51,663	18,124	2,671	15,142	5,061	25,861
Accommodations	31,911	11,479	45,919	144,525	70,081	8,366	51,762	13,156	159,298
Other	10,993	3,426	14,823	27,670	22,827	4,737	15,985	5,437	60,579
Unclassified	0	0	0	27	0	0	0	0	13
Total	**222,551**	**83,378**	**361,658**	**841,202**	**725,781**	**78,023**	**366,595**	**115,326**	**1,353,530**
% of All Jobs in Region	60	35	74	74	78	40	72	79	74

Note: The source for total employment in each region the Florida Statistical Abstract 2011, Table 6.06. Employment data are for 2010 and are listed by county. Regional totals are calculated by aggregating the county data by regions.

ALTERNATIVE SCENARIOS AND POLICY STRATEGIES

Strategic planning has a standard and fairly well known methodology. It involves looking both internally and externally. Internally, an assessment is conducted of the organization's strengths and weaknesses, while externally the horizon is scanned for possible threats and opportunities. At first blush, this methodology appears straightforward and simple.

However, anyone who has ever tried to develop a meaningful strategic plan for a complex enterprise facing a constellation of challenges and encumbered by rigidities accumulated over long periods of time knows that this methodology yields bland conclusions unless it is accompanied by a rigorous effort to conceptualize the context of action and formulate policy options for various contingencies.[25] Otherwise, the planning process will arrive at the simplistic conclusion that the organization should just take advantage of its strengths, correct its weaknesses, pursue available opportunities, and avoid visible threats.

To conceptualize the context of action for Florida aviation, this concluding section discusses five possible scenarios for the state's aviation future. The scenarios are listed and briefly described in Table 6. All but one of the scenarios envisioned for aviation are negative. They have to do with issues or problems that are already visible and that might (or might not) escalate. More attention is devoted to the first two scenarios than to the others because they are currently of most concern. At the end of this section, a strategy is suggested for moving forward under conditions of uncertainty, when all of the scenarios are possible and little is known about how effective various policy options might be.

[25] For a brief discussion of this problem, see deHaven-Smith and Wodraska (1996).

TABLE 6
Scenario Characteristics and Implications

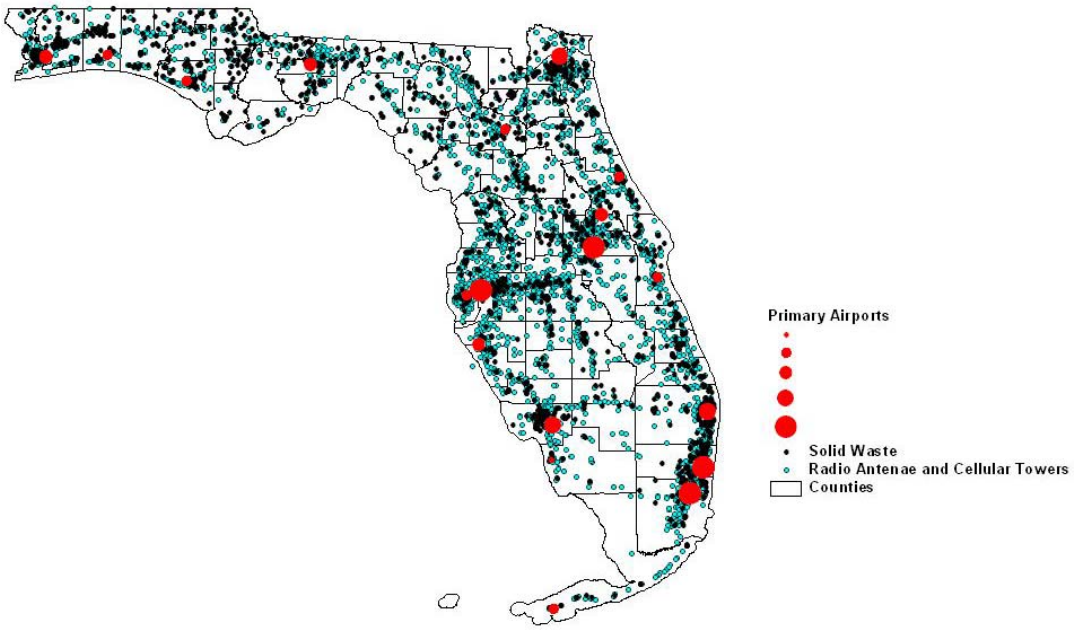
Scenario	Probability of Occurring	Time Frame	Underlying Conditions	Level and Valence of Consequences	Policy Implications
Airport Capacity Crunch	Medium	Mid-Term	Local politics; incompatible land uses	Serious consequences; predominately negative	Intervene into local land-use decisions; Force capacity-sharing
Market Disruptions	Medium	Near-Term	Ongoing threat of terrorism; Financial problems of legacy carriers; Failure to add new small jets to aging fleet	Serious and negative	Improve screening; enhance passenger comfort; build an emergency fund
Centralization of Aviation Services	High	Near-Term	Hub–and-spoke system; market forces necessitate service scaling	Serious but locally isolated; mixed (positive and negative)	Force capacity sharing; Contract for in-state service to small communities
Generalized Congestion on Roads Statewide	Medium	Near-Term	Local use of regional thoroughfares	Moderate and negative	Expand thoroughfares; Limit access; Reduce traffic
Technological Breakthroughs	High	Long-Term	Development of VLJ / NextGen technologies	Serious and positive	Support R&D; preserve/promote small airports

Scenario: Airport Capacity Crunch

Florida's rapid, sprawling, stage-wise pattern of urban development brings a cascading series of challenges for infrastructure planning, construction, and maintenance. One of the most vexing difficulties is siting locally unwanted land uses, such as landfills, jails, adult congregate living facilities, and wastewater treatment plants. Residents living near proposed sites typically mobilize in opposition, which can cause long delays and higher project costs. Efforts to locate or expand Florida airports can encounter similar impediments. In part, this is why many of Florida's busiest airports have not been expanding to meet growing demand. Miami International and Fort Lauderdale International are situated almost immediately adjacent to residential developments. The locations of Tampa International and Orlando Sanford are only slightly further away from similar communities.

Urbanization can also bring special aviation hazards. Figure 15 is a map of Florida's primary airports overlaid with the locations of radio antennas, cellular towers, and landfills, all of which can impinge on takeoffs and landings. As the state's airports become surrounded by urban development, airport operations and facility expansions will become increasingly problematic.

FIGURE 15
Primary Airports Scaled to Enplanements with Obstructions

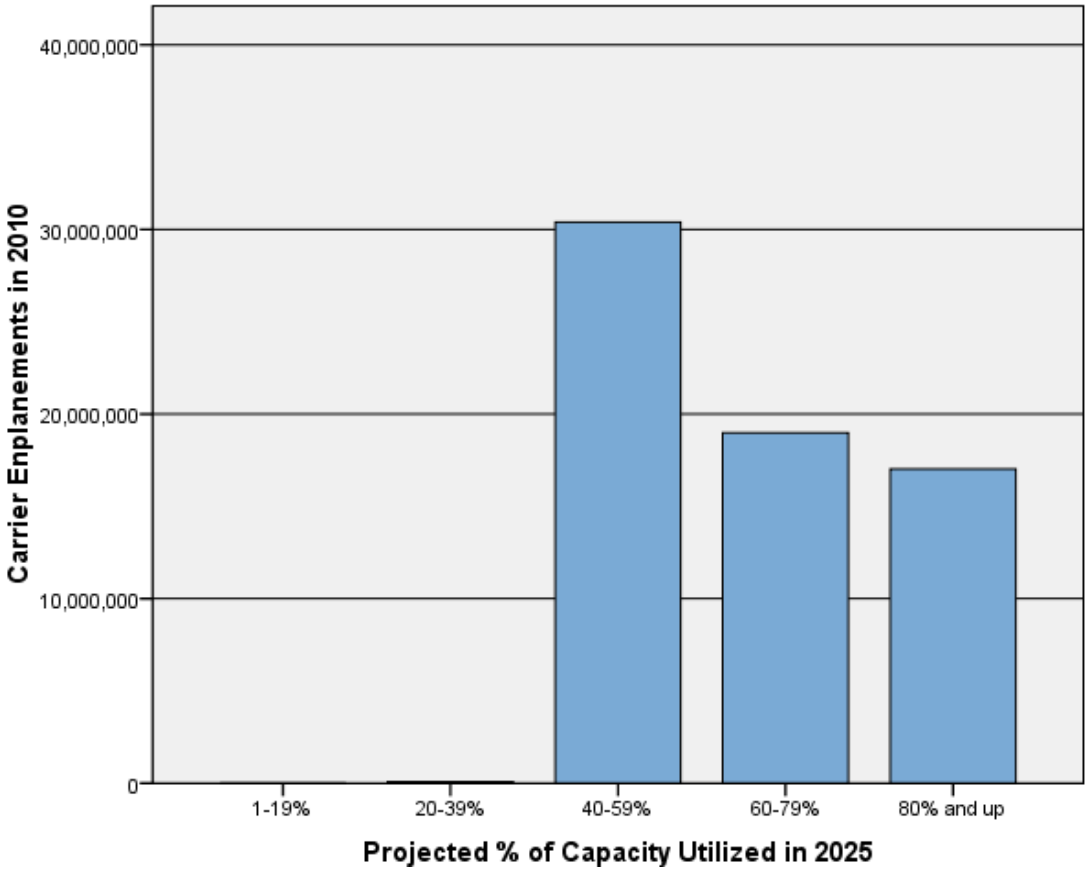


Source: Airport shape file from the Florida Department of Transportation. Solid waste facilities layer file from the Florida Geographic Data Library at the University of Florida. Antenna shape file from the Federal Communications Commission, Bureau of Wireless Telecommunications.

Although demand for air services will rise steadily for the foreseeable future, many of Florida's largest airports have little room for additional flights, and surrounding development and opposition from nearby neighborhoods increasingly hamper airport expansion. In the mid- to long-term, capacity may be increased greatly by emergent technologies. For example, the use of the global positioning system (GPS), when combined with electronic controls and computers, will eventually allow airports to use airspace much more efficiently, and this will increase airport capacity greatly. In the near-term, however, capacity problems could prove irresolvable.

One factor contributing to fears that a capacity crunch is imminent is that the airports that are beginning to run up against expansion limitations are Florida's busiest. Currently, only 8 percent of Florida's airports are operating at over 60 percent of capacity, but these airports handle 16 percent of Florida's total commercial carrier enplanements. In 2025, projections indicate that, unless preventive steps are taken, 16 percent of Florida's airports will be operating at over 60 percent of capacity. These airports currently account for 54 percent of all commercial carrier enplanements (See Figure 16). Airport capacity in central Florida was studied by FDOT and select central Florida airports through an initiative funded by the FAA.

FIGURE 16
Enplanements of Airports Categorized by Demand-Capacity Ratios Projected in 2025



Source: "Demand/Capacity Study" compiled during the Florida Aviation System Plan, 2012

In the near term, there are only three policy options for dealing with the approaching gridlock at Florida's airports. The state could intervene into local land-use decision-making to overcome political obstacles to airport expansions; it could try to redirect air services from maxed-out airports to others with available capacity; or it could simply allow the gridlock to develop and let market forces push passengers and carriers to other airports where capacity is available.

None of the three options is free of disadvantages. The first option is politically difficult, the second may not be doable, and the third would entail disruptions that could be devastating for the state's economy.

Scenario: Serious Market Disruptions

The market for commercial air services is dynamic. Small changes in supply and demand occur constantly as travelers choose between alternative carriers and as carriers compete for customers by adjusting routes, prices, and schedules. In the past, this dynamism has been interrupted periodically by market shifts and industry upheavals in reaction to major changes in public policy, large spikes in fuel prices, and other events originating outside the market. The most recent shocks to hit aviation were the terrorist attacks of September 11, 2001, and the SARs outbreak in 2003. Examples from further back in history include the OPEC oil embargo, airplane hijackings, and the bankruptcy of major commercial carriers. Common sense suggests that unanticipated disruptions of comparable magnitude may occur in the future.

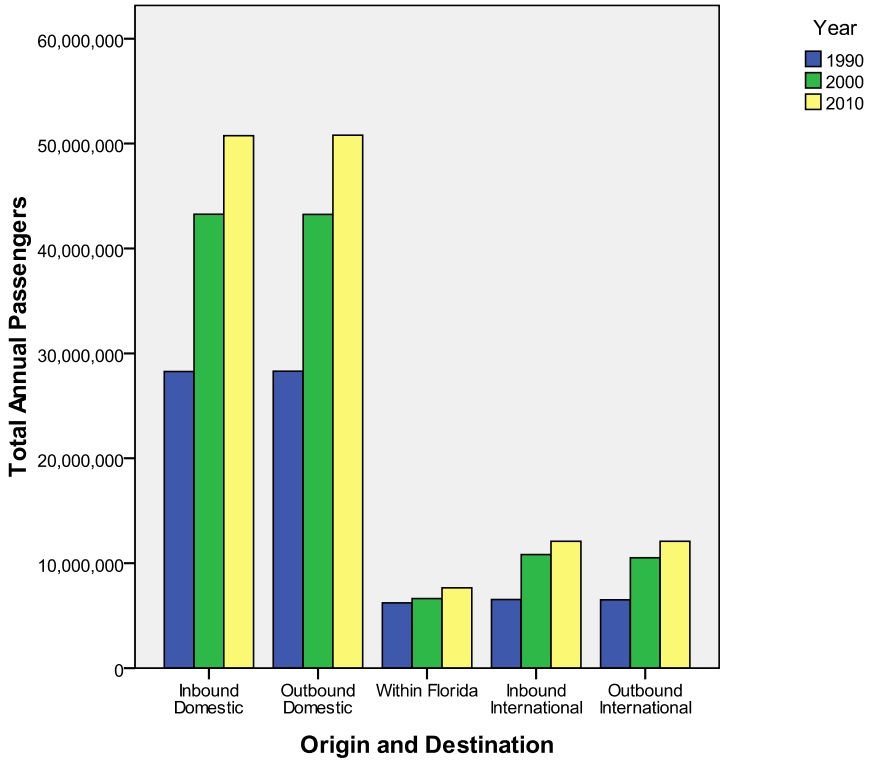
One of the keys to preparing for such eventualities is to learn how producers and consumers respond to various circumstances. The events of September 11, 2001, affected commercial air travel in Florida differently, depending on passengers' travel needs. Figure 17 is a chart showing the number of passengers in 1990, 2000, and 2010, divided according to whether their origins and destinations were within Florida, in another state, or in another nation. The majority of passengers at Florida airports are flying between Florida and other states. Next in amount of passengers is international travel, the magnitude of which, at least since 2000, has been about double that of intrastate air travel.

The events of 9/11 caused a significant, but temporary break in the steady growth in enplanements that had been experienced during most of the past three decades. Declines in enplanements were greatest for intrastate air travel and among travelers going from Florida to other states and other nations. National and international air travel into Florida experienced much smaller reductions.

The drop in enplanements for the state as a whole was significant--about 10 percent--but individual airports were impacted differentially as a function of their passenger mix. The airports serving a large proportion of passengers flying from Florida to other states and nations are Miami, Orlando, and Fort Lauderdale. Orlando and Miami experienced large drops in enplanements. Fort Lauderdale was spared because it attracted new service from low-cost carriers.

These and similar data suggest that the airports impacted most by the aftershocks of market disruptions are those that handle the bulk of Florida's commercial passenger travel. This is not surprising, but it has important policy implications. To defend against the consequences of future disruptions, Florida should consider making investments in security at the state's busiest airports. It might also be prudent for the state to establish an emergency fund for aiding these or other airports in the event of future emergencies.

FIGURE 17
Passengers at Florida Airports, Origins and Destinations: 1990, 2000, and 2010



Source: Bureau of Transportation Statistics, Table: T-100 Market, Database: Air Carrier Statistics (Form 41 Traffic) - All Carriers. This table (Table T-100 Market) combines domestic and international market data reported by U.S. and foreign air carriers, and contains market data by carrier, origin and destination, and service class for enplaned passengers, freight, and mail. Service within Florida double counts passengers to reflect that Florida airports are handling departing passengers as well as arriving passengers.

Scenario: Continued Centralization of Service

The flipside of potential capacity problems at Florida's largest and busiest airports is the issue of service centralization. The growing dominance of Miami, Orlando, Fort Lauderdale, Tampa and a few other airports in commercial air travel and air shipping has meant that service at airports in Florida's smaller communities has declined or has failed to expand commensurate with expectations and bonding assumptions. Hence, efforts to overcome capacity constraints at Florida's busiest airports could have the unintended and undesirable effect of undermining service in other parts of the state.

Declining service at smaller airports may improve airline efficiency and expand the overall capacity of Florida's passenger and cargo systems, but it imposes large costs on the state as well as on the affected communities. Florida has invested millions of dollars over several decades to develop a system of airports that is widely accessible. To the extent that service migrates from smaller communities to Miami, Fort Lauderdale, Orlando, and Tampa, these investments are in danger of being abandoned. Travelers to and from these smaller communities end up having to drive elsewhere for service, which entails costs, places additional traffic on the highways, and

contributes to air pollution. Employment opportunities in these communities are also impacted, along with property values, consumer and business spending, and state and local tax revenues.

Declining service at small communities has become a national issue and has led to a grant program for small communities seeking to retain or increase carrier activities at their airports.[26] With the help of such grants and sometimes without it, a few local governments in Florida and elsewhere have offered subsidies and income guarantees to air carriers for increased service and lower fares. At the same time, communities in several New England states have joined forces to address the issue at a regional level by making airport improvements to encourage service decentralization.

In general, these efforts have met with mixed results. The New England initiative was successful, but the success was due in part to unrelated decisions by low-cost carriers. Elsewhere, subsidies to carriers have attracted increased service, but sometimes increases by subsidized carriers have been offset by declines by other carriers, which have been placed at a competitive disadvantage. Also, offers of large subsidies by some communities have failed to attract takers, and even when additional service is achieved, it has often disappeared when the subsidy has been withdrawn. Overall, subsidies for air carrier services in small communities have proven to be expensive and only marginally effective.

If Florida policymakers conclude that subsidies are warranted to improve service in small communities, they can benefit from lessons already learned. Experience shows that service decentralization should be pursued on a regional or statewide basis rather than through isolated initiatives by multiple jurisdictions operating independently. Otherwise, service levels by different carriers are likely to change in unpredictable ways, both locally and regionally. Consideration must also be given to the types of passengers for whom additional service is needed. Residents of small communities would benefit more from timely connections to hub airports than from additional service to spokes. Together, these lessons point toward state programs that would offer funding to airlines for adding an increment of service to the existing delivery system regionally or statewide in a manner that would not only increase service to small communities, but also achieve system-wide improvements in connectivity and capacity.

Scenario: Generalized Traffic Congestion

Airports cannot be successful without a well-functioning road system connecting them to passengers and cargo. Florida's recent initiative establishing the Strategic Intermodal System (SIS) recognizes this imperative by focusing attention and resources on intermodal connectivity around airports and seaports. However, an emphasis on high-value transportation centers may not be enough when it comes to assuring access to Florida's primary airports.

Orlando International and Miami International obviously need nearby roads to be free of chronic congestion, but their catchment areas are not exclusively, or even primarily, local. Orlando attracts passengers from all over central Florida, and Miami not only serves passengers throughout South Florida but also cargo transporters from across the entire state and beyond. Consequently, air service in Florida would be adversely affected if traffic congestion became chronic on almost any expressway in the state. In recent annual reports, the Florida

[26] Goetz and Sutton (1997); GAO (2003).

Transportation Commission has pointed out that traffic is mounting on Florida's highways. Similarly, national studies of traffic congestion now rank parts of Florida alongside such notoriously congested cities as Atlanta and Los Angeles.

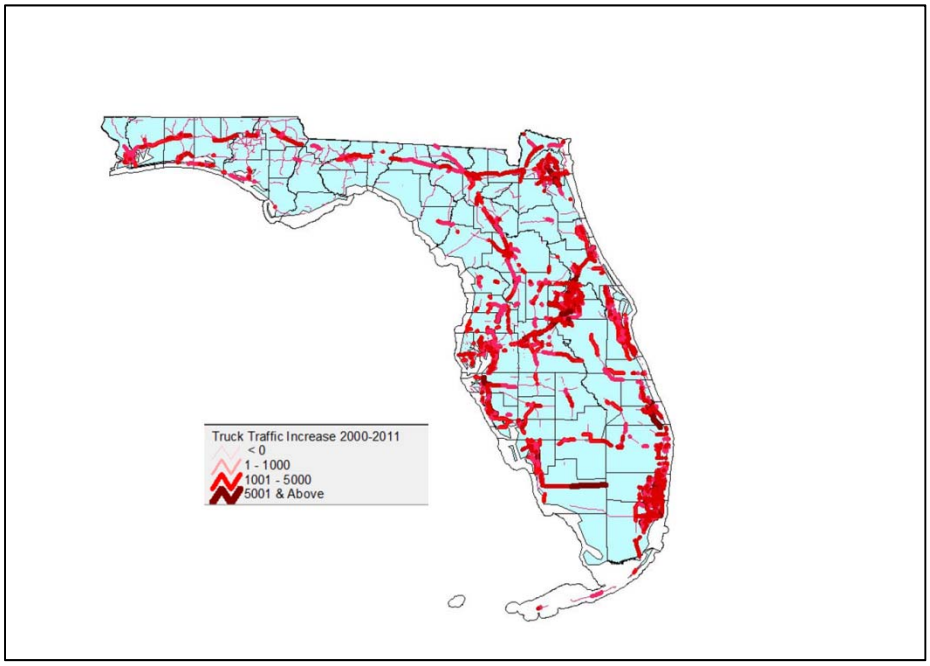
A gradual and diffuse buildup of traffic may not attract much attention from citizens and elected officials until it is too late to do much about it. Once roads become severely congested, travelers will adjust their driving times to avoid peak hours, but this simply lengthens the rush hour and eventually results in traffic jams that are more or less constant. Similarly, construction to expand roads that are already near gridlock have very high costs, take longer than other projects, and make matters worse until they are completed. Furthermore, when lanes are added at this point, their impact on peak-hour traffic is minimal; traffic remains bad at peak hours because commuters become less averse to rush hour and revert to their previous driving times.

If traffic continues to mount along Florida's interstates, turnpikes, and toll roads problems are likely to surface first in the trucking industry that carries cargo to and from Florida's airports and seaports. Traffic delays would rapidly increase the cost of transporting cargo by truck to Miami International Airport, and this would likely hurt international trade and commerce statewide.

Already, traffic is building along many segments of Florida's expressways. Figure 18 is a map indicating the extent to which truck traffic increased between 2000 and 2011 on Florida's highways. Traffic is building along all of the expressways going into Tampa, Orlando, Jacksonville, Fort Lauderdale, and Miami. It is also increasing in Central Florida south of Orlando along Highway 27 and in Southwest Florida on I-75 from Tampa to Naples.

There are only two ways to mitigate this problem: expand the state's interstates and turnpikes, and/or reduce automobile traffic to make way for more trucks. Improving Florida's in-state air service could reduce car traffic. Road improvements will require sustained funding at high levels for the foreseeable future. In the long run, building a dependable, convenient, comfortable, and affordable system of in-state air service would probably be easier, quicker, and less costly.

FIGURE 18
Amount of Truck Traffic Increase, 2000-2011.



Source: Florida Department of Transportation, Florida Traffic Information, 2001, 2008, and 2011.

Scenario: Technological Breakthroughs

New technologies such as ADS-B, RNP, and advanced GPS systems are being developed that will resolve many of today's problems while making air travel and transport much less expensive and much more comfortable and convenient. One of the most promising developments called the Next Generation Air Transportation System, or NextGen, is a wide ranging transformation of the entire national air transportation system to meet future demands and avoid gridlock in the sky and at airports. NextGen is an umbrella term for the ongoing, wide-ranging transformation of the United States' national airspace system. At its most basic level, NextGen represents an evolution from a ground-based system of air traffic control to a satellite-based system of air traffic management.

Another innovation that is now coming on line is referred to as new large aircraft (NLA). European airlines are introducing a super-jumbo jet, the Airbus A380, capable of carrying over 500 passengers between Asia, Europe, and the United States. Seating capacity on some flights will rise to 600 by 2010 and to 800 by 2020. Boeing has also developed their version of NLA, the 787 Dreamliner. Both of these aircraft are currently in service worldwide.

These and other technological innovations have the potential to revolutionize air travel. NLA's will lower the costs of flights to Florida from Asia and Europe, thus benefiting international trade and tourism. Computerized controls and GPS navigation will allow increased use of airspace now jammed with traffic. Aviation is on the verge of dramatic changes that will have special benefits for Florida because of its good weather, flat terrain, and economic dependence on aviation services.

Still, the benefits of new technology are never guaranteed. There are only a handful of airports in Florida, such as Orlando International and Miami International, which have the infrastructure to accommodate NLA. It is reasonable for Florida to support research and development on NextGen technology and to assist aircraft producers in introducing new aircraft into the Florida system. The state may also need to help Florida's general aviation airports add facilities and equipment to take advantage of new types of aircraft if and when they arrive.

A Policy Framework for Continuous Improvement

Not all of these scenarios are equally probable, nor do they have equivalent implications for policy, but each is possible and perhaps likely, and they could occur in just about any combination or sequence. Hence, prudence dictates a strategy that keeps options open, tracks trends and performance, and allows mid-course corrections.

Most of the policy options discussed above should be pursued simultaneously even though in some respects they have different, if not conflicting, aims. If initiatives are undertaken incrementally and at a measured pace, their results can be assessed early on, and ineffective programs can be modified or abandoned. A multi-pronged strategy should include some combination of the following elements:

- Ongoing investments in Florida airports to promote state and regional economic development.
- Encouraging ongoing initiatives and enhance funding opportunities for multimodal connectivity within Florida airports.
- Providing opportunities and removing hurdles related to expanded use of sustainable technology.
- State intervention into local land-use decision making to remove local barriers to airport projects of regional or statewide significance.
- Investments in airport facilities to make air travel easier and more comfortable for senior citizens and international tourists.
- A state initiative to build upon the existing system of in-state air service so that access to hub airports is improved, air service to small communities is increased, and automobile traffic on Florida interstates and turnpikes is reduced.
- Investments to enhance security and improve passenger comfort at Florida's busiest airports.
- An emergency fund to address market disruptions.
- A system for tracking trends, evaluating results, and changing the direction of policy as necessary.

The last item in the list is essential and is already being developed within Florida's aviation planning process. In the long run, the key to success is to learn from experience. The complexity of present circumstances and the uncertainty of future developments must be matched by multiple lines of action and ongoing assessments of performance and circumstances.

BIBLIOGRAPHY

Borchert, J. R., "American Metropolitan Evolution," *The Geographical Review,* Vol. 57,, No. 3, July 1967, pp. 301-332.

Bouvier, L. F. and B. Weller, *Florida in the 21st Century: The Challenge of Population Growth*. Washington: Center for Immigration Studies, 1992.

Bureau of Economic and Business Research, *Florida Statistical Abstract*, University of Florida, Gainesville, 2007.

Bureau of Economic and Business Research, *Florida Population Studies 2006*, Detailed Bulletin 145, 2006.

Bureau of Transportation Statistics, *Table: T-100 Market, Database: Air Carrier Statistics (Form 41 Traffic)- All Carriers*, 2007.

Colburn, D. R. and L. deHaven-Smith, *Government in the Sunshine State: Florida Since Statehood*, University Press of Florida, Gainesville, 1999.

Colburn, D. R. and L. deHaven-Smith, *Florida's Megatrends*, 2nd Edition, University Press of Florida, Gainesville, 2010

deHaven-Smith, L., *Environmental Concern in Florida and the Nation*, University Press of Florida, Gainesville, 1989.

deHaven-Smith, L., "Florida's Unfinished Agenda in Growth Management and Environmental Protection," in *Government and Politics in Florida*, 3rd Edition, , J. Edwin Benton, Ed., University of Press of Florida,2008.

"Florida's CEOs: Cautious Optimism," *Florida Trend Magazine: 2004 Annual TopRank Florida*, December 2004, pp. 8-12

deHaven-Smith, L. and J. Wodraska, "Consensus-Building in Integrated Resources Planning," *Public Administration Review*, Summer 1996.

Denslow, D. A., "A Shift to High-Level Jobs Is Crucial," in *Forum: Florida in a New Era*, Vol. XXXIII, No. 1 (Spring), 2009, pp. 18-21.

Denslow, D. A., A. C. Pierce, and A.H. Shermyen, Eds., *The Economy of Florida*, Florida: Bureau of Economic and Business Research, University of Florida, Gainesville, 1990.

Federal Aviation Administration, "Calendar Year 2005 Primary and Non-Primary Commercial Service Airports," ACAIS Database, October 2006.

Finotti, J., "The Jet Set," *Florida Trend Magazine*, September 2002. pp. 36-41.

Goetz, A. R., and C. J. Sutton, "The Geography of Deregulation in the Airline Industry." *Annals of the Association of American Geographers*, Vol. 87, No. 2, June 1997, pp.238-263.

Isserman, A. M., "Estimating Export Activity in Regional Economy: A Theoretical and Empirical Analysis of Alternative Methods," *International Regional Science Review*, 5, 1980, pp. 155-184.

Isserman, A. M., and J. D. Merrifield, "Quasi-Experimental Control Group Methods for Regional Analysis: An Application to an Energy Boomtown and Growth Pole Theory," *Economic Geography*, Vol. 63, No. 1, 1987, pp. 3-19.

Klesius, M., Wings of Change: From the Wright Flyer to the B-2 Bomber," *National Geographic Magazine*, December 2003.

McGovern, J. R. (1976) *The Emergence of a City in the Modern South: Pensacola, 1900– 1945*, E.O. Painter, DeLeon Springs, Fl, 1976.

Mohl, R. A., "Florida's Changing Demography: Population Growth, Urbanization, and Latinization," *Environmental and Urban Issues*, Florida Atlantic University, Fort Lauderdale, FL, Winter, 1990, pp. 22–30.

National Research Council, *Securing the Future of U.S. Air Transportation: A System in Peril*, National Academic Press. Washington, DC, 2003.

Scoggins, J.F. and A. C. Pierce, Eds. *The Economy of Florida*, University Press of Florida, Gainesville, 1995.

Smith, S. K., and J. M. Nogle (2003). "Population Projections by Age, Sex and Race for Florida and its Counties, 2002-20025," *Florida Population Studies*, Vol. 36, Num. 3, Bulletin 136, July 2003.

Transportation Research Board, *Winds of Change: Domestic Air Transport Since Deregulation*, Committee for the Study of Air Passenger Service and Safety Since Deregulation, Transportation Research Board of the National Research Council, Washington D.C., 1991.

Transportation Research Board, *Future of Flight: A Review of the Small Aircraft Transportation System Concept*, the Committee of a Study of Public-Sector Requirements for a Small Aircraft Transportation System, Transportation Research Board of the National Research Council, Washington D.C., 2002.

CDM Smith, *Florida Aviation System Plan*, Task 2.3.A Florida Air Cargo Inventory/Analysis. Subtask 2.3.4 – Air Cargo Forecasts. Tallahassee, FL., 2001.

CDM Smith, *2008 Florida Air Cargo System Plan Update,* Tallahassee, FL., 2008.

CDM Smith, Statewide Aviation Economic Impact Study, Tallahassee, FL 2009

CDM Smith, *Florida Aviation System Plan*, Demand-Capacity Analysis. Tallahassee, FL, 2004.

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