

**Economic Benefits of Natural Land Conservation:  
Case Study of Northeast Florida**

*Final Report Submitted to Defenders of Wildlife  
in Fullfillment of Sponsored Project Agreement*

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## Executive Summary

Florida's economy increasingly is being recognized as tied to and based on both its human created and natural amenities. Annually, more than 70 million visitors are drawn to its theme parks, beaches, rivers and lakes, parks and to its landscape in general. Other people are drawn to Florida as their homes. The growth in visitors and residents and their activities has induced a form of economy quite different than what has existed in other parts of the United States. Quality of life and amenities play key roles in this new form of economy.

Northeast Florida's economy, having lagged behind the growth of south and central Florida, is now seeing similar growth. Timber, paper production, transportation, military and agriculture continue to be important sectors, but now growth of population in the Jacksonville area and along the coast is inducing an economy similar to central and southern Florida. The natural amenities of the beaches, the intracoastal waterway and the St. Johns River and the overall quality of life are attracting retirees and young families alike. The western parts of the northeast Florida counties remain very rural with forests, pastures and extensive wetlands.

This case study of economic benefits of natural lands focuses on the northeast counties of Duval, Clay, St. Johns and Putnam. The goal is to help readers envision the role and importance of the region's landscape resources to its economy. The resident population of the four county region reached 1.12 million in year 2000, with projections of 1.38 million by 2015, or more than a two-fold increase since the 1970s. By far, the majority of the growth has been and is expected to continue to be in the greater Jacksonville area and along the coastal strip. In the four county region, 23 percent of the area has some form of human development. Of the remaining 77 percent, 20 percent is in some form of agriculture, primarily pasture, 27 percent is some form of natural-terrestrial land use, mostly timber, and 29 percent is natural wetlands, aquatic fresh and saltwater habitats. While the greatest part of continued development is expected east of the St. Johns River, this area is interspersed with wetlands and uplands considered by the Florida Wildlife Conservation Commission (formerly Fish and Game Commission), to be Strategic Habitat Conservation Areas (SHCAs). The majority of the area west of the river consists of relatively natural landscapes. Large areas are in public ownership; areas between these public lands are designated SHCAs and form a biological corridor from the Ocala National Forest to the St. Marys River and Okefenokee National Wildlife Refuge. These rural lands are seen as natural capital that complements the human-created capital of the region with both playing major roles in the vitality of the region's economy.

The region's total economic output in 1999 was \$49.6 billion (Bn), with total employment of 690,000 jobs, and the gross regional product, or total value added by all industry sectors, was \$27.9 Bn. The largest sectors were services (\$6.3Bn), finance, insurance and real estate (\$6.4Bn), government, including military (\$6.1Bn), and trade (\$4.2Bn). Manufacturing, construction and transportation/communications/public utilities sectors each contributed another \$1 to \$2 Bn to gross regional product. Agriculture and forest products based on the rural landscape contributed \$0.4 Bn. Duval County residents garner nearly 70 percent of the regional personal income. The per capita annual income for the region is essentially the same as for Florida at large, approximately \$26,000, with St. Johns County having the highest (approx. \$37,000), and Putnam County the lowest (\$18,000). The poverty level in the region is around 13 percent, which is lower than the state as a whole (15%), although Putnam County's poverty rate is higher (22%). The market value of property in the region is around \$50 Bn, with agricultural and natural lands accounting for nearly \$2 Bn. In most respects, the market-based economic activity in the region shares much in common with the overall Florida economy.

The monetary amounts given above are based on expenditures taking place in markets. In addition to expenditures by people is an economic gain referred to by economists as the consumers' surplus. This monetary measure is seen as the net benefits remaining after the expenditures have been subtracted from the total economic gain (benefits). Economic theory asserts that it is the desire of this consumers' surplus, based on their willingness to pay, that lies behind people's actions in the marketplace, in non-market activities, and the amenity value of the rural and natural landscape. The expectation of enjoyment by visitors and quality of life by residents is the basis of this economic measure.

Literature is cited that gives values for consumers' surplus that is gained by residents and recreationists in various parts of the U.S. For example, researchers at the University of Kentucky found that the average gain

in net benefits for horse farms in the Lexington area was about \$3000 per farm. The aggregate value of the 52,000 acres of horse farms was \$130 million; this is the net value accruing to the people and economy of that region. Similar calculations were made for the four county northeast Florida region. In these calculations, a number that was 10 percent of the Kentucky value was used, i.e. \$0.0023 per acre per household per year. The calculation gives an annual net benefit accruing to the residents of the region from rural natural lands of \$1.5 billion. This net gain is in addition to the annual value added by agricultural and forest industry activities that accrues to the owners of these lands (\$0.4Bn). Therefore, these rural landscapes contribute a combined value of \$1.9Bn to the regional economy from both production activities and amenity values.

In a similar way, there is economic gain resulting from recreational activities on the lands and waters of the region. These activities are very much a part of the region's economy. Consumers' expenditures were estimated to be \$390 million (Mn) for hunting, fishing, and wildlife viewing. The associated consumers' surplus was estimated at \$313 Mn. Thus, the overall economic contribution of recreation is around \$703 Mn per year. The impact on the region's economy is around 10,000 jobs and \$530 Mn in total output.

Given the region's location relative to transportation corridors, the tourism economy influences the northeast region of Florida. In the year 2000, 71.5 million people visited Florida, many coming by automobile through the northeast region. For Florida as a whole, these visitors resulted in \$117 Bn in total economic output, 1.75 million jobs and \$78 Bn in gross state product. Clearly, the tourism economy is very important to the state, and to the degree that the northeast Florida region can attract tourists to the area, it will be an important part of the region's economy.

The ability to continue to attract visitors and new residents will be based largely on the ability of the region to maintain an image of high quality of life and an attractive landscape. Florida's economy, indeed the entire U.S. economy is more and more tied to the amenities of life. Basic needs are being met for a large proportion of the nation's population. People are now seeking greater enjoyment of life and amenities are seen as playing a role in this enjoyment. Very important in the perceptions of amenities is a viable natural landscape. Surveys of residents and visitors show that people are increasingly interested in maintaining critical habitats and attractive landscapes. These surveys demonstrate that people have a high willingness to pay for these natural landscapes. When the aggregate value of the willingness to pay for natural lands are considered in light of the overall economy, one begins to see the role that these natural lands play in the region's economy. For the northeast Florida region to continue to prosper, the citizens and leaders of the region must evolve means of maintaining the ecological viability of its lands while structuring their twenty-first century economy.

## **Introduction: Florida's Amenities and Economic Growth**

Florida's population has grown from less than three million people to more than sixteen million in the last 50 years. This growth was not due to any of the traditional bases of economic growth such as agriculture, resource extraction and manufacturing. Agriculture and forestry, although major users of the landscape, have declined in employment. The basis of the economic growth has been amenities, both natural and human created. In this respect, Florida preceded much of the nation in this form of economic growth. The implication for Florida, and the nation, of this new form of economic development, if it is economic development and not just unbridled growth, is not yet clear. Some citizens and leaders are beginning to recognize the critical role natural environments play in the perception of the amenities and their value. In Florida, as in the nation as a whole, political leaders are oscillating on policies which can ultimately assure the long-term viability of the natural environments that are the basis of this economic growth, and it is hoped, true economic development.

The focus of this study is to identify and measure the "economic" benefits and costs of natural lands conservation. In such a study the intent is to better understand the natural environmental base and its contribution to the true economic well being of the people of the area. Such an approach is not limited to just monetary value and the immediate present. Rather, the perspective is one of expressing the positives and negatives in whatever form they are manifest and over the long-term. Political decision makers are often interested in short-term financial benefits and costs. There is a valid perspective, for it helps them in dealing with their fiscal responsibilities. But, if this monetary perspective is the only one considered in the policy give and take, there is the likelihood of under considering the bases of the true economic development: the natural amenities which undergirds Florida's economy.

Florida's economic growth and development has occurred somewhat differently than in much of the rest of the United States. This has especially been the case in the second half of the twentieth century. The traditional view of economic growth was that jobs are created by expanding agriculture, resource extraction or manufacturing. Fundamental to this economic structure was the mining and harvesting of materials and crops from the land, transformation of these to products and selling of these products to people in other parts of the country. Thereby, jobs were created and people moved to the jobs. Incomes increased in the region, more capable people came to participate in the activities, technologies improved, output increased, the economy expanded and the process continued to spiral upward. As this economic process occurred in some parts of the U.S. in the second-half of the nineteenth century and in the first-half of the twentieth century, Florida lagged very far behind. It was a poor state and had a small population. Few people had ventured into the peninsular part of Florida. Primary outputs were from agriculture and forestry. Job growth was slow and few people were drawn to the state.

Following World War II the U.S. economy as a whole rebounded with great vigor, generating substantial growth in incomes for much of the population. Florida began to be viewed in a different way. People ready for retirement saw it as having a year around warm climate, tropical beaches, exotic landscapes, waters to be fished, it was a place they could enjoy living in. And, they came in great numbers. For the same reasons those not yet ready for retirement came as tourists to get away from the cold winters of the north. With the location of great entertainment complexes in central Florida, families began coming during the summers as well, and the population and state economy grew.

This was a different form of growth dynamic than had occurred in other parts of the U.S. (although the western U.S. was experiencing a similar growth). Retired people and tourists came for Florida's amenities: the retired people for the overall quality-of-life amenities and the tourists for the recreational amenities. Income flowed into the state, demand for services expanded rapidly, causing job expansion and attracting younger people into the state. The result has been Florida's continued growth in both the elderly and younger migrants. In Florida, the economic growth instead of being based on people following new jobs in manufacturing, resource extraction and agriculture, jobs followed people. And, the people were following the amenities Florida offered. Florida's growth and development has been, and is being greatly influenced by its amenity base.

Northeast Florida's economy lagged somewhat behind south and central Florida, but is now shifting to this new economic base. Timber, paper production, transportation, military, and agriculture continued to be



important sectors well into the second-half of the twentieth century. In more recent years with the growth in the state as a whole, development of the coastal parts of the northeast counties began much as it had on the lower east and west coasts. This too was tied to the natural amenities of the area. Retiring people, not wishing to be caught up in the hustle and bustle of the growing south and central Florida, chose this northeast coast for its slower and more natural pace of life. The amenities of the developments and the greater area were factors in the choices. With the increases in population in areas that had been rural came increases in demand for services. As in the rest of Florida, jobs followed people, and younger people came to fill the jobs. Additionally, with major transportation corridors to south and central Florida running along the northeast coast, the growth in visitors to the state influenced the commerce of this part of the state, too. The result has been that the eastern parts of the counties along the coast have become highly developed, while the western parts have remained rural in nature.

## Study Setting: The Northeast Florida Region

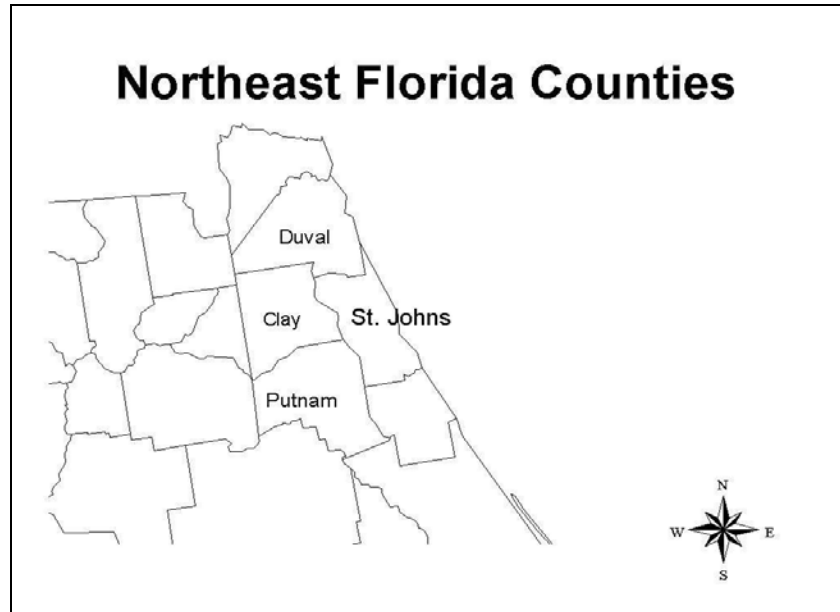
This case study of economic benefits of natural lands was conducted for the region of northeast Florida, specifically Duval, Clay, St. Johns, and Putnam counties, shown in Figure 1. Data gathered from a variety of sources are intended to shed light on the economic driving forces for and against natural land conservation in this region. The dominant landscape features of the northeast Florida study setting of Duval, St. Johns, Clay and Putnam counties are the Atlantic coast and the St. Johns River (Figures 1 and 6). Jacksonville, the dominant metropolitan area straddles the St. Johns River and extends east to the Atlantic beaches and to the north, west and south along the two major interstate highways (I10 and I95). Development extends along the coastal barrier islands to St. Augustine in St. Johns County, and there is considerable pressure for development south of St. Augustine on the mainland side of the Intracoastal Waterway (Mantanzas River). There is also some development along the major highways and the sand hills of southwestern Clay and northwestern Putnam counties in the Melrose/Keystone Heights areas. Otherwise, the western most parts of Duval, Clay and Putnam counties are dominated by wet forested areas, creeks and lakes with little development. In many respects this part of the study area offers a continuous forested and wetland landscape.

### Population and Growth

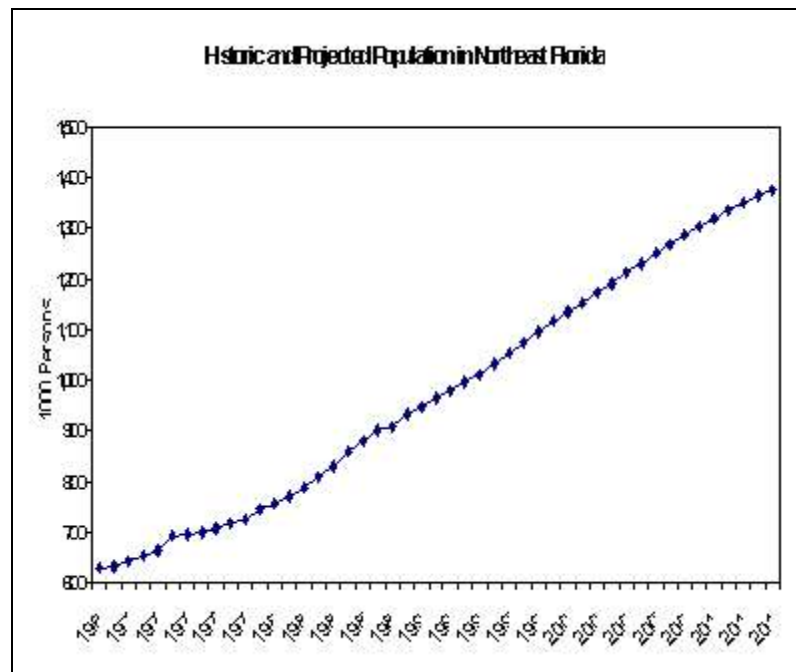
Human population is perhaps the single most important factor affecting demand for natural lands and the impacts of society on the environment. During the 1900s, Florida's population about doubled every 20 years. In 1900, there were about 500,000 people living in Florida. By 1980, Florida's population had increased to nearly 10 million people. The population is currently over 16 million, and is expected to reach over 20 million by 2020 (Bureau of Economic and Business Research, 2001).

The historic and projected future population of the four northeast Florida counties is indicated in Figure 2. The resident population was 1.12 million in

**Figure 2.** Northeast Florida counties for case study.



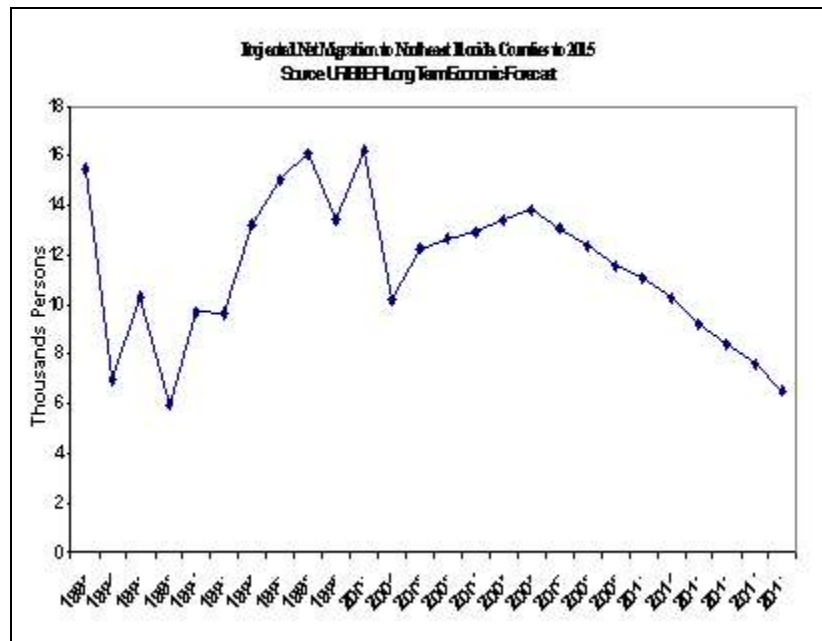
**Figure 1.** Historic and projected population growth in four northeast Florida counties.



year 2000. Over two-thirds of the population resided in the Greater Jacksonville Metropolitan area of Duval County. The official forecast of population growth by the University of Florida's Bureau of Economic and Business Research indicates that the region's population will grow by 23 percent to 1.38 million persons by the year 2015, or more than a two-fold increase over 1970 levels. The projected growth of the region is based upon demographic models that consider migration, age structure, fertility and mortality of the population (Appendix Tables A1, A2).

Duval county has and will continue to be the fastest growing county in absolute numbers, gaining an additional 119,000 people between 2000 and 2015. In percentage terms though, Clay and

**Figure 3.** Historic and projected net migration to Northeast Florida



St. Johns Counties have experienced and are projected to continue growing at significantly faster rates. Although Putnam County experienced substantial growth between 1970 and 1990, it's population is projected to increase only marginally during the next decade (Appendix Table A1).

Historic and projected household numbers are shown in Appendix Table A3. These numbers closely follow population patterns. There is a trend toward smaller household size, so that the number of households has and will continue to increase at a slightly faster pace than population. The total number of households in the four-county area is expected to increase from 434,000 in year 2000 to nearly 557,000 in 2015.

Migration of new residents into Florida has historically been among the most important drivers of growth. Net migration represents the number of people that move into an area minus those that move away, and does not include population change due to births and deaths. Net migration to Florida during the 1990's totaled 2.6 million persons, or an average of 705 persons per day. Net migration to northeast Florida was 116,000. Figure 3 indicates the historic and future trend in net migration to northeast Florida counties. Migration increased rapidly during the latter 1990's and peaked in year 2000, and is expected to decrease after 2008. During the period 2000-2010, migration to both Florida and to the northeast region is expected to increase somewhat above the level of the past decade, although it is expected to slow in Duval county.

## Land Use and Change

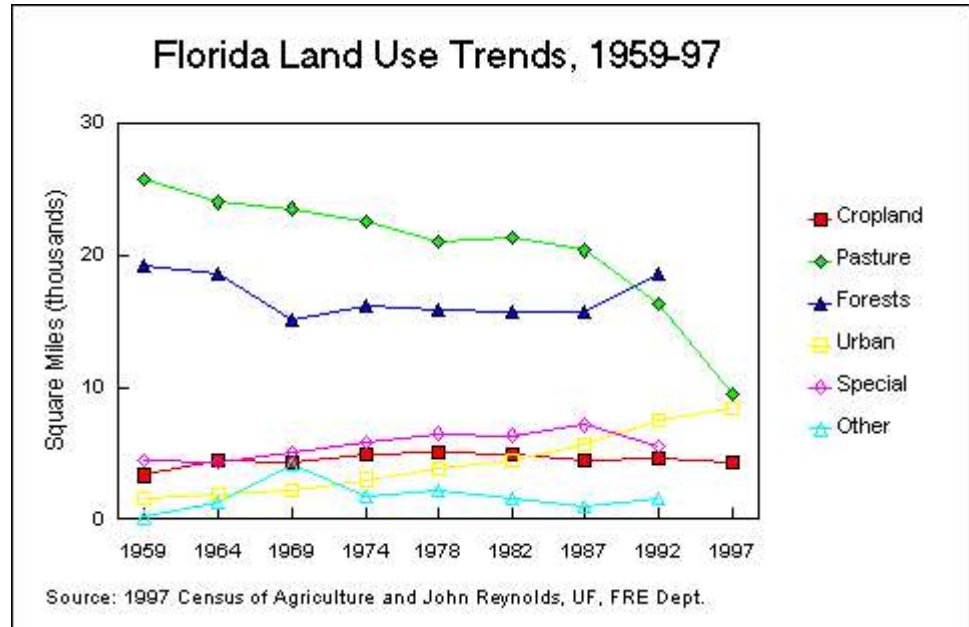
Conversion of land from rural to urban use is more pronounced in Florida than in many other states. About three percent of the total land area in the United States is classified as urban. While Florida's urban land area is small (15 percent), it is still expanding more rapidly than in most other states. Land in urban areas in Florida increased from 1.2 million acres in 1964 to over five million acres in 1997. In the South, the increases in urban land were greatest in the Southeast and Southern Plains regions. These increases were due to the large population increases in Florida and Georgia in the Southeast and in Texas in the Southern Plains. As the demand for high value uses increases, land is bid away from more extensive uses such as pasture, forest land and other undeveloped uses. Those who want to develop land for urban uses are usually able to bid land away from extensive uses because of the higher capitalized net returns in the more intensive uses.

Urban land-use coefficients have been estimated for Florida, using county data for the period 1973 to 1984, and for the fourteen states in the four southern farm production regions, using aggregate state data for the period 1974 to 1987 (John E. Reynolds, *Urbanization and Land Use Change in Florida and the South*, 2002). In the Florida analysis, the urban land-use coefficients ranged from 0.363 acres per person for Metropolitan Statistical Area (MSA) counties in the Central and South region to 1.904 acres per person for non-MSA counties in the North region. The coefficients were two to three times higher in the North region than in the Central and South and the coefficients were also two to three times higher for non-MSA counties than for MSA counties. The urban land-use coefficients for the state-level data ranged from 0.652 acres per person for the Southern Plains to 0.772 acres per person for the Delta States. The Florida analysis reinforces the hypothesis that, when cities increase in size and mature as an urban area, the land use coefficient declines. Therefore, in the larger urbanizing areas, less land is added to the urban land base as each additional person is added to the population base. The Florida analysis also indicates that disaggregating the data to the county level and separating MSA and non-MSA counties allows more accurate estimates for specific areas. For example, the use of the state-average coefficient (0.535) for the Central and South instead of the coefficient for MSA counties in the Central and South (0.363) would have resulted in an estimate of 614,711 additional acres of land to be converted to urban uses by the year 2020.

**Figure 4.** Trends in land use in Florida, 1959-97.

Figure 4 indicates trends on land use for the state of Florida between 1959 and 1997. The most obvious trends are the steady increase in urban land use and the concurrent decline in pasture acreage.

As noted, in Northeast Florida, the urban growth is occurring in the eastern part of the counties, while the western parts of Duval and Clay Counties and most of Putnam County are very rural. The southwest corner of Duval, where it contacts Nassau and Baker Counties is primarily flatwoods interspersed with wetlands and creeks, many flowing northwest to the St. Mary's River. This part of Duval County is within ten miles of the river. The northwest part of Clay County is much like the western Duval area. The north fork of Black Creek drains the wetlands. Devil's Den Creek, Ates Creek and south fork of Black Creek drain the center part of the county. Black Creek from State Road 16 north and east to the St. Johns River, approximately, 17 miles is a state designated canoe trail. Camp Blanding Military Reserve and Wildlife Management Area dominate the western most part of Clay County. The west part of the county adjacent to Camp Blanding is covered with lakes. Gold Head Branch State Park and Magnolia Lake State Recreation Area are in this part of Clay County.



The western part of Putnam County is likewise covered with lakes and wetlands. At the northwest corner of the county is the Putnam Hall potentiometric surface high for the Floridian Aquifer (the other potentiometric high is in the Green Swamp Area of Critical State Concern in central Florida). The implication of this high point on the Floridian Aquifer potentiometric surface is that this region is an important part of the recharge to the aquifer. The Floridian Aquifer is the dominant source of water for urban areas and agriculture from the area below Orlando to southern Georgia to Tallahassee. In the central part of western Putnam County is Levys Prairie and the Ordway Preserve. The eastern part of the county is dominantly wet flatwoods and

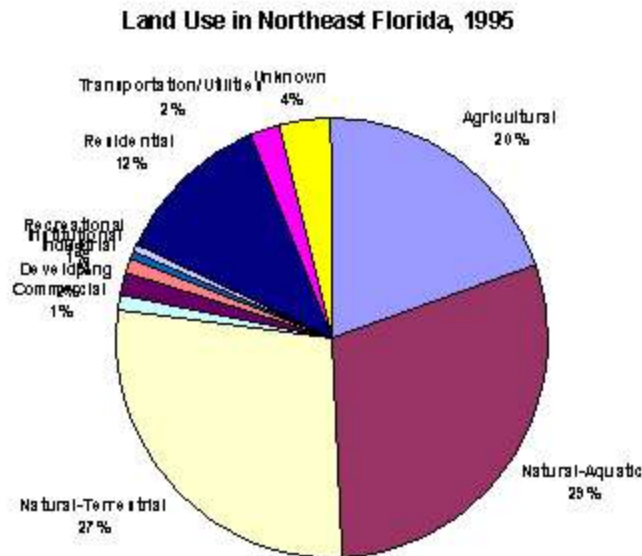
prairies drained by numerous creeks to the St. Johns River. The southern part of Putnam County is dominated by the Ocala National Forest (which is also a dominant part of eastern Marion County).

As noted the coastal part of St. Johns County is rapidly developing. The western part along the St. Johns River remains rural with wetland forest cover. Being between the St. Johns River and the Atlantic, the development pressures are much greater than in Putnam County and the western parts of Clay and Duval Counties.

Table 1 and Figure 5 show the allocation of land in each county and the region by its use for 1995. Putnam County has the highest number of square miles and proportion of land area in agricultural and natural uses. Duval has the lowest proportion of its land area in agricultural and natural uses, but still has more area in this class of use than Clay County does.

As would be expected, Duval county has over 46 percent of the

**Figure 5.** Land use in northeast Florida, 1995



developed land area in the region. For the four county region as a whole, 77 percent of the land area remains in agricultural and natural uses. A detailed breakdown of land use in the four counties of the region is presented in Appendix Table A7 with the percent of the four county region devoted to each use is shown in the right hand column. The largest single specific form of land use in the region is pine plantations, which represented 13.7 percent of the region's land area in 1995.

Population and land use intensity indices in the four counties are compared over time in Table 2. The bottom row shows the projected decrease in agricultural and natural land area in the counties and region between 1995 and 2015. It was assumed that urban area expansion will occur at the expense of agricultural and natural lands. Overall, agricultural and natural lands will be reduced by approximately 9 percent, with somewhat higher percentage losses in Duval, Clay and St. Johns Counties, and lower losses in Putnam County.

The region of northeast Florida still has relatively abundant natural land and resources, but lags behind the rest of the state in conservation. The Northeast Florida Regional Planning Council Strategic Plan, Natural Resources Element (1997), succinctly described the situation:

*“Northeast Florida has not experienced the growth that other parts of the state have experiences. This has resulted in the present existence of large tracts of undisturbed native vegetative communities and habitats within the region which support a wide variety of native species. However, projections indicate that the region will begin to grow faster than the rest of the state, on a percentage basis, between 1994 and 2010....There exists a need in northeast Florida to perform a comprehensive inventory and analysis of the habitat types that are being converted to suburban and urban uses and are projected to be impacted by future growth.”* The report goes on to say: *“Florida has one of the most aggressive land acquisition programs in the nation, having spent more than the federal government in the state during the past few years”.* However, *“The northeast Florida region has*

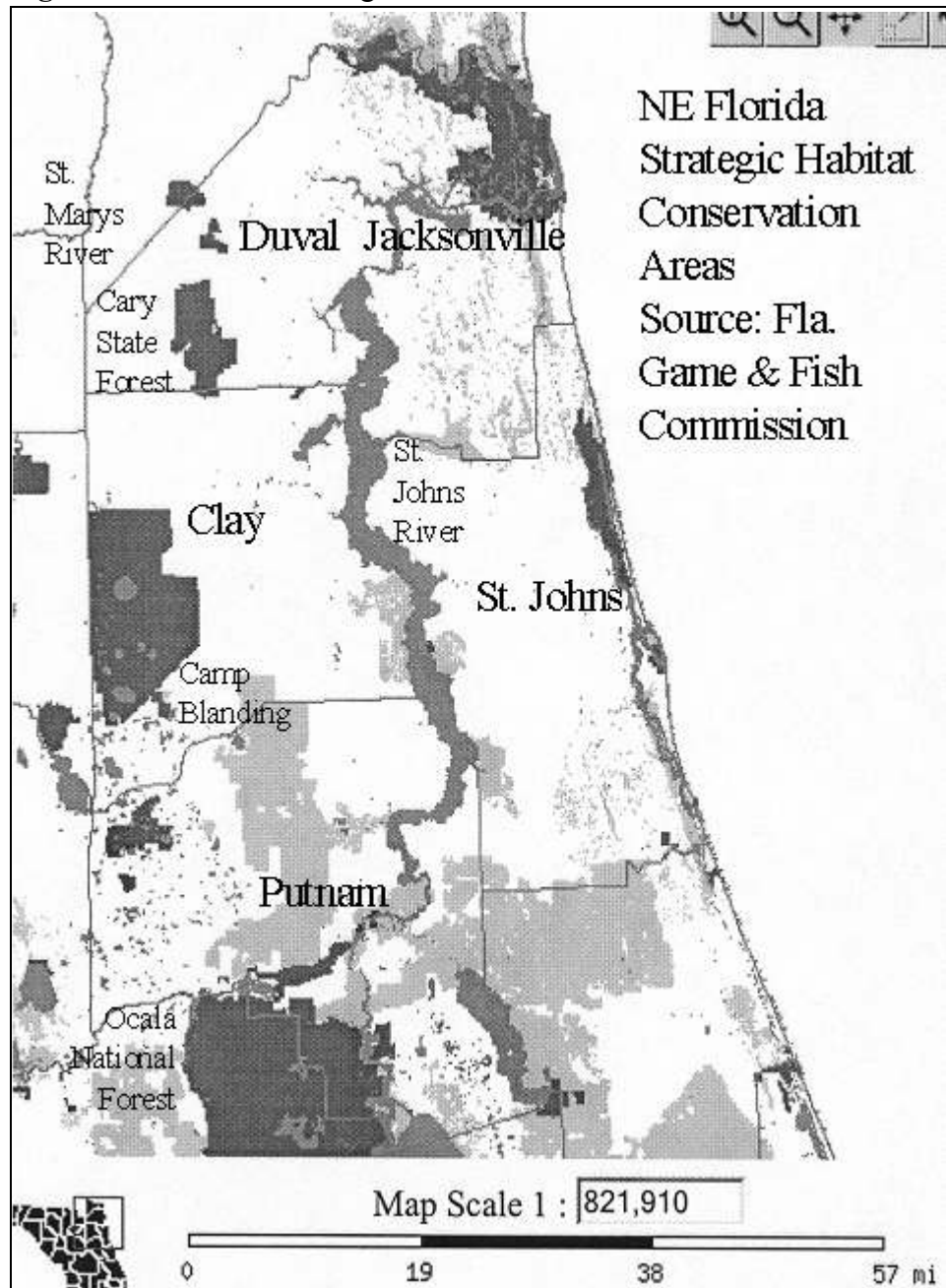
lagged behind other regions of the state in the acquisition of lands for conservation purposes. Overall, conservation land in the northeast Florida region, as of 1988, comprises 11.9 percent of the land within the region, which is well below the 19.6 percent average on a statewide basis”.

Figure 6 highlights Strategic habitat Conservation Areas (SHCAs) as designated by the Florida Fish and Game Commission (Cox, et al. 1994). In the southern part of the broader region SHCAs make up a large part of northern Flagler County and the part of southeastern Putnam County east of the St. Johns River. A major SHCA run as a corridor from the Ocala National Forest north through the center of Putnam County into Clay County east of Camp Blanding. The area north of Camp Blanding although not designated a SHCA is an important link of the corridor to the St. Marys River and to the SHCAs to the west. The majority of the lands are in private ownership,

although there are large areas of natural lands in public ownership (U.S. Forest Service, Florida National Guard, St. Johns River Water Management District, and county governments). Additionally, both public and private lands provide multiple service flows. The national forests are timbered and used for recreation and conservation. Camp Blanding provides space for military maneuvers as well as hunting and wildlife habitat. Private forested lands provide timber revenues along with hydrologic and habitat service flows. Pastures likewise support livestock grazing in addition to habitat. These lands for hundreds of years have provided joint private and public service flows.

From an economic perspective the overall landscape of the region is the natural capital that generates both private and public economic returns. Timbering, livestock, recreation and natural amenities all depend on the landscapes ecologic and hydrologic functions. For the service flows to continue into the future and support

**Figure 6.** NE Florida Strategic Habitat Conservation Areas



the future economy the ecologic and hydrologic functions must continue to be viable. To a considerable degree the viability of the natural functions will depend upon prevention of fragmentation of natural land areas and compatible land management. Additionally, it is highly likely that not all the needed natural lands can be publicly acquired in fee-simple ownership. More likely joint public-private relationships will need to be established (ex. conservation easements under less than fee simple agreements). Under such management approaches private and public goals are jointly met (ex. timber production, hydrologic function and wildlife habitat) thereby contributing to both the commercial and amenity bases of the region's economy. The degree to which such private/public ventures continue and expand depends considerably on unfolding public policies and decisions.

**Table 1.** Land Use in Northeast Florida Counties, 1995

Land Use Type	Duval	Clay	St. Johns	Putnam	All	Percent of Area
	Area (sq.mi.)					
Agricultural	123	143	171	176	613	19.7%
Natural-Aquatic	268	148	238	269	922	29.6%
Natural-Terrestrial	183	239	179	262	863	27.7%
<b>Agricultural and Natural</b>	<b><u>575</u></b>	<b><u>529</u></b>	<b><u>588</u></b>	<b><u>707</u></b>	<b><u>2,399</u></b>	<b><u>77.0%</u></b>
Commercial	26	3	4	3	35	1.1%
Developing	8	6	15	19	48	1.5%
Industrial	18	13	2	6	38	1.2%
Institutional	11	5	1	1	18	0.6%
Recreational	8	1	6	1	16	0.5%
Residential	165	77	48	83	373	12.0%
Transportation/Utilities	40	10	9	9	68	2.2%
<b>Urban &amp; Developed</b>	<b><u>276</u></b>	<b><u>115</u></b>	<b><u>85</u></b>	<b><u>120</u></b>	<b><u>596</u></b>	<b><u>19.1%</u></b>
UNKNOWN	26	0	94	0	120	3.8%
<b>Total</b>	<b><u>877</u></b>	<b><u>644</u></b>	<b><u>767</u></b>	<b><u>827</u></b>	<b><u>3,115</u></b>	<b><u>100.0%</u></b>

Source: St. Johns River Water Management District

**Table 2.** Projected Population and Land Use Change in Northeast Florida Counties, 1995 and 2015

	Clay	Duval	Putnam	St. Johns	All
Population 1995 (1000 persons)	120	723	68	101	1,012
Urban & Developed Land Use Intensity 1995 (sq.mi./1000 persons)	0.9578	0.3820	1.7591	0.8426	0.5891
Projected Population 2015 (1000 persons)	201	901	78	197	1,377
Urban & Developed Land Use Projected 2015 (sq.mi.)	193	344	138	166	811
Agricultural and Natural Land Use Projected 2015 (sq.mi.)	451	507	689	507	2,184
Decrease in Agricultural and Natural Land Use 1995-2015	-14.7%	-11.8%	-2.5%	-13.8%	-9.0%

## **Economic Activity: Industry Output, Employment, Value Added**

The environment for land conservation is intimately tied to economic activity in a region. Table 3 presents data on overall economic activity for the four county region of northeast Florida in 1999, including output, employment, value added and its components (employee compensation, proprietor income, other property income, and indirect business tax). The region had total economic output of \$49.6 billion, and total employment of 690,000 jobs. The value added column is the sum of employee compensation, proprietor income, other property income and indirect business taxes, and represents net change in economic value created by the economy. Gross regional product is the sum of value added for all industry groups, which amounted to \$27.9 billion. The information is reported for major industry groups corresponding to the one digit level of the Standard Industrial Classification (SIC). The largest industry groups were services (\$6.3Bn), finance, insurance and real estate (\$6.4Bn), government (\$6.1Bn) and trade (\$4.2Bn). Manufacturing, construction, and transportation/communication/public utilities also contributed \$1-2 billion each to gross regional product. This pattern of industries is typical of the Florida economy. Trade and finance, insurance and real estate generated similar amounts of indirect business taxes to local, state, and federal governments.

Figure 7 presents information on trends in economic output and value added for the four counties of northeast Florida, 1995 to 1999. Economic activity has steadily increased over this period, in all counties, with the exception of a significant downturn in Duval County in 1999.

A more detailed industry profile of the broader economy of the 16 county northeast Florida regional economic area in 1999, as defined by the U.S. Bureau of Economic Analysis, is presented in Appendix Table A5. The industries are ranked in order of output. The five largest industries in the area are construction, real estate, retail trade, health services, and business services, each having output in excess of \$4Bn. It is noteworthy that state and local non-educational government is the sixth largest industry/institution in this region. Some important natural resource-based industries of the broader region include pulp and paper, forest and wood products, farms, food processing, tobacco manufacturing, recreation services, and mining.

Employment is a key indicator of economic development because it represents the livelihood of the population and often has political consequences. Employment has consistently increased in all counties and state as a whole, and is expected to continue increasing through the forecast period to 2015. Again, Duval County dominates the job market of the regional economy. Historical and future projections for total employment in the northeast Florida counties, and the state of Florida are given in Appendix Table A8, and unemployment data for year 2000 are presented in Appendix Table A9. The highest number of unemployed persons occurred in Duval County, but Putnam County had the highest rate of unemployment that year, while St Johns and Clay Counties had the lowest rates.

Retail sales is another indicator of economic activity in a region. Over three-quarters of retail sales occurred in Duval County in the year 2000 (App. Table A10). This dominance is projected to continue on into the year 2015. Putnam County has the lowest proportion of taxable retail sales to gross retail sales, while St. Johns County had the highest proportion.



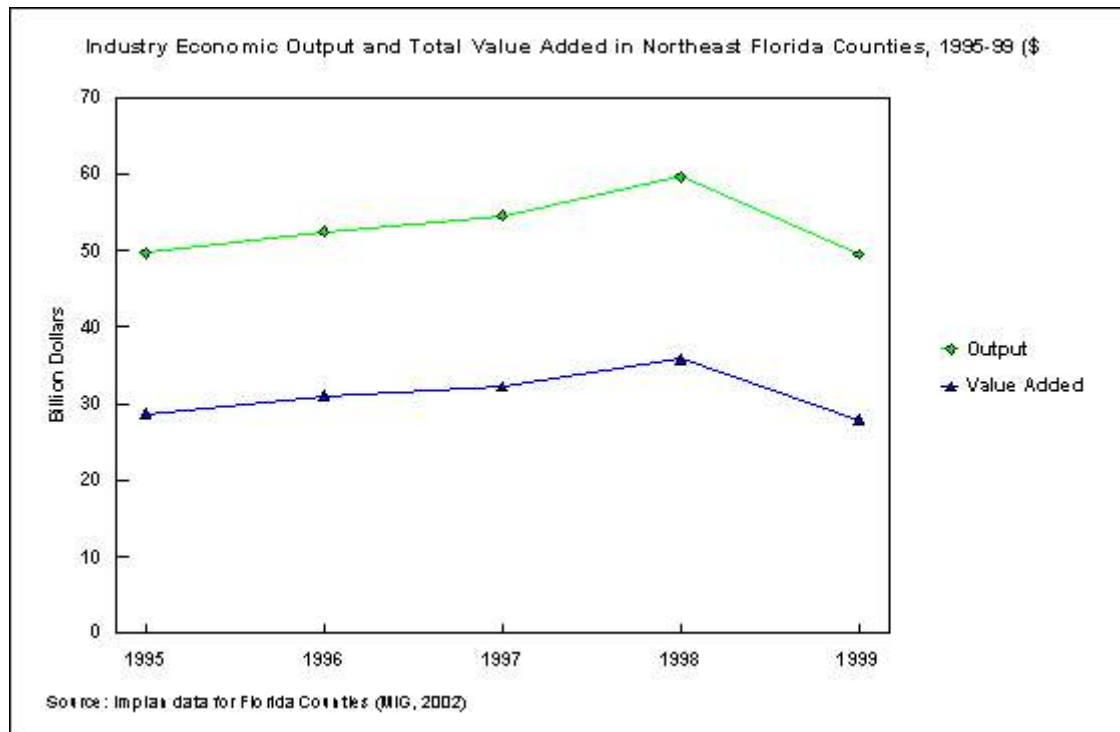
**Table 3.** Economic Characteristics of Industries in Four Northeast Florida Counties, 1999

Industry Group	Output (Mil.\$)	Employment (jobs)	Employee Compensation (Mil.\$)	Proprietor Income (Mil.\$)	Other Property Income (Mil.\$)	Indirect Business Tax (Mil.\$)	Value Added (Mil.\$)
Agriculture	375	8,156	81	65	70	10	227
Mining	133	478	20	34	20	12	86
Construction	5,142	48,239	1,020	301	128	27	1,475
Services	10,803	226,354	4,786	655	693	173	6,306
Manufacturing	6,404	42,051	677	55	420	42	1,194
Transportation, Com., Public Util.	4,507	41,851	988	208	630	139	1,966
Trade	5,758	151,234	2,435	140	866	789	4,230
Finance, Insurance, Real Estate	9,549	79,170	1,691	364	3,540	774	6,368
Government	6,920	91,971	4,403	0	1,655	0	6,058
Other	(5)	0	0	0	(5)	0	(5)
<b>Total All Industries</b>	<b>49,585</b>	<b>689,504</b>	<b>16,100</b>	<b>1,821</b>	<b>8,017</b>	<b>1,966</b>	<b>27,904</b>
Total Agriculture & Natural Resources*	2,029	17,056	170	113	128	31	443

Source: Implan data for Florida Counties, MIG, Inc., Stillwater, MN

\*Agriculture, Mining, Food, Forest Product and Agric. Chemicals Manufacturing

**Figure 7.** Economic output and value added in the northeast Florida region, 1995-99.



## **Personal Income and Distribution**

Statistics on total and per-capita personal income for the region are presented in Appendix Table A11. Real total personal income represents the combined incomes of all the residents in an area. Duval County residents garner nearly 70 percent of regional personal income. These income statistics are referred to as real because they are adjusted for inflation, so that one dollar in 2000 would have the same purchasing power as a dollar in 1970. Total income has been and is projected to continue increasing in all counties and the state. Per capita income in the region is very similar to the state average. Per-capita incomes across the region have also been rising and are projected to continue rising. There is substantial variation in per-capital incomes across the region. St. Johns County had the highest per-capita income, at \$36,970 for the year 2000, while Putnam County's per-capita income was roughly half this level, at \$17,655 during the same year.

Transfer payments from governments are a major sources of income in Florida, particularly for the large retired population. Appendix Table A12 shows the historical and projected distribution of transfer payments by county, region and state between 1970 and 2015. Total transfer payments to the northeast Florida region in year 2000 were \$3.8 billion. Transfer payments have increased during the past and are projected to continue so into the future, as more retirees move to the region and state.

Poverty rates are negative indicators of personal wealth and income. Appendix Table A13 shows that poverty rates range from 8 percent in St. Johns County to 22 percent in Putnam County. In proportion with the population distribution among counties, the great majority of the regions impoverished individuals live in Duval County.

## **Education, Healthcare and Social Welfare Indicators**

Education and healthcare are not only basic social services but are often viewed by people as living amenities that are traded off against other indicators of environmental and social welfare. Appendix Table A14 shows the number of individuals receiving high-school diplomas in each of the four counties, the region, and state in 1999-2000. Duval County has the highest number of diplomas awarded while Putnam County has the least. The number of high-school graduates from each county that enroll in various forms of higher education is shown in Appendix Table A15. These numbers will vary depending on a county's overall population, the age distribution of a their population, and the quality of their educational programs.

The quality of healthcare is often determined by the availability of healthcare practitioners and facilities. Appendix Table A16 indicates the number of various types of healthcare service establishments in the four counties and State. Counties with smaller populations are found to have fewer number and types of these services. Only Duval County has at least one establishment for each of the different types of health services. Communicable disease statistics for the region are arranged by type of disease, county, region and state in Appendix Table A17. Sexually transmitted diseases are largest communicable disease in this region. Regional health and healthcare quality may be represented by measures of potential loss or shortening of life. Data in Appendix Tables A18 and A19 represent the total number of years of potential life under age 75 lost by persons who die prematurely due to preventable causes. Cancer is the largest source, contributing to over 19,000 years of lost life in the region. The loss of life has increased since 1991.

Crime is another social indicator of quality of life. Crime statistics for the four county region and state are given in Appendix Table A20 for murder, sex offenses, robbery, aggravated assault, burglary, larceny, and motor vehicle theft. The absolute number of crimes in an area will be a function of its overall population, among other variables. As such, Duval County suffers a large majority of the crimes that occur in the region.

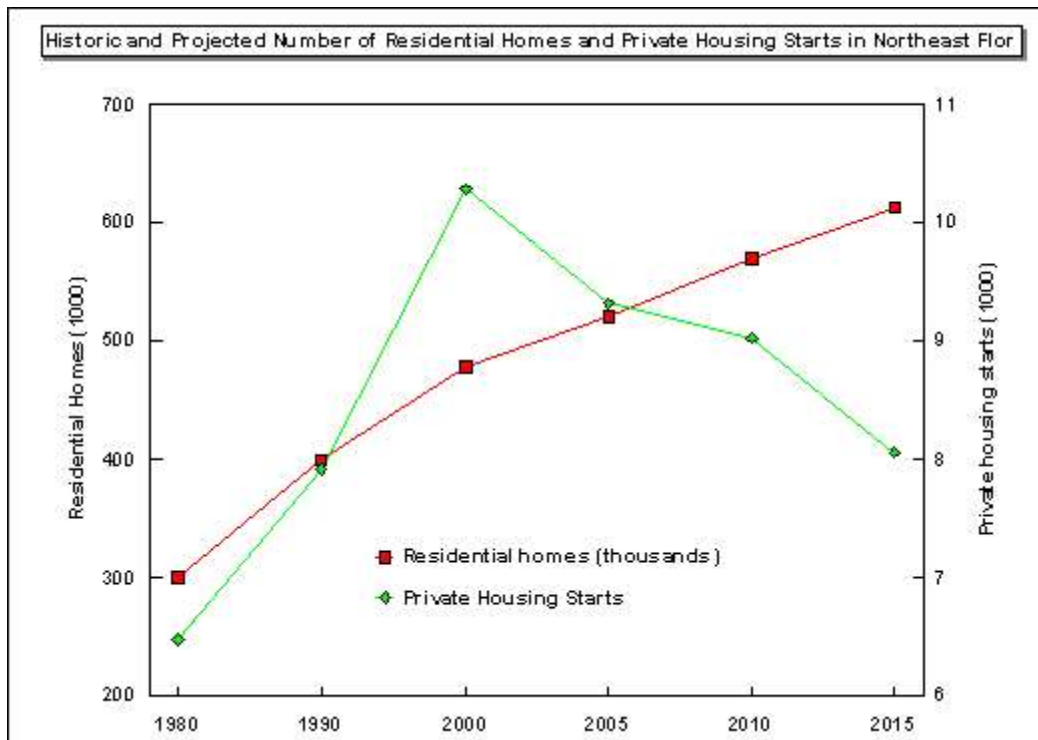
## Building Activity and Property Values

Growth and development in Florida is tied to building activity to accommodate new residents. Historic and projected estimates of the stock of residential homes and housing starts in the four counties and state are arranged in Figure 8 and Appendix Table A21. The total number of residences in the region in 2000 was 478,000, and is expected to increase to 613,000 in 2015. Clay and St. Johns Counties are projected to experience higher rates of growth in residential homes, compared to Duval and Putnam Counties. The number of housing starts in the region in 2000 was 10,276, but this is expected to decline due to slowed population growth and more multi-family housing development. In Duval County they are projected to decline by 1,238 units, or 20 percent, by the year 2005. St. Johns County is also projected to experience a gradual decline in this growth indicator by 2005. Housing starts have been declining in Putnam County since 1980. Housing starts are projected to continue increasing in Clay County until the year 2010.

Information on taxable property values for the four county region are given in Table 4. Total just (market) value of property in the region is about \$50 billion, while taxable value, net of exemptions, is around \$34 billion, with the vast majority for residential property.

Aggregate assessed value of agricultural or natural land uses in the four county area for timber, livestock, recreation and natural wetlands are presented in Table 5. There is considerable variation between counties in parcel values and numbers. There were a total of 4,733 parcels of timberland, 90 in livestock production, 79 in recreational use, and 614 wetland parcels. Timberland had a total assessed value of \$1.5 billion, and wetlands had a value of around \$500 million.

**Figure 8.** Historic and projected housing stock and housing starts in northeast Florida, 1980-2015.



**Table 4.** Property Valuations of Counties in Northeast Florida, 1999 (mil. \$)

Value Basis	Clay	Duval	Putnam	St. Johns	Total 4 Counties
Just Value	5,185	34,193	2,398	8,967	50,743
Taxable Value	3,426	23,007	1,405	6,614	34,452
Assessed Residential Value	3,504	18,904	1,402	6,243	30,053
Assessed Commercial Value	587	5,961	183	839	7,570
Assessed Industrial Value	90	2,091	85	86	2,353
Assessed Agricultural Value	70	99	62	90	321
Assessed Institutional Value	156	1,363	90	237	1,846
Assessed Miscellaneous Value	377	3,834	371	532	5,114

Source: Florida Department of Revenue

**Table 5.** Property Values for agricultural and natural land uses in Northeast Florida Counties, 1999 (\$million)

County	Timberland	Livestock	Recreation	Wetlands
Clay	218.4	12.5	2.7	0.0
Putnam	137.0	2.8	0.4	11.9
St. Johns	452.1	0.2	0.2	72.5
Duval	682.8	1.9	0.5	365.4
Region	1,490.4	17.4	3.8	449.8

Source: Florida Department of Revenue, Tallahassee

## Government Spending and Tax Revenues

Local government fiscal balances may influence their ability to engage in natural lands conservation through tax incentives or special services. Revenues and expenditures for each county in northeast Florida for the year 2000, along with the percentage change in those numbers since 1993, are summarized in Appendix Table A22, taken from the Florida Department of Revenue uniform reports for local governments. Government revenues and expenditures are closely correlated to population, so Duval County local government makes up over 87 percent of the region total. Local government has grown most rapidly in percentage terms in St. Johns County, followed by Clay, and Putnam. It is not readily possible to determine what share of these local government fiscal revenues or expenditures are specifically related to natural lands or service activities.

The northeast Florida region receives significant payments from the federal government, as summarized in Appendix Table A23. Total federal expenditures in the region amounted to over \$6.6 billion in 2000, with retirement and disability being the largest class (\$2.6Bn), followed by salaries and wages (\$1.5Bn) and other direct payments (\$1.2Bn). As in many other categories, Duval county had a dominant share at 78 percent share of Federal expenditures in the region.

# Analysis of Economic Benefits of Natural Lands

## Analytical Approaches to Natural Resource Valuation

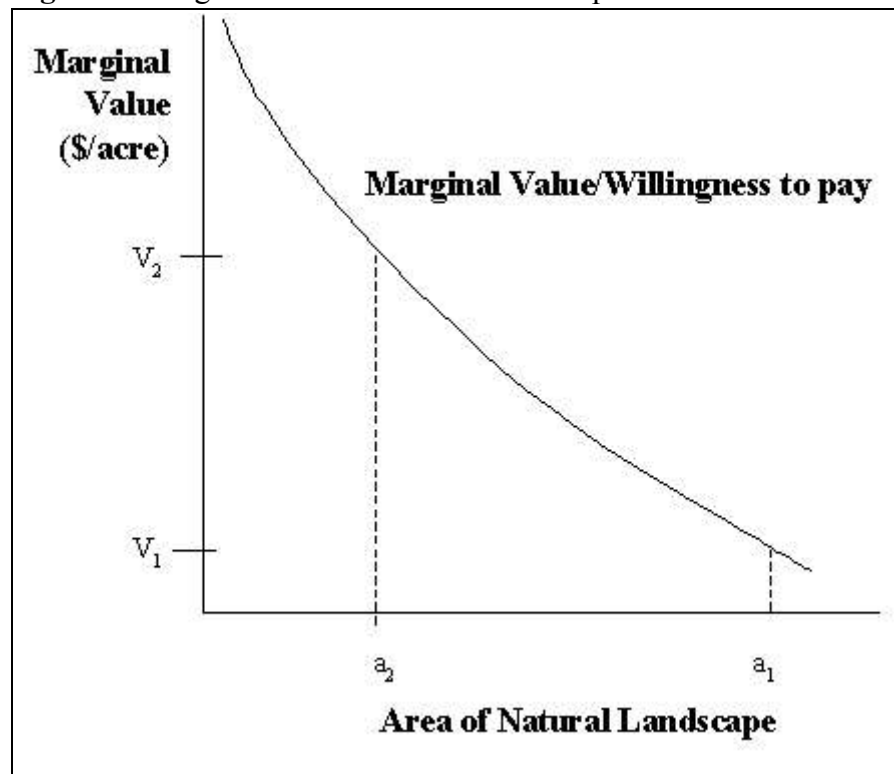
Underlying economic theory and the measurement of economic values and costs are the concepts of ‘preferences’ and ‘willingness to pay’. People hold preferences for products and services based on deeper held values, and the marketplace is a forum for many of these preferences to be met. Each day people express their willingness to pay for a multitude of products and services. These are largely viewed as ‘private’ goods and services, for the majority of costs are born by, and benefits gained by the person expressing their preferences for the goods and services. Markets and their accompanying prices are seen as socially efficient means for allocating and valuing these products and services that by their nature are exclusive to the persons involved in the transactions.

Landscape resources offer products and services that are both exclusive to the owner and non-exclusive to others. The owner of piece of rural property can use it to produce agricultural or timber products. The values of the products and the land are based on the willingness to pay by those participating in the markets. In this sense there is an exclusivity. Additionally, there are others who hold values for these rural lands based on the service flows they provide. There are a range of environmental services these lands provide as part of ecological and hydrological processes. These services are generated and provided in a non-exclusive way, in that it is not readily possible to exclude non-owners from sharing in the service flow. A simple example is the enjoyment a driver experiences when cruising through a rural landscape of pastures and forests.

As in the case of excludable goods and services, the foundation of value for the non-exclusive landscape services is the concept of willingness to pay. Although there are not social forums directly connected to the provision of these landscape services, people do hold preferences for them and these preferences can be expressed in terms of willingness to pay. Economists have developed analytical bases for and means of measuring environmentally based willingness to pay that are conceptually consistent with the measurement of exclusive private goods and services.

Forgoing the logic of formal economic analytics, we can make an analogy for non-exclusive goods with the market demand for exclusive private goods. As illustrated in Figure 9, the marginal value held by people living in an area for natural landscapes declines with the total area. That is, if there is a great deal of natural area, say  $a_1$  acres, the last acre has a low value ( $V_1$ ). But, if the area is quite small, now  $a_2$  acres, the value of the last acre is quite high ( $V_2$ ). As in traditional market goods and services, scarcity results in a high marginal value, whereas plenty results in a low marginal value. The total value, the area under the marginal value curve out to the landscape area  $a_1$ , however, is high when there is a large area and low when the area is small

**Figure 9.** Marginal value of a natural landscape.



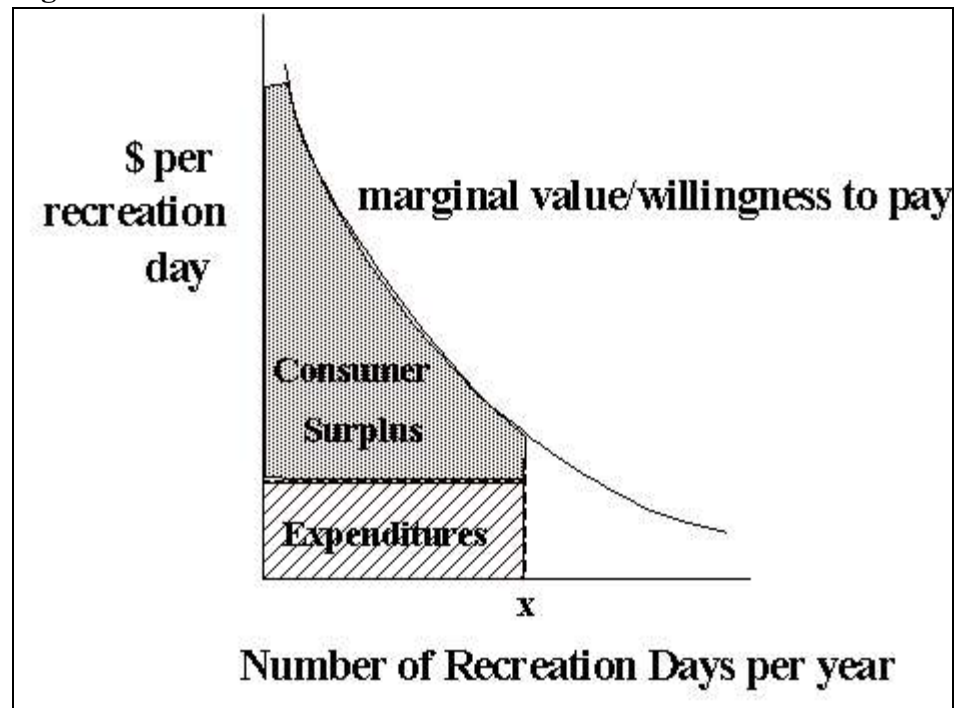
(a<sub>2</sub>). Empirical means based on willingness to pay have been developed for estimating marginal values and total values for a broad range of natural environments, ecological processes and amenity service flows. Higher incomes in a region translate into higher marginal willingness to pay. That is, in terms of the graphic representation, the marginal value curve shifts upward. The marginal value for the two areas of natural landscape, a<sub>1</sub> and a<sub>2</sub>, will be higher, and in both cases the total value will be greater. An increase in real incomes, as has occurred in the U.S. and in Florida, also increased the economic value of amenities associated with natural landscapes and ecological processes.

Additionally, it is not only the natural landscape that people value highly, it is the combination of natural amenities and human created amenities, as well. As incomes have risen, a greater part of household budgets are spent on entertainment and travel. Tourists come to Florida for a broad range of reasons, and its natural amenities and its human-built attractions are among these reasons. To the degree that the tourists' incomes are higher and more people come to the Florida, the marginal and total value of the natural amenities and ecological processes will be increased. Again, the marginal value curve will move upward.

The concept of willingness to pay for environmental resources and natural amenities opens the way to use of benefit-cost analysis for public policy evaluation. Again considering Figure 9, if a policy which would affect the area of natural landscape were being considered, and two options would give a<sub>1</sub> and a<sub>2</sub> acres, monetary measures for the two options can be expressed. The benefits for the option that gives a<sub>1</sub> acres is the area under the marginal value curve out to a<sub>1</sub>, whereas the option that gives a<sub>2</sub> acres is the corresponding area under the curve out to a<sub>2</sub>. Having these two benefit estimates in monetary terms, they can be contrasted with the corresponding costs associated with the two options to obtain the possible net benefits. Such monetary measures of benefits and costs can complement the broader give and take in public decision processes. The surplus of value (i.e., the net benefits), additionally, is the basis of expanded value of other land properties. Where there are attributes that are associated with a high quality of life, such as attractive landscapes, recreational opportunities, etc. and ecological viability, the willingness to pay for ownership of the other property is higher. Using Figure 9, the implication is that the marginal willingness to pay curve is shifted upward, producing an overall greater area under the curve. For the region as a whole, the economic value of amenities, and therefore the land, is high. On the other hand if, in the eyes of the public, the amenities of the area are lost due to poor planning and development, the curve would shift inward, thereby reducing the economic value of the land in the region.

Natural processes and amenities are also the underpinnings of the value of outdoor recreation. Many people find outdoor activities (e.g., fishing, hunting, camping, hiking, wildlife observation, swimming, boating, bicycling etc.) very enjoyable. Undertaking an activity in natural settings provides deep satisfaction. And, this satisfaction and enjoyment can be translated into economic value. From an analytical perspective, people have a willingness to pay for recreational

**Figure 10. Economic value of recreation.**



experiences. Certainly, people make expenditures for products and services associated with the recreational experiences. The experience, however, has a value to the persons undertaking the activities that is higher than the level of expenditures. It is the enjoyment and satisfaction that motivates the activity, and it is the willingness to pay that allows a monetary value to be put on the activities and their natural settings.

A graph such as Figure 10 can help clarify the economics of recreation. Envision a lake, for instance Bass Lake, in northeast Florida renowned for good fishing. Residents and tourists come to fish on Bass Lake. Their economic valuation of the lake can be expressed by the marginal willingness-to-pay (marginal value) curve shown. Their total willingness to pay is the area under the marginal willingness-to-pay curve out to the number of people,  $x$ , using the lake. But, for them to fish the lake they will incur expenses, shown on Figure 10 as "Expenditures". The remaining area above the expenditures is termed the "consumer surplus" by economists. Since the area under the marginal willingness-to-pay curve out to the number of people,  $x$ , using Bass Lake is the total value accruing to the people and to use the lake they make expenditures as shown, the consumer surplus is the net value accruing to the users of the lake. This net value is actually in the form of enjoyment of the lake and fishing, although economists based on economic theory and empirical methods measure it in dollars. The expectation of this enjoyment is what motivates people to come to the lake. In this same sense it is an amenity value for the natural processes and setting that attracts them in the first place.

Considering Figure 10 is also useful in understanding of amenity value in economic base theory. The fundamental data used in economic base theory are expenditures for various "exported" products. In the case of amenity based economic activities, say tourists coming to Bass Lake for fishing, the "export" earning is the expenditure in the region's economy by those tourists coming to use the lake. The consumer surplus is not considered directly in the analysis. But, most importantly, the perception of the fishing and amenities of Bass Lake is what motivates the tourists to come and make expenditures in the first place. Additionally, the same positive perceptions of amenities of the lake is what motivates local residents to recreate there and make local expenditures inside the region. Although economic base analysis does not incorporate the monetary value of the economic surplus (i.e., consumer surplus/net benefits), it is the reality of this surplus that is the basis of the expenditures used in the analysis. The point is that while economic base analysis gives insight into the structure of an economy it is not a complete economic picture.

## **Empirical Measurement of Economic Value**

Based on the broad concept of willingness to pay, empirical means have been developed for estimating marginal and total values of a broad range of service flows from environmental amenities and ecological processes. Although there are many methodological issues remaining to be resolved in establishing means of determining monetary values for environmental service flows and amenities, there is sufficient agreement within the economics profession for use of such estimates in social decision processes. The acceptance or rejection of estimates by the economics profession depends considerably upon the methodological rigor of the study putting forth the estimates. For the present study of northeast Florida, well established values from studies in other locations will be put forward to gain insight into realm of values held for environmental and amenity service flows.

The empirical studies of willingness-to-pay values for landscape services and amenities typically fall in two broad categories: stated preference approaches and revealed preference approaches. Stated preference approaches most often fall in the categories of contingent valuation and contingent choice methods. Contingent valuation methods are based on surveys in which individuals are directly questioned about their willingness to pay for certain potential changes (expressed as hypothetical changes) in environmental services or amenities. Contingent choice methods are similar in that survey respondents are asked to choose among a series of bundles of attributes that portray different levels of the environmental services or amenities.

Under revealed preference approaches, the intent is to infer the values that people place on environmental services from their behavior in markets for related goods and services. Revealed preference approaches most often fall in the categories of hedonic pricing and travel cost methods. The fundamental idea behind hedonic pricing methods is that people express value for environmental attributes through their

willingness to pay for properties in the market place. For example, consider housing markets. The price paid for a particular house will reflect not only the attributes of the house and land it sets on, but also the environmental surroundings beyond the piece of property itself. By collecting data on previous market transactions, the analysts can infer values for the landscape services and amenities. In the travel cost studies, data is collected on the various costs for traveling to a site for hunting, fishing, bird watching or any activity at the site. The fundamental idea is that the landscape attributes are what attracted people to the site. In both cases, analysts can infer values for the site from the market expenditures.

All of these approaches to estimating environmental services and amenities have undergone more than 25 years of research and development. Explicit procedures have been put forward by the economics profession. When the procedures are rigorously followed the profession accepts the resulting values as reasonable reflections of people's willingness to pay and are supportive of their use in environmental policy forums.

Economists, in an attempt to readily communicate the types of environmental values being measured, have put forward categories of use and non-use values. The use-value category is specified with two sub-categories: direct use and passive use. Direct use is, as the term suggests, a use in which attributes are used directly, often changing ecological and hydrologic processes. Timbering, pasturing animals, mining, and crop production are examples of traditional direct land use. Often in these uses the underlying structure of the natural processes are dramatically changed; this change may or may not be the intent of the direct use. Passive use, on the other hand, occurs in a way that does not (apparently) change the natural processes. Various recreational uses, if properly managed, can be a form of use that does not induce dramatic changes in the natural processes. Direct-use and passive-use values have long been recognized and measured in monetary terms.

Increasingly in recent years the economics profession has begun to recognize non-use values for natural systems. The idea here is that even though a person may never have, or expect to have any direct or passive use of a natural resource, they may still value it and have a willingness to pay for the natural resource. One aspect of this non-use value category is existence value. Individuals can hold a value for the continued existence of a landscape and its natural processes. Closely associated with existence value is bequest value. In this type of value individuals have hope and an expectation that the natural resource can exist into the future for others to enjoy. In both these non-use values, individuals do express monetary willingness to pay for these natural resources to exist and be viable into the future.

A third category of value, lying between use and non-use value, is option value. In this case individuals express a desire to keep forms of both use and non-use open for the future. The implication is that much of the natural processes that make up the resource will be maintained so that realistic options between use and non-use are viable. Again, individuals are able to express this option value, and economists have developed methods for assessing the monetary value of the options.

## **Fiscal Impacts of Development**

An excellent review of the literature on fiscal impacts of development and the question of whether growth pays for itself, was provided by Steven Deller in *Urban Growth, Rural Land Conversion and the Fiscal Well-Being of Local Municipalities* (paper presented to the Research Workshop on Land Use Problems and Conflicts, Orlando, Florida, February 21-22, 2002). As urban areas grow in terms of population, income, and wealth the value of land surrounding these places increases. Returns to developing the land for housing and commercial enterprises exceed the returns to farming, and some of the most productive agricultural areas become attractive sites for development (Morris, 1998). Prior to the 1960s, the conversion of farmland was considered part of the natural process of spatial economic growth. In 1974, the infamous Cost of Sprawl study was released by the Real Estate Research Corporation (RERC 1974a) for the U.S. Department of Housing and Urban Development. For the first time the public was made aware of differential fiscal impacts on local governments from alternative land use patterns. The major conclusion of this study was that "for a fixed number of households, 'sprawl' is the most expensive form of residential development (RERC 1974a). In a follow up study in Wisconsin, the RERC (1974b) analyzed the cost implications of accommodating projected



future growth under different development scenarios. The study compared the public costs associated with accommodating the forecasted statewide population increase under three different growth scenarios: compact, high density “containment;” “suburban extension” and “exurban dispersion.” On the basis of the study, RERC concluded that an increase in density and will save significant sums.

In a more recent study, Rutgers University’s Center for Urban Policy Research (CUPR, 1992) calculated the public costs that would result from following the New Jersey growth management plan compared to unregulated growth, and estimated that over a twenty-year period \$1.3 billion in infrastructure costs could be saved. In this study it was assumed that growth management plans did not limit the amount of growth to occur but rather simply alter the pattern, density, and location of development. In other studies in the Twin Cities of Minnesota, in Maryland, and Chicago, low-density growth and sprawl that consumes disproportionate amounts of land was shown to have significantly higher capital costs born by local governments (Association of the Twin Cities, 1996; Kelly, 1993; DuPage County Planning Department, 1992). Within the academic literature, Ladd and her colleagues associated with the Lincoln Institute of Land Policy have conducted perhaps the most systematic and rigorous analysis of alternative growth patterns (1990, 1994 and 1998). In the 1990 study, among 248 large counties examined, it was found that counties with higher rates of growth and larger increases in new tax-paying development, had higher levels of public expenditures and higher tax rates than slower growing communities. Ladd and her associates have consistently found that more rapidly growing areas tend to have greater increases in expenditures and tax burden than slower growing areas, although this might be expected intuitively, since rapidly growing areas require higher levels of support for new infrastructure.

This work has been viewed as supporting evidence for the advocates of managed, or more recently “smart growth.” As noted by Bunnell (1997, 1998), fiscal impact assessment has moved from unbiased information used in the public debate over land use and growth patterns into the realm of advocacy against unmanaged growth and for farmland and open space preservation. For example, a report issued by the Sierra Club’s Midwest Office presents findings from a number of fiscal impact studies which show that development is fiscally unbeneficial to local governments and therefore should be severely limited. Fiscal impact studies have also been used to support an advocacy position on growth management and farmland preservation by the American Farmland Trust.

Cost of Community Service (COCS) studies are one common approach to evaluation of fiscal impacts of local development. These studies examine a community’s overall balance of revenues and expenditures at any given point in time and attempt to determine the proportion of municipal revenues and expenditures attributed to major categories of land. The final product of a COCS study is a set of ratios expressing the proportion of revenues and costs for various land uses, such as residential, commercial, industrial and farmland. The critical part of these studies is the determination of which revenues and expenditures should be allocated to what types of land use and in what proportions. Some allocations decisions are straightforward such as property tax revenues. Determining the allocation of certain expenditures can be accomplished through analysis of community records, such as the number of fire department calls to alternative land uses or refuse collection based on tonnage collected from different land uses. In the end, the allocation of revenues and expenditures depends on the availability and completeness of local records, the willingness of local staff and officials to participate in interviews and help in the allocation process, and the objectivity of the analyst conducting the analysis.

Results of a large number of COCS studies are summarized in Appendix Table A24. These studies consistently show that for residential land, the cost of service ratio is greater than one, and the ratios range from about 1.05 to 1.5. COCS ratios for commercial and industrial properties are typically below one, ranging between 30 and 65 cents for every dollar of revenue generated. For agricultural land and open space, ratios are typically smaller, ranging from 10 to 15 cents for every dollar of revenue generated. COCS studies across the board have concluded that farmland and open space provide more revenue to a community that is incurred in expenditures, resulting in a net fiscal benefit to the community. These studies, however, are fraught with problems, and critics often discount them because of the many underlying assumptions. One problem is that they often fail to acknowledge that the residential category includes the homes of most people who farm or work on farms in the study area, meaning that the costs associated with servicing farmers, resident agricultural workers, and their families are apportioned to the residential category, and many kinds of costs—such as street

maintenance, garbage collection or protective services are not assigned to any agricultural uses. As a result of this approach, the overall costs associated with agriculture and other natural resource industries will necessarily be low or nonexistent.

## Regional Economic Analysis

The traditional view of regional economic growth and development has been that a region earns income by marketing products or services to customers outside the region, as illustrated in Figure 11. As the export sector expands, employment and incomes rise. The money circulating through the economy creates what is termed the multiplier effect. This re-cycling through the local economy can occur several times before it slowly “leaks” out of the region through taxes, savings, and purchases of imports. If a region provides very little of the inputs and products needed in the region, the export earnings leak out of the economy rapidly and have little multiplying effect. The growth of this traditional regional economy is to a large degree established by the external demand for its primary products, and the basis of the economy can be said to be exogenous.

Additionally, if the economy is based on agriculture, forestry, mining or other primary products, dramatic fluctuations in exogenous demands can cause severe fluctuations in the export earning, thereby sending shock waves through the local economy. This, in turn, can induce a search for other means of strengthening the export earnings, and often a quick solution is greater extraction and export of land-based resources. In this process the environmental quality and natural environments can be sacrificed.

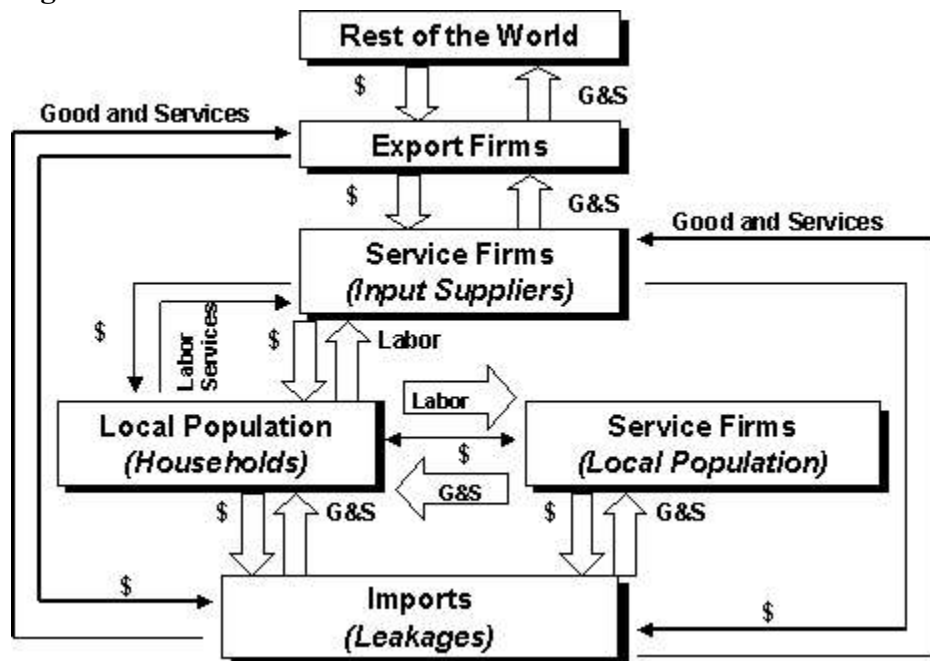
Policymakers, industry officials, and concerned citizens often need information on the total economic impacts of specific local economic sectors or on the impacts of various changes in the local economy. Changes in employment or output often occur locally as a result of new business locations, plant closings, regulatory changes, or other community events, and such changes have implications for other parts of the local economy. For example, expansion of sales by farms within a local area will mean increased sales for agricultural support firms, increased incomes for farm proprietors and workers, and increased sales for local retail and service businesses that support the agricultural sector and provide goods and services to farm owners and employees. The initial change, the “direct” effect has “indirect” or “multiplier” effects that reverberate throughout the local economy.

Export base theory provides a general framework for understanding a local economy and assessing the total impacts of specific local changes in economic activity. This approach holds that a local economy consists of two parts or two distinct types of activities: (1) *basic industries* that sell goods and services to markets located outside the local area, and (2) *service industries* that provide goods and services to local businesses and residents. Basic industries attract money from outside into the local economy; this money then circulates within the local area through spending and re-spending by local service industries and employees of local businesses.

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Figure 11. Economic base model.



Money generated by the basic industries starts the spending chain that supports the services segment of the local economy. New dollars eventually are lost from the local economy (leakages) in the form of tax payments to state and federal government, savings, profits that accrue to non-residents, and payments for goods and services imported from outside the local area.

The key to identifying basic industries at the local level is the location of markets served, a distinction more important than the nature of the goods or services involved. Typically, basic industries are associated with activities such as agriculture, mining, or manufacturing. However, almost any type of local business may be classified as a basic industry if its products or services are sold outside the local area or if it attracts customers from other areas. What are the basic industries in Florida and in local areas within Florida? Clearly, any such listing would include the traditional basic industries (agriculture, forestry, fisheries, mining, manufacturing, etc.) that ship a variety of products to markets located elsewhere within the United States and abroad. In addition many other businesses, typically thought of as service activities (banking and financial services, real estate services, consulting firms, etc.) are considered basic industries when they provide services to nonlocal clients; new dollars are attracted to the local area as a result of their activities. Many local areas within Florida also depend on a variety of businesses that serve the large number of tourists who visit Florida each year. Visitors spend money locally for food and lodging, entertainment, travel services, and other goods and services associated with vacation or business travel. Firms in tourist related businesses differ from traditional basic industries only in the nature of the goods and services provided and in the fact that their customers travel to Florida rather than purchasing Florida products that are shipped to their home state or country. Finally, basic industries in Florida include businesses that serve the large number of retirees who spend all or a part of the year in the state. When retirees receive payments from Social Security, retirement plans, and health insurance from out-of-state sources, such payments represent new dollars within the local economy and represent basic activity in the same way as tourist expenditures. New dollars, when spent, support local service businesses and result in additional local spending, employment, and income.

Service industries, unlike basic industries, consist of business firms that serve local markets. Examples include the full range of retail and service establishments that serve local residents as well as firms that provide goods and services (inputs) to businesses engaged in basic activities. Again, the key factor that distinguishes basic from service activity is the location of the market served and not the type of goods or services provided. Any of the activities characterized above as basic may, in fact, be service activities if they are serving local markets. Two additional considerations must be noted when distinguishing between basic and service activities for particular industries or business firms. First, many businesses perform both basic and service functions at the same time. Florida agriculture is an example of such an industry at the state level. Florida agriculture produces a number of commodities that are sold both outside the state and to consumers within the state. The same dual role exists for a number of other Florida industries. Examples include financial service firms, restaurants, amusement parks, retail stores, and repair shops that serve both local residents and tourists. Although this mix of basic-service activities within the same industry groups is a complicating factor in local impact analysis, it is important to remember that each has a distinctly different effect within the local economy. Basic activities attract new dollars while service industries circulate those dollars within the local area.

At the local or regional level within the state, an additional basic-service consideration emerges. The geographic definition of an economic region, for example, a county or multi-county area, may determine whether a particular industry or firm should be considered to be a basic or service activity for analytical purposes. For example, if the local area of interest consists of one county within the state, then markets located elsewhere in Florida are considered non-local in nature. Examples of such activity might include a Florida resident from Pensacola who vacations in Miami, an Orlando consulting firm working for state government in Tallahassee, or a Sarasota nursery selling plants to a retail firm located in Gainesville. At the state level, each activity noted clearly represents a service activity — the market served is local (within the state) and no new dollars are generated. However, when a particular area within the state is considered, each activity attracts new money to the area (a basic activity). The fact that the new money comes from Pensacola, Tallahassee, or Gainesville rather than from New York, Chicago, or Boston is irrelevant to the determination of economic impacts in Miami, Orlando, or Sarasota. With the considerations noted, the basic-service industry dichotomy from export base theory provides the framework within which total economic impacts can be estimated. The

key is to determine the division between basic and service activities within a local area and then to assess the relationship between changes in the basic components of the economy and the resulting changes in the service components. An increase or decrease in production and employment within a local area has a “multiplier” effect as other sectors of the local economy are impacted by the changes in local spending. For a given industry, the size of the multiplier depends on the level of local spending; firms that purchase more local inputs have higher multipliers. The total impact for an industry also depends on the level of sales outside the local region; firms with greater external sales have greater impacts. The estimation of the multiplier effect for each sector is the objective of economic impact analysis.

The estimation of multipliers relies on input-output models, a technique for quantifying interactions between firms, industries, and social institutions within a local economy is the purpose of input-output models. These models use techniques to quantifying the interactions between industries (or sectors) within an economy. Each industrial or service activity within the economy (agriculture, mining, manufacturing, trade, services, etc.) is assigned to an economic sector with the number of sectors determined by the level of detail desired. Then, for a one-year production period, a transactions table reflects the value of goods and services exchanged between sectors of the economy. Three components of a local economy are producing industries, final demand and value added which capture all transactions within the economy. Producing industries in the economy (Agriculture, Mining, Manufacturing, Trade, and Services) are each listed twice in the transactions table. Rows in the table reflect the sales of output by each producing industry to other industries or institutions within the local economy or to final consumers (households, government, exports, etc). Columns in the table reflect purchases by each producing industry from other industries as well as profits, payments to workers, taxes, and imports. The table is balanced in that the total sales of each producing industry (intermediate sales to other industries plus sales to final consumers) equals total purchases by that industry (input purchases plus value added). For the one-year production period, the transactions table shows how much each local industry purchased and/or sold to every other industry within the local economy. Values are expressed in dollars and track the movement of goods and services between industry sectors and between producing industries and final demand and value added components of the economy. In some cases, households may be reflected in the table as a producing industry that sells services (labor) and purchases inputs (consumption) in order to capture the effects of spending associated with changes in household earnings. Importantly, the transactions table reflects the way in which the agricultural sector is linked to each of the other industries and to the final demand component of the local economy. The value added section of the table would show how agriculture is linked to household income in the local area, and the household component of final demand would reflect how agriculture is impacted by local spending household spending. Changes in the agricultural sector affect other sectors of the local economy through the linkages indicated. Estimating such affects is the focus of economic impact analyses. Manipulation of the transactions table allows the calculation of multipliers that measure the total impact of a change in one industry on all other industries within the local economy. Impacts are usually measured in terms of gross output (sales), income, employment, and value added. The intent is to measure the total impact on the local economy for a given change in one industry. Input-output models are driven by changes in final consumption (final demand). Producing industries then respond directly by selling to final consumers or indirectly by selling goods and services (intermediate inputs) to other industries.

An alternative view of the regional economic base is to focus on “... *that which determines the multiplier effect: the character and structure of the local economy*” (Power, p. 11). The multiplier is inversely related to the rate of leakage for imported goods and services to the local economy. To the degree that the many goods and services needed for the export earning sectors and by the local population can be met by the local economy, the multiplying effect will be stronger. Increasingly, the greatest need within these economies are high quality human services and products. A local economic structure that can meet these demands is a growing economy. A second aspect of this more complete view of an economic base is the identification of new external income generating activities. To the degree that the local economy with its restructuring to meet locally needed high quality services and products can offer these competitively to others outside the region, new sources of income are generated. Additionally, attraction of new residents with non-employment incomes, often retirees, is a form of “export” in the sense of bringing new income to the region, that purchase an array of local products and services. Similarly, often in the form of human created and natural amenities.

Entertainment and leisure have become a major part of the U.S. economy. The expression “quality of life” is much heard. As the nation as a whole has achieved real income increases, people have sought out the pleasant aspects of life. Clearly, tourism is also an important part of this new economic structure and requires a large range of services from waiters and hotel workers to accountants and lawyers. Tourists and retirees will be attracted to those locations with amenities. The amenity base is a crucial part of an economic base in the beginning of the twenty-first century.

A community that expects to capture and maintain “export” incomes from tourism and people with non-employment income must structure the economy to maintain the amenities that attract these people. If the natural environment and the human-built environment deteriorates, the perception of amenity value and quality of life decreases, causing a downward spiral in the attractiveness to retirees and tourists, and thereby retarding economic growth. When the economy is well structured to provide the range of services and products the money stays within the local economy and leaks out at a slower rate, and employment and incomes are increased.

Both input-output model based economic base theory and econometric-statistical models can be criticized (e.g. Polzin 2001). Till now each approach is limited, especially in considering the dynamics of specific regional economies. Predictive power is very limited. At this time the best approach is to use economic theory combined with empirical studies and qualitative exploration to communicate the important features of a specific regional economy being considered.

Regional impacts of natural lands and various amenity-based industries in northeast Florida were evaluated with an input-output and social accounting regional modeling software package and database known as IMPLAN. The acronym IMPLAN is for *Impact Analyses and Planning*. IMPLAN was originally developed by the U.S. Forest Service in cooperation with the Federal Emergency Management Agency and the U.S. Department of the Interior’s Bureau of Land Management to assist in land and resource management planning. Since 1993, the IMPLAN system has been developed under exclusive rights by the Minnesota Implan Group, Inc. (Stillwater, Minnesota) which licenses and distributes the software to users. Currently there are hundreds of licensed users in the United States including universities, government agencies, and private companies. The IMPLAN software allows both the estimation of the transactions table for specific local areas and the manipulation of the resulting table to estimate multipliers that capture both the direct and indirect effects of changes in a particular sector for use in economic impact studies. The IMPLAN software also allows modification of the model so that, in addition to direct and indirect effects, the multiplier will capture the effects of increased consumer spending resulting from direct and indirect income changes or *induced* effects. Economic data for IMPLAN comes from the system of national accounts for the United States based on data collected by the U. S. Department of Commerce, the U.S. Bureau of Labor Statistics, and other federal and state government agencies. Data are collected for 528 distinct producing industry sectors of the national economy corresponding to the Standard Industrial Categories (SICs). Industry sectors are classified on the basis of the primary commodity or service produced. Corresponding data sets are also produced for each county in the United States, allowing analyses at the county level and for geographic aggregations such as clusters of contiguous counties, individual states, or groups of states. Data provided for each industry sector include outputs and inputs from other sectors, value added, employment, wages and business taxes paid, imports and exports, final demand by households and government, capital investment, business inventories, marketing margins, and inflations factors (deflators). These data are provided both for the 528 producing sectors at the national level and for the corresponding sectors at the county level. Data on the technological mix of inputs and levels of transactions between producing sectors are taken from detailed input-output tables of the national economy. National and county level data are the basis for IMPLAN calculations of input-output tables and multipliers for local areas.

The IMPLAN software package allows the estimation of the multiplier effects of changes in final demand for one industry on all other industries within a local economic area. Multipliers may be estimated for a single county, for groups of contiguous counties, or for an entire state; they measure total changes in output, income, employment, or value added. Definitions are provided below. More detail on the derivations of multipliers is available in the earlier cited IMPLAN User’s Guide. For a particular producing industry, multipliers estimate three components of total change within the local area. *Direct effects* represent the initial

change in the industry in question. *Indirect effects* are changes in inter-industry transactions as supplying industries respond to increased demands from the directly affected industries. *Induced effects* reflect changes in local spending that result from income changes in the directly and indirectly affected industry sectors. IMPLAN allows the analyst to choose from multipliers that capture only direct and indirect effects (Type I), multipliers that capture all three effects noted above (Type II), and multipliers that capture the three effects noted above and further account for commuting, social security and income taxes, and savings by households (Type SAM). Total effects multipliers usually range in size from 1.5 to 2.5. *Output multipliers* relate the changes in sales to final demand by one industry to total changes in output (gross sales) by all industries within the local area. An industry output multiplier of 1.65 would indicate that a change in sales to final demand of \$1.00 by the industry in question would result in a total change in local output of \$1.65. *Income and employment multipliers* relate the change in direct income to changes in total income within the local economy. For example, an income multiplier for a direct industry change of 1.75 indicates that a \$1.00 change in income in the direct industry will produce a total income change of \$1.75 in the local economy. Similarly, an employment multiplier of 1.75 indicates that the creation of one new direct job will result in a total of 1.75 jobs in the local economy. *Value added multipliers* are interpreted the same as income and employment multipliers. They relate changes in value added in the industry experiencing the direct effect to total changes in value added for the local economy.

## Economic Benefits of Natural Lands and Ecological Services

The intent of the information presented in this section is to give an overview of the concepts economists use in envisioning a regional economy. The idea of economic value spins out of the complex of values that individuals hold and express in a variety of ways, one of which is their willingness to pay with their limited incomes to meet their preferences. From this expression of individuals willingness to pay come the concepts of total economic value, consumer surplus, expenditures and costs. The aggregate of the willingness to pay are the market supply and demand concepts. Whole economies result as the multitude of goods and services come together in the market place. It is this market structure that lies behind the economic base models such as *Implan*. Additionally, it is important to remember that not all the goals individuals desire to achieve, and have a willingness to pay for, can be accomplished through the market. There are, however, economic methods for evaluating these, and this is the purpose of the next section.

Much of the foundations of modern economics spun out of concern about the use of land and the potential of economic growth based on the products that could be obtained from the land. In the early United States, land was seen as having value for timber harvesting, mining and agriculture, and economic value of the land was based on these uses. The natural processes behind the productivity of the land were little understood and taken for granted. In the twentieth century, technologies were developed that complemented and augmented the natural potential of land for productive use. The result is that much of the land has been transformed, leaving changed landscapes. It is not yet clear as to what these changes imply about the long-term viability of various natural processes. What is clear is that people now recognize the change in landscape and are expressing concern about the potential loss of important ecological, hydrological and other natural processes. Economists have set about attempting to establish methodologies for determining the value people place on these resources and processes in terms of willingness to pay.

Writers from other fields have detailed the processes and the products and services they generate. Daily et al. (1997) identify the biological underpinnings in the broad terms ecosystems' products and services. In addition to familiar ecosystems' products such as seafood, wild game, forage, timber, biomass fuels and natural fibers, they also identify ecosystem services important to the support of life generally. These include:

- Purification of air and water
- Mitigation of droughts and floods
- Generations and preservation of soils and renewal of their fertility
- Detoxification and decomposition of wastes
- Pollination of crops and natural vegetation
- Dispersal of seeds
- Cycling and movement of nutrients
- Control of the vast majority of potential agricultural pests
- Maintenance of biodiversity
- Protection of coastal shores from erosion by waves
- Protection from the sun's harmful ultraviolet rays
- Partial stabilization of climate
- Moderation of weather extremes and their impacts, and
- Provision of aesthetic beauty and intellectual stimulation that lift the human spirit

(Daily et al., 1997, p. 3)

A somewhat more extensive listing of rural landscape values was provided by Bergstrom (2002):

- Support of local agricultural industry
- Support of local resource extraction industry
- Support of local agricultural jobs
- Support of local resource extraction jobs
- Job satisfaction value
- Support of job security and stability
- Support of community security and stability

- Support of national security and stability
- Provision of local food supplies
- Self-sufficiency in production of food items
- Dispersion of food production
- Continued production of unique food products
- Land input for residential development
- Land input for commercial development
- Land input for recreational activities
- Support of local tourism industry
- Provision of wildlife habitat
- Provision of open space
- Provision of scenic views
- Support of aesthetic enjoyment
- Surface water storage
- Ground water recharge
- Natural water filtration
- Support of rural life values
- Provision of character building opportunities
- Support of national identity/ideals
- Cultural symbolization value
- Historical value
- Ecological life-support
- Provision of genetic diversity
- Intrinsic value
- Existence value
- Therapeutic value
- Physical health value
- Religious/spiritual value
- Educational value
- “Natural laboratory” value
- Protection of cultural heritage
- Nostalgic value
- Environmental amenities
- Countryside amenities
- Promotion of orderly development

Although the distinction between “natural” and “human-dominated” ecosystems is becoming increasingly blurred, the underlying processes of both types of ecosystems remain important in terms of the products and services that they generate. In a region like northeast Florida most of the ecosystems have in some way been affected by human activities. Not all the ecosystems are “human dominated”, but certainly few completely “natural” ecosystems remain. However one wishes to identify the ecosystems of the region, it is very important to recognize that these systems provide a great deal of products and services and that these are vital to the economy of the region. Additionally, it is highly likely that the people of the region do value these ecosystems products and services in terms of willingness to pay.

Having asserted that people are likely to have a willingness to pay for the services of natural lands and ecosystems does not mean we know what these values are specifically. Unfortunately the specific surveys for northeast Florida have not been conducted. At this point, to give a tentative glimpse of what the realm of these values might be, we are going to present values from studies of other regions. It is thought that, to the degree that the peoples of these regions are similar in terms of values and culture, their valuations can give insights useful in considering the northeast Florida region.

This section of the report is organized in six parts. The first portion starts with the broad values of



natural landscapes that attract people: amenity, quality of life and intrinsic values. The later parts deal with more specific economic components of natural land use activities: recreation, tourism, agriculture and forestry. The last part of the section is a discussion of the material presented as it relates to the northeast Florida region. As stated, specific surveys for this region have not been conducted. Therefore this discussion is somewhat extrapolative, meaning that we have taken license to transfer empirically based values from other studies into our computations. In doing this extrapolation we have been extremely cautious and conservative.

## **Amenity and Quality of Life Values**

As real incomes rose in the second half of the twentieth century, the patterns of individual and household expenditures changed. A smaller proportion of income was required for the necessities of American life leaving more discretionary income for other activities and purposes. The “finer thing in life” became possible to a much larger part of the population. Amenities and quality of life became a concern of households with growing discretionary income. An aggregate effect of this change has been a movement of households from their original locations to locations with higher quality of life and amenities.

Economists have set about to identify amenities that make up the desired quality of life and to measure household willingness to pay for these amenities. As with the study of other non-market goods and services, economists use both revealed preference and stated preference methods, primarily hedonic pricing methods (HPM) and contingent valuation methods (CVM), respectively.

The term “quality of life” is used in many contexts and for many reasons, and in this usage has many dimensions. In the broadest use it includes such elements as potential for personal growth and continued education, participation in the arts, security from crime, recreational facilities, healthy environment, and pleasant climate in addition to other natural amenities. Many studies have been done on the broad aspects of quality of life elements (see Dissart and Deller 2000 for an excellent annotated bibliography). The interest here is primarily on environmental and natural amenities and the role they play in people’s perceptions of quality of life.

In urban areas the overall quality of the neighborhood would be thought to be an important factor in quality of life and to affect housing values. Arguea and Hsiao (2000) in a study of Tampa, Miami, New Orleans and Atlanta in addition to considering the usual variables affecting the value of housing included variables for noise, litter, crime and other neighborhood features. Although their study is primarily methodological, it does point up that “the estimated effect of neighborhood quality on prices is positive and statistically significant” (p.122). A recent study in Sweden found that noise pollution resulting from a house being located near a road where noise is loud has a 30% lower value (Wilhelmsson 2000). As one would also expect, landscaping with trees and attractive vegetation adds to the value of houses (Des Rosiers et al. 2002). In a similar way open space around a house adds monetary value. In a recent study of the monetary impact of nearby high voltage power lines, the visual impact had a negative value, but the right-of-way space associated with the power line translated into a positive economic value for the houses abutting the open area (Des Rosiers 2002). The study suggests that open space is perceived as a premium factor by many people.

Considering quality of life attributes at a more aggregated level, Blomquist et al. (1988) used a hedonic methodology that included 16 climate, environmental and urban amenities and full implicit prices to calculate quality of life indices expressed in dollar values for 253 urban areas. Florida, with 6 urban areas in the top 50, was tied for first place (with California and Colorado) and had no urban areas in the bottom 50. The quality of life index puts the top Florida urban areas \$5,500 to \$7,000 per household above the lowest ranked urban area. The implication is that the majority of Florida’s urban areas are perceived as having very high environmental quality of life. Nord and Cromartie (1997), on the other hand, focused their study on rural natural amenities. They developed a summary index of each U. S. county’s natural amenities. Every county in Florida is in the highest quartile. When the amenity index is associated with net migration in the period 1992-94, the counties on Florida’s northeast coast are all in the highest quartile of net migration. One can conclude that Florida and Florida’s northeast counties are perceived as areas of high quality natural amenities and desirable places to live.

Economists' views are that positive perceptions of high quality of life and high quality natural amenities translate into higher willingness to pay by both property owners and the broader public. The result is that locations with high quality of life and high quality natural amenities will have higher property values than locations with lower quality of life and lower quality natural amenities. Recent studies give insight into this economic phenomenon.

Leggett and Bockstael (2000) focused on the influence of water quality on property values. Noting "a paucity of hedonic water quality studies", they set about to determine the effects of various levels of water quality on the property values of waterfront residences on Chesapeake Bay. Focusing on fecal coliform counts as a dimension of water quality, and using a statistical model, they concluded that of the 6,704 residential waterfront properties in Anne Arundel County, MD, 494 have fecal coliform count values exceeding 200 counts per mL (the Maryland standard). The upper bound estimate of benefits of improving water quality at all 494 properties is \$12.145 million, with a 95% confidence level of \$3.789 million to \$20.501 million. They go on to point out that these figures are based only on the willingness to pay of waterfront property owners. The figures do not consider the willingness to pay of owners of approximately 750 other parcels on non-monitored tributaries, or the willingness to pay of near-shore property owners and recreational users of waterways and beaches. Certainly the waters of a region are important assets, and residences and visitors have a willingness to pay to improve and maintain water quality.

Bastian et al. (2002) were interested in the environmental amenity values associated with agricultural lands. Using transacted land sales data in Wyoming for the period 1989 through 1995, a hedonic price model was used to estimate the impact of environmental amenity and agricultural production land characteristics on price per acre. Their findings were that land prices were explained by the level of environmental amenities, as well as production attributes. Land transaction prices indicate purchasers had a higher willingness to pay for lands with wildlife habitats, productive sports fishing, and overall scenic attractiveness. Their conclusions summarize the situation faced by many agricultural areas: *"The demand for amenities such as outdoor recreation, scenery, and open space is expected to grow as population migration to less urban areas continues. These pressures will increase the competition for agricultural lands. Results of this study indicate that remote agricultural lands, which include wildlife habitats, angling opportunities, and scenic vistas, command higher prices per acre than those which primarily possess agricultural production capacity. Amenity-rich lands may be at risk for conversion from agriculture and open space function to residential use"* (p. 346).

Ready et al. (1997) used both hedonic pricing and contingent valuation methodologies in their study of the amenity value of farmland. Their focus was on the rolling pasturelands that make up the farms in the middle of Kentucky, the horse farms for which Kentucky is famous. Using the hedonic pricing model, and by considering available combinations of farmland amenities, house prices, and wage rates, they were able to infer a representative household's marginal rate of substitution between quality of life aspects provided by landscape amenities and net income. With this information, they could determine the monetary value contribution of the landscape amenities. In the case of the contingent valuation study, survey respondents were placed in a hypothetical situation where they must make a decision that affects the amount of farmland that will continue to exist. If respondents chose to preserve more farmland, they were required to give up income, thereby establishing a willingness to pay for farmland attributes provided to them as representatives of Kentucky households. Ready et al.'s findings were that the typical Fayette County (Lexington) Kentucky household had an average annual value (willingness to pay) when expressed on a per acre basis of \$0.023, or a per horse farm value of \$3,000. Although this figure appears low at first glance, when it is considered that the survey results were for a representative household in Fayette County and that there are 108,000 households in this county, and 52,390 acres of horse farms, the aggregate value to the people of the county is \$130.4 million per year. Again, the conclusions are, while the valuing of landscape amenities is diffuse, the aggregate values are high and the public supports their preservation.

Another recent study considers the amenity benefits of a different type of agricultural lands. Johnston et al. (2001) studied the coastal farmlands on the eastern end of Long Island, New York (farmlands in the Peconic Estuary System of Suffolk County.) As in Ready et al.'s study, Johnston et al. used both a hedonic property value model and a contingent choice model, but the results for Long Island contrast with the findings in Kentucky. Whereas, Ready et al. found positive influences of horse farms on nearby properties, Johnston et

al. (2001) using a hedonic model, found that nearby row-crop farmlands diminished the value of adjacent nonagricultural parcels. This was thought to be due to the aesthetic differences between rolling pastures and woodlands (Kentucky) and row crops (Suffolk County, New York). The contingent choice model, on the other hand, indicated an overall positive value of farmlands. The likely reason is that the contingent choice study involved the broader population of the Peconic Estuary, not just the properties next to the farmland. The results indicated positive values (willingness to pay) for preservation of all natural land uses, ranging from \$0.04 to \$0.16 per household, per acre, per year. The positive value for farmland (\$0.16 per acre) exceeded the value for all other resources. When considering all 8,387 year-round households in the community of Southold, this leads to an annual value of \$1,355 per acre, per year. This represents the residents' willingness to pay to preserve the non-market services provided by the community's farmlands (p. 318). This figure is based only on the willingness to pay of Southold community residents, but the area also has large numbers of tourists visiting the Peconic Estuary, and they too have a willingness to pay for landscape amenities, such that if this were known, the figure would likely be much larger.

Shrestha and Alavalapati (2002) have recently completed a study of the northern part of the Lake Okeechobee watershed. They, too, used a choice-based stated preference methodology. Their interest was in determining the benefits residents of the Lake Okeechobee watershed (which runs from Orlando south to the lake) would receive from landscape attributes. Their specific goal was to estimate residents' willingness-to-pay values for silvopasture practices. Preliminary results indicate a representative household has an annual willingness to pay between \$37 and \$80. Considering that the large number of households in the northern Lake Okeechobee watershed, the aggregate values of the landscape amenities are likely very high. If these values are any indication of the values Floridians have for their landscape amenities, it is clear that these amenities are important parts of the Florida economy.

The above studies support the premise that residents receive benefits from natural landscape amenities and have a willingness to pay to assure the continued service flow from these landscapes. An important question to a state like Florida is: Do landscape attributes play a role in a person's decision to relocate to areas of high environmental amenities? Considering Florida's history, anecdotally, one would answer, most likely. Recent studies support this perception. Mueser and Graves (1995) examined the role of economic opportunity and amenities in explaining population redistribution in the United States from 1950 to 1980. Migration trends over this time period appear to have been tied to household preference for amenities in conjunction with changes in income. Although the shifts occurred slowly in any single decade, the same locations appear to have grown in attraction over extended periods. Their conclusion was that while "employment opportunities may have played an important role in migration patterns, amenities were no less important and may have played a greater role" (p. 192).

Deller et al. (2001) used data from 2,243 U.S. counties to evaluate a range of factors related to population and economic growth in rural areas. Of the five environmental amenity attribute measures, "all five appear to play a significant role in regional economic growth" (p. 361). Additionally, they found that "counties with higher levels of water amenities . . . tend to be associated with higher levels of population and income growth" (p. 361), and "developed recreational infrastructure is strongly associated with population, employment, and income growth rates" (p. 362). The finding of a positive relationship between land amenities and employment and population growth supports a broad hypothesis that for a region to continue to prosper, it is important to maintain the landscape amenities, especially those associated with various forms of recreation.

In a complementary study, Beale and Johnson (1998) found that what they classified as "recreational counties" in non-metropolitan areas of the United States had population growth rates that exceeded those of any other counties. The growth was largely due to net migration into these recreational counties, particularly by those households not bound to specific locations by employment or economic necessity (i.e., retirees) that are drawn by scenic and recreational amenities. Beale and Johnson noted "the flow of tourists and recreational spending produces additional employment and opportunities for existing residents, thereby reducing out-migration" (p. 38). Haigood and Compton (1998) studied specifically the role recreation amenities played in retirees' relocation decisions. In a survey of five Texas communities, they found that, of 26 items, the two that dealt with recreation (i.e., desire to live in a more recreationally enjoyable area and desire to live in a place where recreational opportunities are plentiful) were ranked second and third, respectively, behind desire to get

away from cold weather. This is likely to be true for non-retirees as well. Haigood and Compton, in interpreting their findings, state: “This study suggests that communities that fail to provide high levels of recreational opportunities for retirees [and others] are likely to have their tax base eroded by the loss of the economic spending power from some of their more affluent retirees” (p. 25). And, since recreational opportunities depend on landscape amenities, it can be extrapolated that those counties that do not maintain their natural amenity base may likewise see their economic base undermined. To further echo the point of the importance of natural amenities in selecting places to which to relocate, Nord and Cromartie (1997) state: “In studies that estimate the effects of economics and location factors on migration while controlling for effects of other factors, natural amenities emerges as the strongest single factor associated with net immigration to rural counties” (p. 23).

A remaining question is: What are the dynamics of economic growth associated with the maintenance and enhancement of landscape amenities? Certainly for those responsible for the economic future of an area such as northeast Florida, this is an important question. Presently, however, it cannot be answered. The art of economics is currently insufficient to envision such a dynamical picture or to use as a starting point.

Two studies can give insights into some aspects of this question. The first, by Bergstrom et al. (1990), uses an impact analysis model (*IMPLAN*) to measure economic growth stimulated by increases in final demand for products and services produced in a regional economy. This study considers outdoor recreation and landscape amenities that attract visitors to a region as an “export” that generates additional revenues in the region. An increase in demand for recreational services, measured as increases in visits or trips to the local area, results in increased recreational spending. The increased revenues become the basis for expenditures for other products and services in the region and as payment to employees. The expenditures are revenues for other businesses, and new revenues in the region provide a multiplying effect within the local economy. The magnitude of the ultimate economic effect depends on the structure of the local economy and on the attractiveness of the landscape amenities to out-of-region visitors. Bergstrom et al. generated the economic impact resulting from a group of northern Georgia state parks. The authors concluded that “the results suggest for some rural areas, outdoor recreation will likely provide a viable economic development alternative . . . . In addition to creating jobs and economic activity, outdoor recreation is generally compatible with existing rural enterprises, such as tourism and agriculture, and helps to enhance the overall quality of life by providing recreational opportunities to local residents” (p. 38).

The second study raises the dynamical question: Do people follow jobs? or Do jobs follow people? Vias (1999) contends that new models (e.g., Regional Adjustment Models) suggest that increasing population is driving employment growth. In considering the Rocky Mountain West, Vias’ finding that the region does not support the traditional notion that people follow jobs into a region suggests strong evidence that the opposite is true – jobs follow people. “Population and employment changes taking place in the Rocky Mountain West show the importance of quality-of-life factors in an area rich in environmental amenities” (p. 22). One of the major reasons for the economic change is demographic change (a larger retiree population) and the importance of non-employment income; this large body of potential migrants is motivated to move for reasons other than work. Vias found that for the Rocky Mountain West retirees are significant because their incomes (savings, pensions, dividends, etc) are not tied to jobs or particular places. These people can and do select places to live that are based on natural amenities that are attractive to them. The result is economic growth generated to a considerable degree by multiplier spending for services and products provided locally.

Such a basis for economic and population growth should not be surprising to those considering Florida’s economy. In the last 50 years, many retirees with non-employment incomes have moved to Florida for the climate and amenities. Demand was created for a large range of products and services. Younger people moved to Florida to meet this demand and to enjoy the natural amenities. This growth in population, and the continued increase in retirees, further expanded demand. The increase in real incomes of both the young and the old populations further expanded demand. The result has been amplifying growth due to both the scale of the economy and the multiplier effect of growing revenues of all types. A great deal of this growth took place in southern and central Florida. In recent years the growth has moved up the east coast to the northeast region counties. The question for these counties is: Can the northeast region maintain and preserve its natural amenities that attract new residents, or will these amenities be allowed to deteriorate to such a state that people

will no longer be attracted to the region? If, as is suggested by many studies, a major basis of a modern economy is its natural amenities base and quality of life, can the region organize to preserve this natural resource base?

The overall productivity and prosperity of the U.S. economy is leading to a different structure of regional economics. It is clear that in the second half of the twentieth century the states commonly referred to as the Sun Belt have grown dramatically in population and in prosperity. The economies have been massively changed. And, in many ways Florida has been, and is a state with the greatest change. From a slow moving, largely rural southern state, it has become a fast paced, cosmopolitan state with a diverse economy. All would agree that the fundamental base of Florida's economy is its people. Yet, its natural amenities have been a major factor in the change and will continue to be in the years to come. The point is that, if the natural amenities are not the base of Florida's economy, they are certainly among the top two or three factors. And, maintaining them will be critical to the future of Florida's economy.

Power (1996, p. 3) in reference to the Rocky Mountain region states: "We must lay to rest the fear that environmental protection will cause imminent economic collapse of communities". In the west there is nothing more controversial than the Endangered Species Act and its potential impact on local economies. Duffy-Deno (1997), in a rigorous econometric study with data from a cross-section of the region, found no negative effect of the implementation of the Act on the non-metropolitan counties of the region. Vias (1999) and others have pointed up that the economic growth appears to be based on the region's environmental amenities. Power (1996) argues that it is possible "to construct an 'environmental model' of local economic development in which people's preferences for certain surroundings lead to a redistribution of economic activity. From this perspective, protected landscape is a central part of the local economic base. People do care where they live. Because of this, and because businesses care where labor supplies and markets are located, desirable environments are likely to have economic worth of their own" (p. 4).

Although most economists agree that natural amenities have become an important element of a region's economic base, it is still not possible to say exactly what their specific role is within the economy. Amenities taken as a whole create a context within which economic activities take place. There is as yet no specific set of metrics that can separate the effect of specific attributes. What is becoming more and more apparent is that the natural amenities create a context attractive to both residents and visitors. Undoubtedly, this is the case for Florida's 16 million residents and 70 million annual visitors. And, the natural amenities are a key resource of the northeast Florida counties' residents and visitors.

If one accepts the premise that Florida's amenities, both natural and cultural, are a major reason people live in Florida and visit Florida, some of the numbers for the economy can give a glimpse of the potential economic importance of these amenities. Florida's economy (1999) is in realm of \$712 billion annually with employment at 8.2 million. The total value added is nearly \$463.5 billion. Florida's visitors contribute \$117 billion (2000) with \$77.5 billion in value added and employment of 1.75 million (Hodges and Mulkey, 2001).

Certainly tourism is a major economic sector for all the four counties of northeast Florida, and the cultural and natural amenities are a major part of the base of this sector. Additionally, many residents both old and young have selected this northeast Florida region to make their home, and others will in the future. The region's image is a key to the various sectors that make up the region's economy. In the economy of the twenty first century it will be crucial for the region to maintain and preserve its amenity base.

## **Existence Value**

Smith (1990), in his presidential address to the Southern Economic Association in 1989, raised the question: Can we measure the economic value of environmental amenities? His answer was, in effect, yes we can. By that time many studies of methodologies for recreational amenities had been conducted and consistent measures of recreational values published. But, at that time, he pointed out our ability to assess nonuse and existence values were somewhat limited. Recognizing that economists preferred methods for establishing economic value based on explicit choices, and recognizing that explicit choices concerning nonuse and existence value are not the usual case, he recommended that information about nonuse and existence values

held by individuals demonstrated in other forms of behavior also be used to infer economic value.

Randall and Brookshire (1978) in an early study sought to assess the willingness to pay of a broad group (hunters, fishermen, wildlife observers and nature lovers) to prevent a decline in land area devoted to wildlife ecosystems in Wyoming. The mean annual willingness to pay ranged between \$202 and \$270 per person depending upon the type of landscape being considered. Steven et al. (1991) in a more recent study asked survey participants to divide their payment (in this case a hypothetical contribution for activities to assure viability of wildlife) into use and existence value categories. Respondents assigned only 7 percent to current or option use, 34 percent was allocated to bequest value, and the intrinsic value category received 48 percent. The implication is that these representative participants had values for wildlife and their supporting ecosystems that extended far beyond a direct use value.

Milon et al. (1999) sought to appraise the willingness to pay for the restoration of the Florida Everglades. This study was structured such that the findings would be representative of the population of Florida. Two separate surveys were conducted with two different groups of participants: one focused on multiple hydrologic attributes and the other on multiple wildlife species attributes. Participants responded to a broad range of attributes in a conjoint choice survey design. The most highly rated alternative in both surveys was the complete restoration alternative. The annual net willingness to pay was \$70 per household for the wildlife species attributes and \$59 per household for the hydrologic attributes. For Florida's 5.82 million households, this is an aggregate annual value of \$406.5 million and \$342.2 million for the wildlife species attributes and hydrologic attributes, respectively. It was understood by participants in the survey that the time frame was ten years. For the ten years, the respective aggregated values are \$4.07 billion and \$3.42 billion. And, if it is assumed that Floridians of the future value the Everglades in a similar manner as the present population, the value of the Everglades expressed in present value terms is in the order of \$12 billion. Additionally, the Everglades, being a nationally and internationally valued ecosystem, is likely to have a much higher existence value due to values held by the U.S. and world population at large.

Anticipating the future, many people believe there will be continued threats to the viability of wildlife and ecosystems and are expressing their concern. Bengston et al. (1999), attempting to gain a qualitative indication of rising concern, used content analysis of the media. Their specific interest was in the direction of public interest in national forest benefits and values. Using almost 30,000 online news stories about the U.S. national forests over the years 1992-96, they searched for expression of four broad categories of values: commodity (timber, livestock, grazing, etc) recreational benefits and values; ecological benefits and values; and moral, spiritual and aesthetic benefits and values.

*“Recreation benefits and values were expressed more often than other categories, both at the national and regional levels, followed by commodity, ecological and moral/spiritual/aesthetic benefits and values. [However], over the years 1992 through 1996, a gradual upward trend was found in expressions of recreation and moral/spiritual/aesthetic benefits and values and a gradual downward trend was found in expressing of commodity-related benefits and values at the national level, suggesting shifting environmental values” (Bergstrom et al., 1999, p. 181).*

Returning to Smith's question, Can we measure the economic value of environmental amenities? The answer is increasingly, yes. And, in Florida, given the importance of the natural importance to our economy, it becomes increasingly important that we understand the economic contribution of the natural surroundings. Increasing scarcity of natural environments and increasing real incomes imply that the marginal willingness to pay by both individuals and the collective population will continue to rise. Although we do not have specific expression of willingness to pay for northeast Florida's natural landscapes and ecosystems, there is sufficient evidence from other studies that they have considerable value and are of strategic importance to the economy of the region.

## Recreation

Recreational willingness-to-pay values are a useful place to start considering the value of natural ecosystems and water bodies of landscapes. Outdoor recreation such as hunting, fishing, boating, hiking, biking, wildlife observation and general outdoor experiences are tied to the positive perceptions of the landscape and ecological processes. Each of these activities are viable in the minds of the participants because the natural processes provide viable ecological services. Participants willing to pay for the outdoor activity is a reflection of their value for the ecosystems and services.

The dominant portion of early work on valuation of natural environments and their services focused on various forms of outdoor recreation. Walsh et al. (1992) collected and reviewed most of the available literature to 1989. Similarly, Rosenberger and Loomis (2001) reviewed literature spanning 1967 to 1998 covering 21 recreational activities. Using 163 individual studies that provided 760 benefit measures they established the realm of values for various recreational activities. Net economic values per recreation day for a variety of types of outdoor recreation in the U.S. from these two studies are reproduced here to establish the order of magnitudes for these activities (Table 6). As for the other monetary measures in our report, we have converted the values to the year 2000 dollars using the consumer price index (U.S. Department of Labor, 2001).

Hunting, with its long history in U.S. culture, continues to be one of the highest valued outdoor recreational activities. There are a number of factors that influence the value of a site used for hunting. The value of the wildlife in which the hunter has an interest and attempts to kill is of course one. Additionally, there is value the hunter obtains from the pursuit of the animal and the value of the social activity involved in the pursuit. Often there is the aesthetic value of camping in conjunction with hunting. These are generally analyzed together under the willingness to pay for a hunting trip. Most of the literature on hunting approaches valuation in this way.

Ziemer and Musser (1978) present information for various recreational values obtained from a 1971 survey conducted in Georgia. For hunting big game (such as deer) an average consumer surplus (CS) per occasion per household of \$303 was given. An average CS per occasion of small game is \$142. They also list a category of wildlife enjoyment and list an average CS per occasion at \$26. In a second study (Musser and Ziemer, 1979) these authors dealt with loss of forestland in Georgia and its impact on hunting. For the period from 1973–76 they estimated the loss of an acre of forestland caused a \$6 loss in consumer surplus associated with hunting. The average CS per hunting occasion per household was \$308. It should be pointed out that the \$6 per acre value is for the hunting circumstances that occurred in Georgia during this time and that generated the average CS of \$308. It would not necessarily apply to other areas where there is proportionally more or less forested areas open to hunting.

Livengood (1983) conducted a study of land leases for hunting in south Texas (during 1978-79) and estimated an equation for the implicit “price” of deer, using the sample mean values, based on the number of kills. For kills of one, two and three the implicit prices for deer are \$67, \$35, and \$24 respectively. Summing these values gives a total value of \$126. Since there is no charge associated with the deer, only a charge for the site lease, the consumer surplus associated with killing three deer is \$126. The average CS is \$42. It should be kept in mind that this is the CS associated with just the deer. The CS of the hunting trip would include all the other attributes of a hunting trip. Additional interesting information from Livengood is the deer kill ranges from 0 to 23 per 1,000 acres and the lease rates range from \$0.66 to \$26 per acre annually in south Texas. The average deer kill per hunter during a season is 1.09 for a leased site and 0.62 for a free site. With a doubling of lease fees between 1975 and 78, Livengood points out that now “...the net return from increasing the number of harvestable deer equals or exceeds the annual net returns from livestock operations in many parts of the state (Texas).”

Two studies give insight into bird hunting values. Bishop and Heberlein (1979) conducted an experiment with early goose hunters. The researchers made specific cash offers to purchase the hunter’s permit. The results yielded a total consumer surplus of \$166 per permit. Cocheba and Langford (1978) established the marginal valuation of waterfowl at \$3.93 per hour of hunting. The values given in these studies for various aspects of hunting, while falling in the range of values Walsh et al. reported, are useful in Florida only to the degree that the people involved in the activities in Florida share tastes, preferences, attitudes and

income levels with the people in the studies. Since the studies give only limited information on the populations observed it is not possible to project specific values for hunting in northeast Florida. It is reasonable to assume that willingness to pay consumer surpluses are in the general range for the study values.

Fishing activities are similar to hunting in that the fishing experience has a number of dimensions and the consumer surplus associated with the entire experience is the measure of interest. The idea of a “fishing trip” is intended to capture all aspects of the experience. Gibbs and McGuire (1973) studied the Kissimmee River Basin lakes in 1970 and estimated the consumer surplus per visit for the average recreationist to be \$266. Many of the study participants were from other areas of Florida and other states. An average visit to the lakes was 5.64 days. This gives a consumer surplus per day for the average recreationist of \$47. Ziemer and Musser (1978) estimating from 1971 data determined the average consumer surplus per occasion to be \$109 for warm water fishing in Georgia. The length of the occasion was not given. Zeimer, Musser and Hill (1980) using the same data but a different functional form estimated the average CS per occasion to be \$117. Strong (1983) estimated similar consumer surpluses for steelhead fishing in cold water in Oregon. The 1977 values ranged from \$58 to \$65 per trip. Earlier Gum and Martin (1975) estimated consumer surplus values per household trip for warm water fishing in Arizona at \$130, and their value for cold-water fishing was also \$130. Vaughn and Russell (1982) using 1979 national data estimated average values for a fishing day by the species sought. A day of trout fishing had values between \$57 and \$78, whereas a day of catfish fishing had values between \$38 and \$52.

Milon et al. (1986) studying Orange and Lochloosa Lakes in north central Florida found local fishermen made expenditures of \$21 per person-trip and \$43 per party-trip, whereas non-local fishers expenditures were \$93 per person trip and \$192 per party trip. The per-person willingness to pay to maintain the fishability of the lakes were similar for both local and non-local fishers: \$42 and \$41 per year, respectively. Milon and Welsh (1989) did a similar study of Lakes Harris and Griffin in Lake County, Florida, and found that expenditures were similar: \$24.25 per trip for local fishermen, \$67 per trip for other Florida fishermen and \$91 per trip for non-Florida fishermen. The average annual willingness to pay to assure the fishability of the lakes, in essence, the annual consumer surplus, was \$41 per person. Bendle in a study for the Florida Department of Environmental Protection (1995) of Rodman Reservoir in Putnam and Marion Counties of north central Florida found similar values. The average user of Rodman had expenditures of \$62 per trip for an annual total of \$955. The willingness to pay to have the reservoir to continue to be available was between \$29 and \$37 per year. The consumer surplus per person per day of fishing was \$14.

It is reasonable to expect the fishers; both local and tourists, fishing the rivers and lakes of northeast Florida have similar values for their activities. Considering that 121,000 are fishing these waters and fish on multiple days, the aggregate passive-use value (i.e., consumers surplus or net benefits) could be in the magnitude of \$70 million per year. Similarly, with 19,000 hunters, their aggregate passive-use value could be \$26 million per year.

Wildlife observing and hiking are also important outdoor recreational pursuits. It was estimated that over 66 million people participate in these activities in the U.S., and expenditures on this activity in 2001 were nearly \$40 billion (USFWS, 2002). A day of these activities has a consumer surplus value of \$34 and \$44, respectively (Walsh et al. 1992). Canoeing and kayaking are a rapidly growing similar form of recreation. Consumer surplus values are estimated to be in the range of \$74 per day of activity (Walsh et al. 1992).

Additionally, as bicycles have been redesigned for riding on rough trails, biking through natural areas has become a recreational past time for many people. Fix and Loomis appraised the WTP value of a trip to Moab, Utah, one of the most popular mountain trail areas, at between \$225 for the revealed preference method and \$258 for the stated preference method. These numbers translate into values of \$58 and \$69 per day of biking. Although Moab is quite different than many other sites, it is evident that bikers receive considerable consumer surplus (net value) from this activity.

In Florida, hunting, fishing, hiking, wildlife observation, canoeing, kayaking, bicycling and other outdoor activities are participated in by both local people and tourists. Climatic conditions allow activities all year, and during winter months people are drawn to Florida from other states to participate in these activities and have willingness to pay to participate in the activities. The activities will only be of value as long as the natural ecologic and hydrologic processes of the landscape remain viable. Whereas much of the lands that are



privately held and provide benefits exclusively to the owners, these lands also provide nonexclusive benefits as part of the ecologic and hydrologic processes of the broader landscape. If natural processes on private property are unduly disrupted, the cumulative impact on broader landscape process can be disrupted thereby potentially diminishing recreation benefits. The ecological and hydrologic processes that underpin recreational activities occur at scales that transcend boundaries between private and public lands. Florida's recreational economy is inextricably intertwined with natural process at many scales.

Total wildlife-related recreation in Florida, including fishing, hunting and wildlife watching activities, was estimated by the U.S. Fish and Wildlife Service, based on national survey data for 2001 (Table 7). Over 3 million persons engaged in fishing and wildlife watching activities in Florida, and over 200,000 participated in hunting. This activity represented in excess of 72 million days, with 12 percent by non-residents. Total trip-related and equipment expenditures for wildlife-based recreation in Florida were estimated at \$7.2 billion. For comparison, total expenditures in the U.S. were in excess of \$96 billion.

**Table 6.** Mean and standard error of net economic values per recreation day for various outdoor activities (in year 2000 dollars).

Activity	Walsh et al (a)		Rosenberger & Loomis (b)	
	Mean	Standard Error	Mean	Standard Error
Total	51.46	2.53	na	na
Camping	29.56	3.08	33.33	6.00
Picnicking	26.27	7.70	38.72	10.61
Swimming	34.82	5.75	23.15	4.90
Sightseeing	30.76	5.65	39.40	10.33
Off-Road Driving	30.76	5.65	19.14	6.88
Boating, Motorized	47.89	15.71	38.16	12.79
Boating, Non-Motorized	73.80	24.03	67.60	15.11
Hiking	44.09	8.82	40.22	8.64
Bicycling	na	na	49.57	9.22
Winter Sports	43.21	6.79	na	na
Big game hunting	68.93	5.26	47.40	2.42
Small game hunting	46.72	5.32	39.20	10.50
Migratory waterfowl hunting	54.03	8.90	34.71	4.46
Cold water fishing	46.42	4.91	na	na
Anadromous fishing	81.88	16.69	na	na
Warm water fishing	35.70	3.73	na	na
Salt water fishing	109.89	21.36	na	na
Fishing (all)	na	na	39.41	3.76
Non-consumptive fish and wildlife	33.66	3.49	33.68	1.52
Wilderness	37.26	9.25	na	na
Other recreational activities	28.53	5.53	44.56	10.58

a.. Walsh et al. (1992). b. Rosenberger and Loomis (2001).

Based on data for recreational activities in the U.S, during the periods 1986 to 1988, and 1967 to 1998, respectively.

**Table 7.** Wildlife-related recreational participation and expenditures in Florida and the U.S., 2001

Activity	Florida				United States		
	Number Participants (1000)	Resident Activity Days (1000)	Non- Resident Activity Days (1000)	Total Trip and Equipment Expenditures (\$M)	Number Participants (1000)	Activity Days (1000)	Total Trip and Equipment Expenditures (\$M)
Hunting	226	4,504	190	381	13,034	228,368	20,611
Fishing	3,104	42,416	6,002	5,283	34,067	557,394	35,632
Wildlife Watching	3,240	17,725	3,663	1,568	66,105	306,006	39,991
Total		63,645	8,855	7,232		1,090,768	96,234

Source: US Fish & Wildlife Service, National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, State Overview, June 2002.

Table 8 presents data on the total economic impacts of wildlife-related recreation specifically for the four northeast Florida counties, for the year 2000. These estimates include the regional multiplier effects, calculated with Implan. County level data from 1996 USFWS survey of hunting, fishing and wildlife watching, were restated in year 2000 dollars using the consumer price index, and adjusted for growth in county population and number of permits. Measures of economic activity compiled included retail sales, number of jobs, economic output, and number of hunting or fishing permits or number of visitors engaged in wildlife viewing. For the region, it was estimated that wildlife related activities accounted for over \$529 million of economic output and 9,771 jobs in the year 2000. Saltwater fishing and wildlife viewing generated the greatest levels of economic impact for the region, but impacts vary considerably among counties. Saltwater fishing had the largest economic output impact in all counties, except Putnam County where fresh water fishing predominated.

Although primary measures of specific willingness-to-pay values for specific recreational activities in the northeast Florida region were not available, we can make reasonable estimates from other studies. For our calculations of the aggregate values of recreational activities in the region, we used mean values for consumer surplus (Table 6). These consumer surplus values are quite conservative relative to the values for other parts of Florida and the southeast U.S. given in the literature. Total economic value of outdoor recreation in the four northeast counties is estimated by using the number of participants, the consumer surplus for the specific activity, and the out-of-pocket expenditures for the activities. For this estimate, data are given for hunting, freshwater fishing, saltwater fishing and wildlife viewing, as well as an aggregate of all recreational activities.

As in all parts of Florida recreation is an important part of residents' and visitors' activities. Economic theory contends that people undertaking the activities have a "willingness to pay" to participate in the activity. Although we do not have primary measures of the actual willingness to pay for the participants' activities in the northeast Florida region we can make an estimate. The total willingness to pay (total value) of a recreational activity is the sum of out of pocket expenditures and consumer surplus (Table 9). The estimated aggregate consumer surplus is \$313 million for these four activities in the year 2000. The corresponding expenditure values total \$390 million. The resulting total economic value of recreation is in the range of \$700 million per year. Salt water fishing has the largest value, but interestingly, wildlife viewing is the second highest at \$226 million per year.

**Table 8.** Economic Impacts of Wildlife-Related Recreation in Northeast Florida Counties, 2000, by Activity

Economic Measure	Activity	Clay	Duval	St Johns	Putnam	Total Four Counties
Jobs	Hunting	168	549	143	213	1,073
	Freshwater Fishing	310	695	137	557	1,699
	Saltwater Fishing	350	1,979	674	312	3,315
	Wildlife Viewing	451	2,611	373	249	3,684
	All Activities	1,279	5,834	1,327	1,331	9,771
Retail Sales (\$1000)	Hunting	4,735	15,962	4,043	6,031	30,771
	Freshwater Fishing	15,680	35,867	6,893	28,524	86,964
	Saltwater Fishing	14,894	84,324	28,713	11,988	139,918
	Wildlife Viewing	15,720	94,614	12,993	8,632	131,960
	All Activities	51,029	230,767	52,642	55,175	389,613
Economic Output (\$1000)	Hunting	5,095	17,178	4,351	6,491	33,115
	Freshwater Fishing	16,846	38,534	7,405	30,645	93,430
	Saltwater Fishing	27,813	157,469	53,619	24,813	263,713
	Wildlife Viewing	16,601	99,914	13,721	9,116	139,352
	All Activities	66,355	313,094	79,096	71,064	529,610
Number Permits or Visitors (1000)	Hunting	3	10	2	4	19
	Freshwater Fishing	23	50	10	38	121
	Saltwater Fishing	15	88	30	14	147
	Wildlife Viewing	37	192	32	18	278
	All Activities	78	339	74	74	565

Source: David Harding , Florida Fish & Wildlife Commission, and Southwick & Associates, USFWS.

**Table 9.** Total Economic Value of Outdoor Recreation in the Four Northeast Florida Counties, 2000

Activity	Number Of Participants, Permits Or Visitors (1000)	Consumer Surplus Per Person-Day	Total Consumer Surplus (M\$)	Expenditures On Activity (M\$)	Total Value: Expenditures Plus CS (M\$)
All Activities	565	\$52	\$293.8	\$389.7	\$683.5
Hunting	19	\$69	\$13.1	\$30.8	\$43.9
Freshwater Fishing	121	\$36	\$43.6	\$87.0	\$130.6
Saltwater Fishing	147	\$110	\$161.7	\$139.9	\$301.6
Wildlife Viewing	278	\$34	\$94.5	\$132.0	\$226.5
Total			\$312.9	\$389.7	\$702.6

Values taken from Tables 26 and 28. It is assumed that the average participant undertakes the activity ten times per year in the northeast Florida region.

## Tourism

Tourism is the largest industry group in Florida. The state's moderate climate, beaches, and other natural amenities, as well as many entertainment attractions, draw visitors from across the United States and many foreign countries. Florida's 4,700 hotels and motels have a total of 370,000 rooms at an average daily room rate of \$91, and they have an average annual occupancy rate of 70 percent. Surveys by *Visit Florida USA* indicate that over 71 million people visited Florida in year 2000, and visitors stayed an average of 5.3 days, representing a total of 379 million visitor-days (Table 10). Visitor expenditures averaged \$125 per day in 2000, giving estimated total expenditures of \$47.37 billion in year 2000. These values do not include the tourism spending by Florida residents traveling within the state. It is interesting that although the total number of visitors has steadily increased since 1998, the average length of stay has decreased commensurately, resulting in total expenditures remaining rather stable. Florida visitor expenditures were distributed across transportation (28%), food (20%), lodging (21%), shopping (13%), entertainment (14%), and miscellaneous other expenses (5%), according to 1998 surveys. Multiplying the total visitor expenditures by these percentages gives the estimated total expenditures by category (Table 11).

**Table 10.** Characteristics of Florida Visitors, 2000

Measure	
Number of visitors (millions)	71.5
Average length of stay (days)	5.3
Total number of visitor-days (millions)	379.0
Average expenditure per person-day	\$125.00
Total annual expenditures (billion\$)	\$47.37

Source: Visit Florida USA, *Florida Visitor Study*, 1998, 2000, Tallahassee

**Table 11.** Florida Visitor Expenditures, by Category

Expense Category	Percent of Expenditures (1998)	Total Annual Expenditures, 2000 (\$billions)
Transportation	28%	13.07
Food	20%	9.29
Lodging	21%	9.97
Shopping	13%	6.15
Entertainment	14%	6.63
Miscellaneous	5%	2.25
Total	100%	47.37

Source: Visit Florida, 1998 Florida Visitor Study

The total economic impact of Florida visitor expenditures was evaluated with the *Implan Professional* impact analysis and social accounting system software, and associated database for Florida (MIG, Inc.). Florida visitor expenditures were assigned to various industry sectors in the *Implan* system, with some judgement about their relative magnitude within the expense groups. For example, transportation expenses were subdivided into air transportation (45%), transportation services (25%), automotive dealers and service stations (25%) and travel agents (5%), while entertainment expenses were subdivided into amusement & recreation services (30%), theatrical producers, bands, etc. (40%), commercial sports (10%), racing and track operations (10%), and membership sports and recreation clubs (10%). The estimated total economic impacts of visitor spending in Florida in 2000 are summarized in Table 12. Total output (sales) impacts amounted to \$117.2 billion (Bn), including \$48.4Bn in direct effects in the tourism and travel industries, \$13.3Bn in indirect effects in other linked industries, and \$55.4Bn in induced effects of consumer expenditures by industry employees. Total employment impacts were estimated at 1.75 million jobs, including both full time and part time positions. Total

value added impacts amounted to \$77.5Bn, including \$50.6 Bn in labor income, and \$7.8 Bn in indirect business taxes. Impacts on major industry groups are summarized in Table 13. The largest industry group impacted was the services industry, at \$36.4 Bn in output, \$22.7 Bn in value added, and 576 thousand jobs. Also heavily impacted was the trade sector, including retail stores and wholesale distributing businesses, with \$31.8 Bn in output, \$23.0 Bn in value added, and 693 thousand jobs. In addition, there were major impacts to the transportation/communication/utilities industries, and finance/insurance/real estate.

**Table 12.** Total Economic Impacts of Florida Visitors, by Impact Type, 2000

Impact Measure	Direct	Indirect	Induced	Total
Output	48.44	13.29	55.44	117.17
Total Value Added	32.33	8.37	36.79	77.48
Labor Income	21.04	5.45	24.10	50.59
Indirect Business Taxes	4.38	0.60	2.79	7.77
Employment (jobs)	882,447	155,723	710,547	1,748,716

\*All amounts in billion dollars (2001), except employment (jobs).

**Table 13.** Total Economic Impacts of Florida Visitors, by Major Industry Group, 2000

Industry Group	Output (M\$)	Total Value Added (M\$)	Labor Income (M\$)	Indirect Business Taxes (M\$)	Employment (jobs)
Services	36,413	22,743	17,157	1,535	575,868
Trade	31,816	22,995	14,303	4,201	693,106
Transportation, Communications, Public Utilities	15,663	10,113	6,349	851	161,416
Finance, Insurance, Real Estate	11,864	8,651	2,338	1,060	57,065
Government	9,015	8,335	6,752	0	151,849
Construction	6,965	2,495	2,218	49	62,111
Manufacturing	4,760	1,721	1,160	57	28,196
Agriculture	522	298	198	10	10,429
Other	103	103	103	0	8,228
Mining	51	30	9	3	450
Total	117,172	77,483	50,587	7,766	1,748,716

All amounts in million dollars (year 2001), except employment (jobs).

A recent study in Saint Johns County Florida (Stevens et al, 2002) indicates the magnitude of economic impacts from tourism to the region of northeast Florida. This study was sponsored by the local visitors and convention bureau, and conducted in collaboration with the University of Florida Department of Recreation, Parks and Tourism. Interviews were conducted at various tourist destinations in the county between June 2001 and June 2002, and respondents were questioned regarding the nature of their visit(s) to the area, the activities they engaged in while there, the types and amounts of expenditures already made and anticipated during their visit, and some standard demographic attributes. Data from 1,094 observations were analyzed to estimate per-visitor spending averages were estimated for various expenditure categories by combining expenditures to-date and anticipated remaining expenses, and dividing by party size. Three million day-trip tourists, and 3.26 million over-night visitors were reported to have visited the county in 2001, according to the St. Johns County government. It was assumed that these numbers represent visitors coming from outside the county area.

Revenues from all tourism are estimated to total \$1,485.05 million in 2001. Tourism revenue estimates were then entered into the IMPLAN Pro regional economic modeling software package to compute the

economic impacts of these activities on the county. Summary results of the estimated economic impacts from tourism are presented in Table 14, showing direct, indirect, induced and total effects for output, value added, labor income, indirect business taxes and employment impacts. The output values in this table represent a gross measure of economic impact from the revenues generated by tourism. Value-added impacts represent the compensation or returns to labor, management and ownership generated by the activity. Labor income is the earnings to labor generated by the heritage tourism. Employment impacts are based on industry-average output per worker statistics. Indirect business taxes are estimates of how the spending attributed to heritage tourism changes local, state and federal tax revenues, such as sales tax, excise tax, property tax, etc. Economic impacts are also classified in terms of how they are generated in an economy. Direct impacts are those directly attributable to the revenues generated by a particular enterprise or industry, basically measuring the value of production or services. Indirect impacts count the expenditures the original enterprise makes for the inputs needed to conduct business or produce its output, and the increased output and purchases of its suppliers. Induced effects include the impacts from the spending or the earnings in the local economy by employees. Finally, the total impact is the sum of the direct, indirect and induced effects and measures the complete impact of an activity as it ripples throughout the local economy. The total economic impact of tourism was estimated at \$1.87 billion (Bn) for the year 2001. Over \$1.09Bn of value was added to the local economy in the form of income and profits, and over \$692 million of this was attributable to labor earnings, which was equivalent to approximately 32 thousand jobs in the area. Finally, it was estimated that \$116 million in indirect business taxes paid to local, state and federal governments were generated by tourism in St. Johns County, Florida. These results are useful in identifying how particular economic sectors benefit from tourism and the associated environmental amenities. Although this study dealt with only one county, similar amenity-based tourism is occurring in all four counties in northeast Florida.

**Table 14.** St. Johns County Tourism Economic Impacts, 2001-2002.

Impact Type	Direct	Indirect	Induced	Total
Output (\$Mil.)	1,163.80	181.12	521.55	1,866.47
Value Added (\$Mil.)	664.18	110.52	317.69	1,092.39
Income (\$Mil.)	420.42	71.16	199.94	691.51
Indirect Taxes (\$Mil.)	78.67	8.87	28.95	116.50
Employment (jobs)	23,456	1,942	6,220	31,618

## Agriculture and Natural Resources

The economic activity associated with agriculture, forestry, fisheries and mining is predicated upon the existence of open space and other natural resources. The total economic impacts of the agriculture and natural resource related industries, including food, forest products, and agricultural chemicals manufacturing, together with mining and production agriculture, amounted to \$3.48 billion (Bn) in output, 38,000 jobs, and \$1.29 Bn in value added. The industries included in this are listed Table 15 in rank order of output impact. The direct impacts of these industries represented about 1.6 percent of gross regional product. As has been stated, much of the agriculture and forestry activities in the region are highly compatible with wildlife habitat and quality of life attributes. To a large degree the economic of agriculture, recreation and amenities complement each other.

**Table 15.** Total Output, Employment and Value Added Impacts of Agriculture, Forestry, Fisheries, and Related Manufacturing Industries in Northeast Florida Counties, 1999

Industry	Output (Mil\$)	Employment (jobs)	Value Added (Mil.\$)
Roasted Coffee	507.3	4,543	165.8
Bottled and Canned Soft Drinks & Water	448.7	3,837	110.4
Paperboard Containers and Boxes	231.0	2,239	47.0
Landscape and Horticultural Services	225.3	5,853	142.9
Fluid Milk	189.6	1,027	39.1
Paperboard Mills	136.3	915	26.3
Poultry Processing	133.3	1,457	23.4
Malt Beverages	118.9	1,524	36.1
Paper Mills, Except Building Paper	106.9	1,286	57.7
Vegetables	104.9	1,228	53.8
Structural Wood Members, N.E.C	100.0	1,026	45.8
Sawmills and Planing Mills, General	95.3	592	30.1
Bread, Cake, and Related Products	93.4	1,153	25.4
Forestry Products	80.4	961	49.9
Greenhouse and Nursery Products	73.1	1,211	55.3
Wood Preserving	70.3	475	22.6
Food Preparations, N.E.C	58.2	643	15.1
Logging Camps and Logging Contractors	53.6	397	22.9
Prepared Fresh Or Frozen Fish Or Seafood	50.5	547	10.1
Dairy Farm Products	46.7	583	31.5
Creamery Butter	41.4	221	7.6
Sausages and Other Prepared Meats	26.3	143	1.7
Agricultural, Forestry, Fishery Services	26.2	981	16.4
Poultry and Eggs	23.7	150	6.2
Prepared Feeds, N.E.C	20.0	128	3.4
Flour and Other Grain Mill Products	15.1	139	4.4
Commercial Fishing	14.9	443	11.0
Agricultural Chemicals, N.E.C	11.5	126	3.4
Wood Containers	11.3	165	5.9
Veneer and Plywood	10.1	59	5.2
Wood Pallets and Skids	9.8	149	4.3
Ranch Fed Cattle	9.7	192	5.0
Paper Coated & Laminated N.E.C.	8.6	99	3.1
Canned Fruits and Vegetables	7.7	109	4.2
Distilled Liquor, Except Brandy	7.5	489	5.7
Confectionery Products	4.6	49	1.5
Cigars	4.5	8	1.5
Pickles, Sauces, and Salad Dressings	3.9	40	1.1
Reconstituted Wood Products	3.1	14	0.9
Hay and Pasture	2.9	151	2.3
Fertilizers, Mixing Only	2.8	8	0.5

**Table 15.** Total Output, Employment and Value Added Impacts of Agriculture, Forestry, Fisheries, and Related Manufacturing Industries in Northeast Florida Counties, 1999

Industry	Output (Mil\$)	Employment (jobs)	Value Added (Mil.\$)
Feed Grains	2.6	44	1.8
Forest Products	2.5	54	2.0
Paper Coated & Laminated Packaging	2.4	28	0.9
Miscellaneous Livestock	2.1	106	1.1
Tree Nuts	2.0	36	1.3
Gum and Wood Chemicals	1.9	19	0.5
Fruits	1.6	29	0.7
Range Fed Cattle	1.4	32	0.7
Wood Products, N.E.C	1.0	10	0.4
Potato Chips & Similar Snacks	0.9	4	0.2
Broadwoven Fabric Mills and Finishing	0.7	8	0.1
Hardwood Dimension and Flooring Mills	0.6	8	0.2
Cotton	0.5	6	0.2
Hogs, Pigs and Swine	0.3	6	0.1
Manufactured Ice	0.3	26	0.1
Cattle Feedlots	0.1	3	0.1
Sheep, Lambs and Goats	0.0	1	0.0
<b>Total</b>	<b>3,484</b>	<b>38,387</b>	<b>1,293</b>



## Discussion: Northeast Florida

Natural amenities and opportunities attract ever-increasing numbers of people to Florida. Older people have seen Florida as a wonderful place to retire; younger people see it not only for its economic opportunities but also as a very pleasant place in which to settle. Shifts in technologies allow a broad spectrum of businesses to locate in Florida and operate worldwide. Although tourism continues to be the economic base, the economy has considerable diversity, with employment of over 9 million and total output exceeding \$711 billion in 1999. The population is 16 million and is projected to grow to 20 million by 2015.

The greatest growth has been in the southern part of the state. The coastal areas were seen as having mild winters and beautiful land and seascapes. Now, increasingly, these parts of the state are seen as suffering from too much growth. Although the natural amenities remain considerable, the built environment is seen as congested and the region is perceived as having complex socioeconomic challenges. Growth is moving up both coasts to the central and northern parts of the state. In the northeast corner Duval County has experienced by far the majority of the population and economic growth. The other counties have remained relatively rural, although considerable growth is occurring along the Atlantic coast.

The rural landscapes, lakes, rivers and coastal areas along with the pleasant climate are the natural amenities that are attracting people to this northeast Florida region. McGranahan (2002) demonstrated that high-amenity counties in the southern U.S. have non-metropolitan population growth. Although the University of Florida's Bureau of Economic and Business Research (2001) projects a slowing of the annual net migration into the region (Figure 3 and Table 4). The population is projected to reach approximately 1.4 million persons by the year 2015. If the trend of people seeking high amenity non-metropolitan areas continues the counties the northeast Florida counties could experience even greater net migration into the area.

The studies discussed above contend that landscapes, streams and their ecological systems provide value to the broader public of a region. This value is based on people's willingness to pay. In this case they do not actually have to pay, but they do have a willingness to pay. Recall in the study of Kentucky's rural landscape the willingness to pay value was \$0.023 per household per acre per year, and the value in Suffolk County, N.Y. was \$0.04 per household per acre per year.

We do not have specific values for the willingness to pay of the people of the northeast Florida region for the landscape attributes, however, to the degree that there are similarities between the landscapes and traits of people for the northeast Florida region and the people of another region, we can use values from other studies. Suffolk County is a coastal area with estuaries, coastal housing and agriculture and wetlands inland. Kentucky has rolling hills covered predominately by pastures and forests. The four northeast Florida counties inland consist primarily of forests, pastures and wetlands. All four have shorelines on the St. Johns River, and Duval and St. Johns have estuaries and Atlantic coast lands. To be very conservative in our estimates of amenity value of the northeast Florida area, we use a proxy value of \$0.0023 per acre per household per year, or 10 percent of the Kentucky value of \$0.023, and far less than the Suffolk County NY value of \$0.04. With a total area of agriculture, pasture, forests and wetlands of 1.45 million acres and 434,000 households, the aggregate consumer surplus, i.e. the annual flow of value to the people of the region, is in the realm of \$1.5 billion.

Recall that the consumer surplus expressed in dollar value does not directly enter market activities. This valuing of the landscape as expressed by the \$1.5 billion per year lies behind the actions the people of the region take in the markets. It is behind their selection of this region to live and work in; it is behind their recreational choices; it is behind the tourists' decision to visit this region. This non-market value of the landscape service flows is above and beyond \$443 million of value added resulting from market sales of products (Table 3) from these same lands. The proper way to view the annual economic value flow to the northeast Florida region is to add the \$1.5 billion of amenity value to the market based \$443 million of value added. The contribution to the region from the land resources is in the order of \$1.95 billion per year.

Another interesting way to consider these lands is in terms of the exclusive and non-exclusive service flows. Table 3 gives the proprietor income from the 1.45 million acres as \$113 million per year. This amount can be viewed as the annual value of the exclusive service flows, i.e. the market products and their net value.

The \$1.5 billion per year, on the other hand, is the annual value of the non-exclusive service flows accruing to the public at large. Interestingly, the owners of the lands that generate these non-exclusive service flows are not compensated for their generation. This means that if the land owner can capture greater monetary gain from changing land use, he or she is likely to consider the change without taking the potential loss of the environmental service flows to the broader economy into consideration. The result of an individual's increase in financial well-being can be a decline in the overall economy of the region. With equitable consideration of both public and private interests in the landscape, this problem could be resolved. Increasingly, conservation easements on private land offer a way to compensate private stewards of natural lands for the variety of service flows that they generate. For example, the St. Johns Water Management District has negotiated a number of these agreements recently.

Next, considering more specific activities tied to natural processes, much of Florida's recreation is dependent on natural landscapes and coastal resources. As in most of Florida, recreation in the northeast region is an important part of residents' and visitors' activities and the economy. Above we presented willingness-to-pay measures from other studies to illustrate the range of net values for a variety of recreational activities. Recall the total willingness-to-pay or total value of a recreational activity has two components, the out-of-pocket expenditures for the activity and the consumer's surplus. The consumer's surplus is the net value associated with the activity; this surplus of value over costs is what motivates people to participate in the recreational activity.

When all aspects of these recreational activities and expenditures are taken into consideration, the resulting employment approaches 10,000 jobs and market activities exceed half a billion dollars (Table 28a). And, it is important to recall that these recreational activities and their market impact only occur because the ecosystems of the region remain viable. A deterioration of the ecosystems of the lands and waters will result in a decline in these recreational activities.

Tourism is by far Florida's largest economic sector, is tied closely to the natural environment. Although human created amenities in the form of theme parks and major attractions draw people to Florida, these attractions are nest in a natural environment that is also part of the visitors' experience. As is the case for recreation, we do not have specific willingness-to-pay measures of tourists' preferences for natural landscapes and environments. We can conjecture that the tourists to the four county region share many of the characteristics of other visitors to Florida, implying that Florida's unique tropical and subtropical landscape is an important part of their Florida experience. The heritage tourism study in the St. Augustine (St. Johns County) area gives insights as to the economic impacts of unique attractions. The St. Johns County attractions were responsible for an estimated \$1.09 billion of value added, over 31,000 jobs, and \$691 million of income, giving an average compensation of just under \$22,000 per employee. And, as was the case for recreation, the potential of the tourism sector will remain viable only if the region is perceived to have a high quality natural environment that is attractive to visitors. A deterioration of the ecosystems of the lands and waters will result in a decline in both tourist and recreational activities, thereby affecting the viability of many local businesses.

In this discussion we have envisioned four broad categories of lands and their use: developed lands; agricultural, pastures and forest lands; natural lands; and Strategic Habitat Conservation Area (SHCA) lands. These delineations help in seeing the potential compatibility of both ecosystem conservation and well-planned economic development. In the four county region the majority of development has occurred in the Jacksonville area and east of the St. Johns River along the Atlantic coast. The great majority of land (77%) especially land west of the river, is pasture, forest and wetlands. Interspersed in the rural lands, both east and west of the St. Johns River are both small and large areas considered to be strategic habitats (see Fig. 6). To a considerable degree, these pastures, forests and wetlands can be compatible with conservation goals of the designated Strategic Habitat Conservation Areas. The lands in the western part of Putnam, Clay and Duval counties can readily provide a biological corridor from the Ocala National Forest, to Camp Blanding and on to the St. Marys River and Okefenokee National Wildlife Refuge, while largely remaining in present agricultural and forestry land uses. It is possible to obtain both the economic gain from the agriculture and forestry and the amenity values from rural lands.

Continued development of lands east of the St. Johns and in the Jacksonville area is highly likely. Given the perceived high quality of life in the region, retirees and young people are likely to continue to move

into the area. Lands that are now in agriculture and forestry uses will be considered for development. Pressure on Strategic Habitat Conservation Areas will increase.

Presently, survey data specific enough to use in benefit-cost studies of development versus preservation of the SHCAs in the region does not exist. Studies from other parts of the nation do show that the public holds values for preservation of these lands that translate into willingness-to-pay values. Studies within the region need to be undertaken. We can say that in the aggregate for the whole four region, the natural lands and their ecosystems through the contribution to perceived amenities, to recreation and to tourism, are major contributors to the local economy. The diminishing of their viability will have long-term negative impacts on the regional economy.

## Conclusions

A number of conclusions can be reached on the role of natural land conservation in northeast Florida. Some of these are based on readily available and accepted data, while other conclusions are extrapolated from these data.

- Land use is changing. As in much of Florida, urban uses of land are increasing. In 1995, 19 percent of the land area was urban and 77 percent was agricultural or natural lands. Projections for 2015 are that agricultural and natural land areas will be further reduced by 9 percent. Some of the lands that could be lost to development are strategic habitat conservation areas.
- Population is growing. The population of this region in the 1970s was approximately 700,000; by 1995 it was over one million and it is projected to reach nearly 1.4 million by 2015.
- The economy is growing and is structured much like the rest of Florida. The regional economy has a total economic output over \$50 billion per year and total employment approaching 700,000 jobs. Value added is \$28 Bn, including employee compensation of \$16 billion, proprietor income of \$1.8 billion, property income of \$8.0 billion, and \$2.0 billion in indirect business taxes. Agriculture and natural resource (mining, forest products, etc.) sectors are relatively small, accounting for \$2 billion of output and 17,000 jobs.
- Total and per capita real personal incomes have grown dramatically. The 1970 total real personal income for the region was \$8.8 billion (1997 dollars); by the year 2000 it was nearly \$30 Bn; in the year 2015 it is project to reach over \$53 billion. Per capita real income has grown from \$13,000, to \$26,000, and to \$39,000, for the same years, respectively. Transfer payments are a considerable part of income in the region, growing from \$182 million in 1970 to \$3.8 billion in 2000, and are projected to reach \$11.5 billion in 2015 (in nominal dollars). Poverty, however, persists in the region, ranging from a low of 8 percent of the population in Clay County, to 22 percent in Putnam County.
- Housing starts are increasing in the region. Since 1980, for Florida as a whole, the number of private housing starts has leveled off, while in the northeast Florida region the number of annual starts has increased by 60 percent.
- Ecological, hydrological and other natural processes provide a wide range of non-market services in the region. Although the report did not attempt to document the full range of environmental services provided by natural processes, the service flows are perceived by the populace and are a basis for the high quality of life in the region. It is this high quality of life that is attracting new residents and tourists to the area.
- Florida is perceived as a place to live and to visit with a very high quality of life. Many surveys put Florida among the most desirable places to live in the U.S. This perceived quality of life ties to Florida's climate and natural environment. Studies from other areas suggest that people have considerable willingness-to-pay values for maintaining the natural environments. The implication for northeast Florida is that the high quality of life is a contributor to the viability of the region's economy.
- People have positive willingness-to-pay values for maintaining natural ecosystems. Studies for other locations indicate that people hold values for the existence of natural ecosystems and that these "existence values" translate into monetary willingness-to-pay values. Studies of the Florida Everglades indicated that Florida residents have a willingness-to-pay of \$70 per household per year, which translates into an aggregate annual value of \$400 million. This suggests a capitalized value in perpetuity for the Everglades of at least \$12 billion. Although we cannot assert a specific value of the ecosystems of northeast Florida, we can say that aggregate value is likely to be substantial. An extrapolation of other studies suggests that the annual flow of value to people of the northeast Florida region from the natural ecosystems could be on the order of \$1.5 billion.
- Outdoor recreation is an important part of the northeast Florida economy. Many studies of recreationists' willingness-to-pay for the continuing potential for recreation have been undertaken, and these studies give insight into the considerable economic value of recreation. Computations based on only hunting, fishing and wildlife viewing put the economic value at \$700 million for the four

county area. This number includes almost \$400 million in direct expenditures, which generates an total economic impact of \$530 million in output and 10,000 jobs as it moves through the local economy.

- Much of the present agricultural and forest land usage in the region is compatible with habitat conservation goals. Although the study did not delve deeply into agricultural and forestry practices, it is possible to say that present practices can be compatible with the maintenance of natural habitats. Much of the lands in the western parts of the region consist of pastures, forests and wetlands, and acts as a contiguous corridor between public lands. The agricultural and forest lands generate approximately \$450 million in value added each year. Based on willingness-to-pay estimates, these same lands plus wetlands and other natural lands generate \$1.5 billion of value annually. Considering both the market and non-market values, these rural lands generate a total of \$1.95 billion in economic value to the region.
- Well planned development can maintain the value flow from natural lands while allowing population and economic growth. As the population of the region grows, the economic value of natural lands will also grow. But, the growth in value of natural lands will only occur if their viability as ecologic and hydrologic systems is maintained. If they deteriorate severely, their economic value will also deteriorate. As mor people seek to live in the area because of the high quality of life, the rural lands will require protection. Development must occur in areas in proximity to existing development to reduce cumulative environmental impacts.
- Florida's economy is an amenity-lead economy. It is likely that the economy of northeast Florida will increasingly become amenity-lead. When one investigates Florida's economy, it is clear that it has a different basis than many other states. Seventy million visitors come each year for Florida's amenities, both human-created and natural. Additionally, many people with non-employment income, who can live anywhere, choose to live in Florida. They too come for the amenities. Increasingly, the four county region of northeast Florida has the same economic structure as the rest of Florida. To maintain the momentum of both Florida's economy and the economy of the northeast region, it is essential tohat both public and private actions be taken to maintain the amenity base.

## Literature Cited

- Apogee Research, Inc. and Resource Economic Consultants, Inc. Economic Assessment of the Indian River Lagoon. Submitted to the Finance and Implementation Task Force of the Indian River Lagoon National Estuary Program, Melbourne, FL, Jan. 1996.
- Arguea, N.M. and C. Hsiao. Market value of environmental amenities: a latent variable approach. *Journal of Housing Economics* 9:1004-126, 2000.
- Arndorfer, D.J. and N. Bockstael. Estimating the effects of King Mackerel bag limits on charter boat captains and anglers. Environmental Resources Management North Central, Inc., Palatine IL, 1986.
- Bastian, C.T. D.M. McLeod, M.J. Germino, W.A. Reiners and B.J. Blasko. Environmental amenities and agricultural land values: a hedonic model using geographic information systems data. *Ecological Economics* 40: 337-349, 2002.
- Beall, C.L. and K.M. Johnson. The identification of recreational counties in nonmetropolitan areas of the USA. *Population Research and Policy Review* 17(1): 37-53, 1998.
- Beasley, Steven D., William G. Workman, and Nancy A. Williams. "Estimating Amenity Values of Urban Fringe Farmland: A Contingent Valuation Approach: Note." *Growth and Change* 17(4):70-78, 1986.
- Bell, F.W. and V.R. Leesworthy. Recreational demand by tourists for saltwater beach days. *Journal of Environmental Economics and Management* 18: 189-205, 1990.
- Bengston, D.N., D.P. Fan and D.N. Celarier. A new approach to monitoring the social environment for natural resource management and policy: the case of U.S. national forest benefits and values. *Journal of Environmental Management* 56: 181-193.
- Bergstrom, John C., B.L. Dillman, and John R. Stoll. "Public Environmental Amenity Benefits of Private Land: The Case of Prime Agricultural Land." *Southern Journal of Agricultural Economics* July, 1985: 139-149.
- Bergstrom, J.C., H.K. Cordell, G.A. Ashley and A.E. Watson. Economic impacts of recreational spending on rural areas: a case study. *Economic Development Quarterly* 4(1): 29-39, 1990.
- Bergstrom, J.C. Postproductivism and rural land values. Paper presented at *Conference on Land Use Conflicts and Problems*, sponsored by the Northeast Regional Center for Rural Development, Orlando, FL, Feb. 2002.
- Bishop, R.C. and T.A. Heberlein. Measuring values of extra-market goods: are indirect measures biased? *American Journal of Agricultural Economics* 61(5): 926-930, 1979.
- Blomquist, G.C. M.C. Berger and J.P. Hoehn. New estimates of quality of life in urban areas. *American Economic Review* 78(1)L 89-107, 1988.
- Bowker, J.M. and D.D. Didychuk. "Estimation of Nonmarket Benefits of Agricultural Land Retention in Eastern Canada." *Agricultural and Resource Economics Review* 23(2):218-225, 1994.
- Bromley, Daniel W. and Ian Hodge. "Private Property Rights and Presumptive Policy Entitlements: Reconsidering the Premises of Rural Policy." *European Review of Agricultural Economics*. 17(1990):197-214.
- Brookshire, D.S, L.S. Eubanks and A. Randall. Estimating option prices and existence value for wildlife recreation. *Land Economics* 59(1)L 1-15, 1983.
- Bunnell, G. Fiscal impact studies as advocacy and story telling. *Journal of Planning Literature* 12(2): 136-151, 1997.
- Bureau of Economic and Business Research. *Florida Statistical Abstract*, 1974, 1985 and 1997. University Press of Florida, Gainesville, FL.
- Bureau of Economic and Business Research. *Long-Term Economic Forecast for Florida, Volume 2, State & Counties*. C. West and D. Lenze, editors. University of Florida, Gainesville, FL, 2001.
- Carson, R.T., N.E. Flores, K.M. Martin, and J.L. Wright. Contingent valuation and revealed preference methodologies: comparing the estimates for quasi-public goods. *Land Economics* 72(1): 80-99, 1996.
- Cocheba, D.J. and W.A. Langford. Wildlife valuation: the collective good aspect of hunting. *Land Economics* 54(4): 490-504, 1978.
- Correll, Mark R., Jane H. Lillydahl and Larry D. Singell. "The Effects of Greenbelts on Residential Property

- Values: Some Findings on the Political Economy of Open Space.” *Land Economics* 54(2):207-217, 1978.
- Cox, J., Kautz, R., Maclaughlin, M., and T. Gilbert. *Closing the Gaps in Florida's Wildlife Habitat Conservation System*. Office of Environmental Services, Florida Game and Freshwater Fish Commission, 1994.
- Crosson, Pierre. “Agricultural Land: A Question of Values.” in *Agriculture and Human Values*, Fall, 1985.
- Daily, G.C., S. Alexander, P.R. Ehrlich, L. Goulder, J. Lubchenco, P.A. Matson, H.A. Mooney, S. Postel, S.H. Schneider, D. Tilman and G.M. Woodwell. Ecosystem services: benefits supplies to human societies by natural ecosystems. *Issues in Ecology*, No. 2, Ecological Society of America, 1997.
- Deller, S.C., T.H. Tsai, D.W. Marcouiller and D.B.K. English. The role of amenities and quality of life in rural economic growth. *American Journal of Agricultural Economics* 83(2): 352-365, 2001.
- Deller, S.C. Urban growth, rural land conversion and the fiscal well-being of local municipalities. Paper presented at *Conference on Land Use Conflicts and Problems*, sponsored by the Northeast Regional Center for Rural Development, Orlando, FL, Feb. 2002.
- Des Rosiers, F. Power lines, visual encumbrance and house values: a microspatial approach to impact measurement. *Journal of Real Estate Research* 23(2): 275-301, 2002.
- Des Rosiers, F., M. Theriault, Y. Kestens and P. Villeneuve. Landscape and house values: an empirical investigation. *Journal of Real Estate Research* 23: 139-161.
- Dissart, J.C. and S.C. Deller. Quality of life in the planning literature. CPL Bibliography 360. *Journal of Planning Literature* 15(1): 135-161, 2000.
- Duffy-Deno, Kevin T. “The Effect of State Parks on the County Economies of the West.” *Journal of Leisure Research* 29(2):201-224, 1997.
- Ferre, Frederick. “Ethics, Assessment, and Technology.” in *Philosophy of Technology*, Englewood Cliffs, NJ: Prentice-Hall, 1988.
- Fields, S.F. “Where Have the Farmlands Gone?” National Agricultural Lands Study, Washington, D.C., 1979.
- Fix, P. and J. Loomis. Comparing the value of mountain biking estimated using revealed and stated preferences. *Journal of Environmental Planning and Management* 41(2): 227-236.
- Florida Department of Community Affairs. 1987. Mapping and Monitoring of Agricultural Lands Project, Summary Data. Unpublished Report. Florida Department of Community Affairs, Tallahassee, FL.
- Freeman, A.M. The economics of valuing marine recreation: a review of empirical evidence. Report submitted to the U.S. E.P.A., Office of Planning and Evaluation, Washington, D.C., 1993a.
- Freeman, A.M. *The Measurement of Environmental and Resource Values*. Resources for the Future, Washington, D.C., 1993b.
- Gardner, B. Delworth. The Economics of Agricultural Land Preservation. *American Journal of Agricultural Economics* December (1997):1030-1036.
- Gibbs, K.C. and J.F. McGuire, II. Estimation of outdoor recreation values. Economics Report 53, Univ. Florida, Food & Resource Economics Dept., Gainesville, FL, 1973.
- Gum, R.L. and W.E. Martin. Problems and solutions in estimating the demand for and value of rural outdoor recreation. *American Journal of Agricultural Economics* 57(4): 559-566, 1975.
- Haigood, T.L. and J.L. Compton. The role of recreation amenities in retiree relocation decisions. *Journal of Park and Recreation Administration* 16(1): 25-45, 1998.
- Halstead, John M. Measuring the Nonmarket Value of Massachusetts Agricultural Land: A Case Study. *JNAEC* April, 1984:12-19.
- Heimlich, R. E. and W. D. Anderson. 1987. Dynamics of Land Use Change in Urbanizing Areas: Experience in the Economic Research Service. In *Sustaining Agriculture Near Cities*. Soil and Water Conservation Society, Ankeny, IA.
- Hellerstein, D., C. Nickerson, J. Cooper, P. Feather, D. Gadsby, D. Mullarkey, A Tegene, and C. Barnard. Farmland protection: the role of public preferences for rural amenities. *Agricultural Economic Report* 815, USDA/Economic Research Service, Washington, D.C., 2002.
- Hite, J.C. and B.L. Dillman. Protection of Agricultural Land: An Institutional Perspective. *Southern Journal of Agricultural Economics*. July (1981):43-53.

- Hodges, A. and D. Mulkey. Economic impact of decreased tourism in Florida. University of Florida, Food & Resource Economics Department, Gainesville, FL, September, 2001.
- Howe, J., E. McMahon and L. Propst. *Balancing Nature and Commerce in Gateway Communities*. Island Press, Washington, D.C., 1997.
- Johnston, R.J. J.P. Opaluch, T.A. Grigalunas and M.J. Mazzotta. Estimating amenity benefits of coastal farmland. *Growth and Change* 32: 305-325, 2001.
- Kline, Jeffrey and Dennis Wichelns. Public Preferences Regarding the Goals of Farmland Preservation Programs. *Land Economics* 72(4):538-549, 1996.
- Lee, Chang-Moo and Peter Linneman. Dynamics of the Greenbelt Amenity Effect on the Land Market – The Case of Seoul’s Greenbelt. *Real Estate Economics* 26(1):107-129, 1998.
- Lee, C-M and M. Fujita. “Efficient Configuration of a Greenbelt: Theoretical Modelling of Greenbelt Amenity.” *Environment and Planning* 29(1997):1999-2017.
- Leggett, C.G. and N.E. Bockstael. Evidence of the effects of water quality on residential land prices. *Journal of Environmental Economics and Management* 39: 121-144, 2000.
- Livengood, K.R. Value of big game from markets for hunting leases: the hedonic approach. *Land Economics* 59(3): 287-291, 1983.
- McGranahan, D.A. Natural amenities drive rural population change. *Agricultural Economic Report* 781, USDA/Economic Research Service, Washington, D.C., 1999.
- Milon, J.W., A.W. Hodges, A. Rimal, C.F. Kiker and F. Casey. Public preferences and economic values for restoration of the Everglades/South Florida ecosystem. Economic Report 99-1, University of Florida, Food & Resource Economics Department, Gainesville, FL, 1999.
- Milon, J.W. and R. Welsh. An economic analysis of sport fishing and the effects of hydrilla management in Lake County, Florida. Economic Report 118, University of Florida, Food & Resource Economics Department, Gainesville, FL, 1989.
- Milon, J.W., J. Yingling and J.E. Reynolds. An economic analysis of the benefits of aquatic weed control in North-Central Florida. Economic Report 113, University of Florida, Food & Resource Economics Department, Gainesville, FL, 1986.
- Mueser, P.R. and P.E. Graves. Examining the role of economic opportunity and amenities in explaining population redistribution. *Journal of Urban Economics* 37: 176-200, 1995.
- National Resources Conservation Service. 1999. Summary Report: 1997 National Resources Inventory. National Resources Conservation Service, U.S. Department of Agriculture, Washington, DC.
- National Agricultural Statistics Service. 1999. 1997 Census of Agriculture, Volume 1, Part 9, Chapter 1, Florida State-Level Data. National Agricultural Statistics Service, U.S. Department of Agriculture, Washington, DC.
- Nord, M. and J.B. Cromartie. Migration: the increasing importance of rural natural amenities. *Choices* 12(3): 22-23, 1997.
- North Florida Regional Planning Council. *Natural resources of regional significance*. Element 4 of the comprehensive regional plan. 1997.
- Oelschlaeger, Max. “Contemporary Wilderness Philosophy: From Resourcism to Deep Ecology.” (Chapter 9), *The Idea of Wilderness*, New Haven: Yale University Press, 1991.
- Polzen, P.E. Why some states grow faster than others: new growth models for state economic policy. *Growth and Change* 32: 413-425, 2001.
- Power, T.M. *Lost Landscapes and Failed Economies*. Island Press, Washington, D.C., 1996.
- Randall, A. and D.S. Brookshire. Public policy, public goods and contingent valuation mechanisms. *Staff Paper* 68, Department of Agricultural Economics, University of Kentucky, Lexington, KY, 1978.
- Ready, R.C. M.C. Berger, and G.C. Blomquist. Measuring amenity benefits from farmland. *Growth and Change* 28(fall)L 438-458, 1997.
- Reed, M.G. and A.M. Gill. Tourism, Recreational, and Amenity Values in Land Allocation: An Analysis of Institutional Arrangements in the Post Productivist Era. *Environment and Planning* 29(1997):2019-2040.
- Reynolds, J.E. and B.L. Dillman. Urban Land Use Change in Florida's Urbanizing Areas. In, *Rural Planning*



- and Development: Visions of the 21st Century*, Volume 2, pp. 529-540. Department of Urban and Regional Planning, University of Florida, Gainesville, Florida., 1981.
- Reynolds, J. E. 1 Urban Land Conversion in Florida: Will Agriculture Survive? *Soil Crop Sci. Soc. Florida Proc.* 52: 6-9.1993.
- Reynolds, J. E. Urbanization and Land Use Change in Florida and the South. Paper presented at *Conference on Land Use Conflicts and Problems*, sponsored by the Northeast Regional Center for Rural Development, Orlando, FL, Feb. 2002.
- Rolston, Holmes III. Valuing Wildlands. *Environmental Ethics* 7(1):23-48, 1985.
- Rosenberger, Randall S. and Richard G. Walsh. Nonmarket Value of Western Valley Ranchland Using Contingent Valuation. *Journal of Agricultural and Resource Economics* 22(2):296-309, 1997.
- Shrestha, R.K. and J.R. Alavalapati. Valuing environmental benefits of silvopasture using choice-based stated preference method. Book of Abstracts, Second World Congress of Environmental and Resource Economists, Monterrey, CA, June 2002.
- Smith, V.K. Can we measure the economic value of environmental amenities? *Southern Economic Journal* 56(4): 856-78, 1990.
- Stevens, T., A. Hodges, and D. Mulkey. Economic impact of heritage tourism in St. Johns County, Florida, 2001-02. University of Florida, Food & Resource Economics Department, Gainesville, FL, October 2002.
- Stevens, T.H., J. Echeverria, R.J. Glass, T. Hager and T.A. More. Measuring the existence value of wildlife: what do CVM estimates really show? *Land Economics* 67 (4): 390-400, 1991.
- Stratis, N. and B. Bendle. A socio-economic study of the Rodman Reservoir. Florida Department of Environmental Protection, Economic Analysis Section, Office of General Counsel, Tallahassee, FL, 1995.
- Strong, E.. A note on the functional form of travel cost models and zones of unequal populations. *Land Economics* 59(3): 342-349, 1983.
- U. S. Department of Agriculture. Major Land Uses (1945-1992). Economic Research Service Data Products Stock # ERS-89003, U. S. Department of Agriculture, Washington, DC, 1996.
- U.S. Department of Labor. *Consumer price indices, sixteen countries, 1950-2000*. Office of Productivity and Technology, Bureau of Labor Statistics, Washington, D.C., June 25, 2001.
- U.S. Fish and Wildlife Service. 2001 *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: State Overview, Preliminary Findings*. Washington, D.C. June 2002.
- U.S. Bureau of Census. Statistical Abstract of the United States: 1999 (119th Edition). U.S. Department of Commerce. Washington, DC, 1999.
- van Kooten, G.C. and E.H. Bulte. *The Economics of Nature: Managing Biological Assets*. Blackwell Publishing, Malden MA, 2000.
- Vaughan, W.J. and C.S. Russell. Valuing a fishing day: an application of a systematic varying parameter model. *Land Economics* 58(4): 450-463, 1982
- Vias, A.C. Jobs follow people in the rural Rocky Mountain West. *Rural Development Perspectives* 14(2): 14-23, 1999.
- Walsh, R.G. D.M. Johnson and J.R. McLean. Benefit transfer of outdoor recreation demand studies, 1968-1988. *Water Resources Research* 28(3): 707-713, 1992.
- Wilhelmsson, M. The impact of traffic noise on the values of single-family homes. *Journal of Environmental Planning and Management* 32: 43-68, 2000.
- Young, Trevor and P. Geoffrey Allen. Methods for Valuing Countryside Amenity: An Overview. *Journal of Agricultural Economics* 37(3):349-364, 1986.
- Zeimer, R.F. and W.N. Musser. The demand for and value of wildlife recreation in Georgia. *Research Bulletin* 221, Georgia Agricultural Experiment Station, Athens, 1978.
- Ziemer, R.F. W.N. Musser and R.C. Hill. Recreation demand equations: functional form and consumer surplus. *American Journal of Agricultural Economics* 62(1): 136-141, 1980.
- Zeimetz, K. A., E. Dillion, E. E. Hardy and R. C. Otte. Dynamics of Land Use in Fast Growth Areas. Agricultural Economic Report No. 325. Economic Research Service, USDA, Washington, DC., 1976.

## Appendices: Data Tables

**Table A1.** Historic and Projected Population in Northeast Florida Counties, 1970-2015.

County	1970	1980	1990	2000	2005	2010	2015
Clay	32,565	67,815	106,507	142,239	163,246	186,743	201,142
Duval	530,297	573,170	675,205	781,696	824,300	865,344	900,643
Putnam	36,854	50,795	65,230	70,439	73,602	76,088	78,343
St. Johns	31,360	51,950	84,491	124,525	150,311	175,486	197,224
Region	631,076	743,730	931,433	1,118,899	1,211,459	1,303,661	1,377,352
	6,865,91	9,839,89	13,009,70	16,087,36	17,546,56	18,966,89	20,216,66
Florida	5	5	6	6	2	3	8

Source: Bureau of Economic Business Research, University of Florida.

**Table A2.** Population Projections by Age Group in Northeast Florida Counties, 2015.

County	<18	18-64	65+
Clay	47,162	120,396	30,343
Duval	224,322	567,132	117,389
Putnam	18,709	10,053	19,157
St. Johns	28,846	100,640	35,310
Region	319,039	798,221	202,199
Florida	3,914,646	11,403,861	4,044,406

Source: Bureau of the Census, *Florida Statistical Abstract* 2000.

**Table A3.** Historic and Projected Number of Households in Northeast Florida Counties, 1970-2015.

County	1970	1980	1990	2000	2005	2010	2015
Clay	9,545	21,907	36,843	50,752	59,193	69,069	75,885
Duval	162,104	209,089	258,099	304,846	322,792	343,410	363,650
Putnam	11,673	18,486	25,132	27,845	29,398	30,953	32,490
St. Johns	10,215	18,863	33,690	50,175	61,779	73,800	84,907
Region	193,537	268,345	353,764	433,618	473,162	517,232	556,932
	2,311,20	3,768,74	5,162,94	6,379,46	7,023,67	7,746,12	8,454,56
Florida	1	9	8	7	3	7	5

Source: Bureau of Economic Business Research, University of Florida.

**Table A4.** Historic and Projected Net Migration to Northeast Florida Counties, 1970-2015.

County	1970	1980	1990	2000	2005	2010	2015
Clay	2,002	2,957	2,410	4,773	4,216	3,600	1,238
Duval	-5,213	7,339	8,395	5,981	3,418	2,079	612
Putnam	885	1,248	1,003	45	553	389	491
St. Johns	534	3,211	3,677	5,425	5,221	5,052	4,148
Region	-1,792	14,755	15,485	16,224	13,408	11,120	6,489
Florida	173,545	344,593	313,711	387,734	262,301	244,455	209,130

Source: Bureau of Economic Business Research, University of Florida.

**Table A5.** Industry Economic Output and Total Value Added in Northeast Florida Counties, 1995-99 (\$ Millions).

County	1995	1996	1997	1998	1999
Industry Economic Output					
Clay	2,737	2,770	2,941	3,291	3,756
Duval	39,621	42,226	43,915	48,015	38,714
Putnam	2,458	2,212	2,106	2,157	2,237
St. Johns	2,939	3,262	3,732	4,263	4,877
Region	49,749	52,466	54,691	59,723	49,585
Florida	557,946	583,613	611,777	664,048	711,690
Total Value Added					
Clay	1,582	1,641	1,759	1,968	2,241
Duval	24,156	26,260	27,399	30,319	21,808
Putnam	1,236	1,128	1,035	1,090	1,170
St. Johns	1,644	1,860	2,041	2,368	2,686
Region	28,618	30,889	32,235	35,745	27,904
Florida	346,103	363,040	383,005	423,581	436,359

Source: Minnesota Implan Group.

**Table A6.** Output, Employment and Value Added in the Jacksonville BEA Region of Northeast Florida (16 counties), by Industry Sector, Rank-Ordered, 1999

Industry	Industry Output (\$million)	Employment (jobs)	Total Value Added (\$million)
Construction	6,782	63,202	1,971
Real estate	5,985	20,218	4,434
Retail Trade	5,390	162,385	4,021
Health services	4,780	75,312	3,041
Business services	3,108	83,353	1,881
State & local non-ed government	3,089	35,522	2,194
Banking	2,703	15,440	1,697
Wholesale Trade	2,571	38,457	1,825
Federal Government - Military	2,524	26,396	2,524
Insurance Carriers	2,443	20,064	1,550
Professional services	2,329	28,213	1,354
State & Local Government - Education	2,167	62,405	2,167
Motor Freight Transport and Warehousing	2,117	21,312	841
Federal non-military	1,922	29,963	1,746
Pulp and paper	1,584	5,419	492
Communications	1,390	7,819	713
Transportation equipment	1,335	7,739	277
Food processing	1,308	7,331	115
Credit Agencies	907	25,224	388
Non-profit organizations	874	13,824	482
Farms	771	10,205	432
Wood products	734	4,782	251
Social services	650	15,416	316
Water Transportation	647	4,005	111
Stone, glass and clay	627	3,667	167
Chemicals and allied	605	2,451	103
Fabricated metal	600	5,235	128
Recreation services	560	15,061	349
Automotive services	552	9,941	292
Utilities	524	1,879	362
Printing and publishing	497	5,368	182
Hotels and Lodging Places	495	11,174	325
Primary metals	475	1,803	122
Personal services	457	17,855	253
Railroads and Related Services	441	2,366	247
Legal Services	420	7,012	310
Scientific instruments	383	3,863	43
Insurance Agents and Brokers	322	8,268	214
Repair services	301	5,123	134
Industrial machinery	300	2,610	41
Electrical equipment	280	1,861	91

**Table A6.** Output, Employment and Value Added in the Jacksonville BEA Region of Northeast Florida (16 counties), by Industry Sector, Rank-Ordered, 1999

Industry	Industry Output (\$million)	Employment (jobs)	Total Value Added (\$million)
Ag Services	236	8,741	148
Education services	220	8,544	80
Rubber products	215	1,638	27
Air Transportation	188	4,186	120
Motion Pictures	175	2,678	32
Petroleum products	126	233	33
Local- Interurban Passenger Transit	122	3,443	68
Furniture	122	1,342	33
Forestry Products	114	564	69
Security and Commodity Brokers	113	2,723	84
Coal Mining	84	54	59
Miscellaneous mfg	81	1,343	24
Transportation Services	61	3,566	31
Apparel	61	731	11
Domestic Services	56	5,058	56
Non-metal mining	52	407	34
Textiles	16	143	4
Commercial Fishing	11	502	10
Metal mining	9	46	3
Tobacco mfg	4	7	1
Leather products	4	23	2
Oil mining	4	89	1
Pipe Lines- Except Natural Gas	1	2	1
Special sectors	(8)	0	(8)
All	68,020	935,605	39,106

Source: Implan data for Florida, Minnesota Implan Group, Inc.

**Table A7.** Detailed Land Use Categories in Northeast Florida Counties, 1995

Land Use Description	Area (hectares)				All	Percent Area
	Duval	Clay	St. Johns	Putnam		
<b>Agricultural</b>						
Abandoned Tree Crops	2	10	3	316	330	0.04%
Aquaculture	10	0	17	127	154	0.02%
Cattle Feeding Operations	126	48	2	5	181	0.02%
Citrus Groves	0	0	0	317	317	0.04%
Corn	0	0	9,789	3,265	13,054	1.62%
Dairies	13	95	0	0	109	0.01%
Fallow Cropland	2	21	96	168	288	0.04%
Feeding Operations	0	0	4	0	4	0.00%
Field Crops	5,219	3,350	3,731	4,793	17,092	2.12%
Hammock Ferns	0	0	0	395	395	0.05%
Horse Farms	131	17	14	129	292	0.04%
Improved Pastures	1,366	1,726	544	5,033	8,669	1.07%
Mixed Crops	5	0	5	7	17	0.00%
Nurseries and Vineyards	432	0	3	0	435	0.05%
Ornamentals	146	35	44	33	257	0.03%
Pine Plantations	23,034	30,721	27,798	28,779	110,332	13.68%
Poultry Feeding Operations	42	63	9	15	129	0.02%
Row Crops	93	78	1,538	208	1,916	0.24%
Shade Ferns	0	0	0	325	325	0.04%
Specialty Farms	11	7	0	6	24	0.00%
Tree Crops	15	23	51	134	223	0.03%
Tree Nurseries	43	69	35	174	321	0.04%
Tree Plantations	47	0	0	3	51	0.01%
Unimproved Pastures	361	190	29	793	1,374	0.17%
Woodland Pastures	883	543	449	607	2,481	0.31%
<b>Commercial</b>						
Commercial and Services	77	29	7	0	113	0.01%
Commercial and Services under Construction	186	18	4	0	208	0.03%
Commercial, Retail Sales and Services	4,864	524	642	574	6,603	0.82%
Marinas and Fish Camps	71	6	43	24	144	0.02%
Mixed Commercial and Services	516	128	320	42	1,005	0.12%
Port Facilities	650	70	0	9	730	0.09%
Professional Services	254	22	10	8	294	0.04%
<b>Developing</b>						
Disturbed Land	246	64	187	25	522	0.06%
Inactive Development Land	874	1,307	3,422	4,426	10,029	1.24%
Non-vegetated	79	23	95	43	240	0.03%
Open Land	645	79	40	256	1,020	0.13%
Other Open Lands	0	3	0	0	3	0.00%
Rural Land in Transition	217	89	107	86	498	0.06%
<b>Industrial</b>						
Borrow Areas	10	30	2	4	47	0.01%
Clays	5	0	0	0	5	0.00%
Extractive	82	495	21	41	639	0.08%
Food Processing	56	3	5	3	68	0.01%

**Table A7.** Detailed Land Use Categories in Northeast Florida Counties, 1995

Land Use Description	Area (hectares)				All	Percent Area
	Duval	Clay	St. Johns	Putnam		
Holding Ponds	30	602	0	6	637	0.08%
Inactive Strip Mines/rock Quarries	0	368	1	460	830	0.10%
Industrial	108	1	0	0	109	0.01%
Junk Yards	438	48	4	6	495	0.06%
Oil and Gas Processing	186	0	0	0	186	0.02%
Oil and Gas Storage	135	0	0	0	136	0.02%
Other Heavy Industrial	264	110	1	0	375	0.05%
Other Light Industrial	2,095	136	194	90	2,515	0.31%
Phosphates	0	645	0	0	645	0.08%
Pre-stressed Concrete Plants	69	8	4	0	81	0.01%
Rock Quarries	0	20	0	0	20	0.00%
Sand and Gravel Pits	273	208	21	434	936	0.12%
Sand Other than Beaches	329	25	169	6	529	0.07%
Ship Building and Repair	39	12	0	0	51	0.01%
Spoil Areas	237	196	35	185	653	0.08%
Strip Mines	340	318	23	0	681	0.08%
Timber Processing	50	20	0	222	292	0.04%
<b>Institutional</b>						
Cemeteries	234	34	15	47	330	0.04%
Governmental	15	2	29	16	62	0.01%
Institutional	1,887	406	281	285	2,860	0.35%
Military	614	870	5	5	1,494	0.19%
<b>Natural-aquatic</b>						
Bay Swamps	516	626	634	1,530	3,306	0.41%
Bays and Estuaries	16	0	11	0	27	0.00%
Beaches	176	15	11	0	202	0.03%
Emergent Aquatic Vegetation	132	42	41	182	396	0.05%
Freshwater Marshes	1,028	1,174	1,312	4,745	8,258	1.02%
Lakes	124	2,925	131	13,267	16,447	2.04%
Major Springs	0	0	0	1	1	0.00%
Mangrove Swamps	0	0	8	0	8	0.00%
Mixed Scrub-shrub Wetland	4,417	1,897	2,803	3,450	12,566	1.56%
River/lake Swamp (Bottomland)	4,509	3,918	4,768	9,716	22,911	2.84%
Saltwater Marshes	13,203	0	7,010	0	20,213	2.51%
Streams and Waterways	20,286	6,627	15,680	9,144	51,736	6.41%
Submergent Aquatic Vegetation	3	27	74	47	151	0.02%
Wet Prairies	656	899	385	982	2,922	0.36%
Wetland Coniferous Forests	4,248	2,317	2,882	2,123	11,569	1.43%
Wetland Forested Mixed	20,110	17,816	25,885	24,365	88,175	10.93%
Wetland Hardwood Forests	5	0	0	0	5	0.00%
<b>Natural-terrestrial</b>						
Cypress	1,367	926	1,650	662	4,605	0.57%
Forest Regeneration	9,347	15,533	15,523	17,246	57,650	7.15%
Hardwood - Conifer Mixed	8,523	9,584	6,358	15,153	39,618	4.91%
Herbaceous	1,205	1,241	737	1,709	4,892	0.61%
Longleaf Sandhill	1,209	8,996	287	8,477	18,969	2.35%
Mesic Flatwoods	17,219	14,607	13,550	13,340	58,716	7.28%

**Table A7.** Detailed Land Use Categories in Northeast Florida Counties, 1995

Land Use Description	Area (hectares)				All	Percent Area
	Duval	Clay	St. Johns	Putnam		
Mixed Rangeland	3,723	1,782	2,718	1,882	10,105	1.25%
Mixed Wetland Hardwoods	1,096	1,234	2,497	1,826	6,653	0.82%
Oak Sandhill	22	5,241	27	3,541	8,832	1.09%
Pond Pine	32	23	25	20	101	0.01%
Reclaimed Land	0	0	0	58	58	0.01%
Sand Pine Scrub	0	233	0	606	839	0.10%
Shrub and Brushland	3,764	2,272	2,565	3,176	11,777	1.46%
Upland Coniferous Forests	8	4	0	0	12	0.00%
Upland Hardwood Forests	11	106	452	194	762	0.09%
<b>Recreational</b>						
Golf Courses	1,253	278	957	55	2,542	0.32%
Parks and Zoos	367	22	163	21	573	0.07%
Race Tracks	40	9	58	8	115	0.01%
Recreational	282	52	144	80	557	0.07%
Stadiums	6	0	0	0	6	0.00%
Swimming Beach	139	1	287	0	427	0.05%
<b>Residential</b>						
Residential, High Density	14,086	1,096	1,015	137	16,334	2.02%
Residential, Low Density	7,086	10,810	4,897	17,423	40,217	4.99%
Residential, Medium Density	21,561	7,938	6,539	3,923	39,961	4.95%
<b>Transportation/utilities</b>						
Airports	2,460	349	216	256	3,282	0.41%
Auto Parking Facilities	52	6	2	0	59	0.01%
Bus and Truck Terminals	92	0	3	0	95	0.01%
Canals and Docks	0	0	0	102	102	0.01%
Communications	55	11	0	12	79	0.01%
Electrical Power Facilities	425	19	16	258	717	0.09%
Electrical Power Transmission Lines	1,058	784	177	899	2,918	0.36%
Highways	0	0	24	0	24	0.00%
Railroads	478	44	0	17	540	0.07%
Reservoirs	734	278	206	72	1,290	0.16%
Reservoirs less than 10 Acres	1,534	559	814	280	3,186	0.39%
Roads and Highways	3,191	432	791	219	4,632	0.57%
Sewage Treatment	102	35	41	13	192	0.02%
Solid Waste Disposal	158	47	55	92	352	0.04%
Transportation	5	0	0	0	5	0.00%
Transportation Facilities under Construction	56	0	0	0	56	0.01%
Utilities	0	0	2	0	2	0.00%
Water Supply Plants	39	17	6	0	62	0.01%
<b>Unknown</b>	6,687	0	24,317	0	31,004	3.84%
<b>Total</b>	<b>227,054</b>	<b>166,766</b>	<b>198,600</b>	<b>214,244</b>	<b>806,664</b>	

Source: St. Johns River Water Management District



**Table A8.** Historic and Projected Employment in Northeast Florida Counties, 1970-2015 (Jobs).

County	1970	1980	1990	2000	2005	2010	2015
Clay	4,553	13,014	26,792	42,670	48,937	55,813	59,858
Duval	194,393	255,082	357,554	460,335	500,633	543,976	577,199
Putnam	8,357	11,582	15,915	19,375	20,902	22,076	23,177
St. Johns	7,868	14,354	27,168	41,879	47,721	54,065	59,365
Region	215,171	294,032	427,429	564,259	618,193	675,930	719,599
	2,152,10	3,576,20	5,387,33	7,075,98	7,833,60	8,586,62	9,084,33
Florida	0	0	8	4	5	3	7

Source: Bureau of Economic Business Research, University of Florida.

**Table A9.** Unemployment and Unemployment Rate in Northeast Florida Counties, 2000.

County	Unemployment	Unemployment Rate (%)
Clay	2,019	2.8
Duval	13,620	3.5
Putnam	1,271	4.6
St. Johns	1,624	2.6
Region	18,534	3.3
Florida	283,465	3.8

Source: Florida Department of Labor and Employment Security.

**Table A10.** Real Taxable Sales in Northeast Florida Counties, 1970-2015 (millions of 1997 dollars).

County	1970	1980	1990	2000	2005	2010	2015
Clay	90	398	832	1,299	1,715	2,158	2,624
Duval	4,954	5,134	7,550	11,842	13,393	16,158	19,375
Putnam	147	231	346	444	547	635	746
St. Johns	179	343	768	1,498	1,953	2,470	3,251
Region	5,371	6,106	9,495	15,083	17,609	21,420	25,997
Florida	56,290	90,749	150,283	236,514	286,569	350,145	426,439

Source: Bureau of Economic Business Research, University of Florida.

**Table A11.** Real Total Personal Income and Per Capita Personal Income in Northeast Florida Counties, Historic and Projected, 1970-2015.

County	1970	1980	1990	2000	2005	2010	2015
Real Personal Income (millions of 1997 dollars)							
Clay	391	1,084	2,268	3,403	4,455	5,678	6,860
Duval	7,045	9,512	15,009	19,958	24,110	28,765	34,105
Putnam	357	589	919	1,244	1,509	1,751	2,056
St. Johns	401	884	2,253	4,604	6,195	8,133	10,509
Region	8,194	12,068	20,449	29,208	36,268	44,328	53,530
Florida	94,363	173,351	298,773	420,619	520,045	632,710	757,626
Real Per-capita Income (1997 dollars)							
Clay	12,011	15,982	21,290	23,921	27,290	30,405	34,105
Duval	13,286	16,595	22,229	25,532	29,249	33,241	37,867
Putnam	9,687	11,592	14,091	17,655	20,502	23,017	26,242
St. Johns	12,785	17,008	26,669	36,970	41,211	46,347	53,284
Region	12,985	16,226	21,954	26,104	29,938	34,002	38,864
Florida	13,744	17,617	22,965	26,146	29,638	33,359	37,475

Source: Bureau of Economic Business Research, University of Florida.

**Table A12.** Transfer Payments in Northeast Florida Counties, Historic and Projected, 1970-2015 (\$ Millions).

County	1970	1980	1990	2000	2005	2010	2015
Clay	9	54	167	392	596	958	1,562
Duval	148	619	1,413	2,607	3,453	4,801	7,157
Putnam	13	68	181	341	446	605	872
St. Johns	12	64	210	473	726	1,156	1,903
Region	182	805	1,971	3,812	5,222	7,519	11,493
Florida	2,631	13,308	34,679	67,014	92,009	131,497	198,099

Source: Bureau of Economic Business Research, University of Florida.

**Table A13.** Persons in Poverty in Northeast Florida Counties , 1997.

County	Persons in Poverty	Persons under Age 18 in Poverty	Poverty Rate (% of Population)
Clay	10,656	4,499	8.0
Duval	98,139	39,029	13.4
Putnam	15,431	5,925	22.0
St. Johns	10,797	3,860	9.7
Region	135,023	53,313	12.9
Florida	2,129,823	775,812	14.5

Source: Current Population Survey, United States Census Bureau.

**Table A14.** Graduates Receiving Standard Diplomas, by Race and Gender, in Northeast Florida Counties, 1999-00.

County	White			Black			Hispanic			Other Racial Groups			Total
	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	
Clay	630	566	1,196	67	41	108	17	32	49	12	26	38	1,391
Duval	1,297	1,161	2,458	936	681	1,617	90	80	170	135	117	252	4,497
Putnam	150	136	286	81	54	135	12	10	22	5	1	6	449
St. Johns	414	417	831	36	31	67	7	6	13	10	6	16	927
Region	2491	2280	4771	1120	807	1927	126	128	254	162	150	312	7264
				11,77		20,71			15,44				102,17
Florida	32,611	29,751	62,362	8	8,935	3	8,296	7,144	0	1,950	1,712	3,662	7

Source: State of Florida Department of Education, Education Information and Accountability Services.

**Table A15.** Graduates Continuing Education by Type of Post-secondary Institution Entered in Northeast Florida Counties, 1999-00.

County	Total Diploma Graduates	Florida Junior College			Florida University			Non-Fla College or University	Technical/Trade/Other		
		Public	Private	Total	Public	Private	Total		Florida	Non-FL	Total
Clay	1,437	481	3	484	305	30	335	63	50	4	54
Duval	4,768	873	0	873	1,139	190	1,329	266	45	0	45
Putnam	498	181	0	181	53	4	57	12	25	28	53
St. Johns	945	48	10	58	206	5	211	43	6	0	6
Region	7,648	1,583	13	1,596	1,703	229	1,932	384	126	32	158
Florida	105,791	26,279	391	26,670	22,288	3,900	26,188	5,756	2,931	553	3,484

Source: State of Florida Department of Education.

**Table A16.** Number of health service establishments in the counties of the Northeast Florida region, 2001.

		Clay	Duval	Putnam	St. Johns	Region	Florida
Offices and	Medical Doctors	291	2,221	130	288	2,930	44,480
Clinics of	Dentists	84	537	28	80	729	10,998
Doctors of	Doctors of Osteopathy	0	1	0	0	1	1
Medicine	Chiropractors	16	80	7	19	122	2,930
	Optometrists	17	82	11	16	126	1,654
	Podiatrists	9	60	7	14	90	1,467
	Other Health Practitioners	30	194	12	50	286	5,070
Nursing Care	Skilled Nursing Care	8	32	3	8	51	708
Facilities	Intermediate Care	0	1	0	0	1	1
	Other	9	43	4	9	65	1,243
Hospitals	General Medical and Surgical	3	26	2	4	35	623
	Psychiatric	1	15	1	4	21	476
	Specialty Except Psychiatric	0	2	0	0	2	35
Laboratories	Medical	8	40	3	6	57	920
	Dental	3	39	0	7	49	896
Miscellaneous	Home Health Care Services	7	41	2	6	56	1,313
Facilities	Kidney Dialysis Centers	1	0	0	0	1	16
	Specialty Outpatient Facilities	0	4	0	0	4	108
	Other	3	51	2	6	62	1,336

Source: Reference USA (database)

**Table A17.** Number of Reported Cases of Communicable Diseases in Northeast Florida Counties, 1999.

County	Enteric Diseases	Sexually Transmitted Diseases <sup>1</sup>	Tuberculosis and Other	Vaccine Preventable	Zoonoses
Clay	102	191	121	4	3
Duval	593	4,763	964	69	4
Putnam	30	197	71	14	3
St. Johns	76	75	100	6	4
Region	801	5,226	1,256	93	14
Florida	8,101	52,083	12,967	628	199

Source: Department of Health, Office of Planning, Evaluation and Data Analysis, 245-4009 SC 205-4009. <sup>1</sup>1998 Data

**Table A18.** Total Years of Potential Life Lost Under Age 75 in Northeast Florida Counties, 1991 and 2000.

County	1991	2000
Clay	7,851	10,337
Duval	68,989	69,441
Putnam	7,615	7,570
St. Johns	7,342	8,024
Region	91,797	95,372
Florida	1,138,929	1,184,903

Source: Florida Department of Health

**Table A19.** Total years of potential life lost under age 75 for selected causes in the counties of northeast Florida, 2000

County	Clay	Duval	Putnam	St. Johns	Region	Florida
Cardio-vascular Disease	1,552	12,850	1,597	1,339	17,338	229,457
Chronic Liver Disease	259	1,594	11	278	2,142	31,167
Cancer	2,450	13,371	1,781	2,030	19,632	265,706
Diabetes	266	2,155	205	81	2,707	27,651
Homicide/ Legal Intervention	189	3,492	264	236	4,181	38,226
Intentional Injury	885	6,644	603	515	8,647	92,884
Motor Vehicle Crashes	971	3,332	824	727	5,854	87,455
Pneumonia/ Influenza	98	811	139	93	1,141	11,803
Stroke	205	1,849	198	169	2,421	32,714
Suicide	696	3,152	339	279	4,466	54,658
Unintentional Injuries	1,815	9,321	1,226	1,268	13,630	177,910

Source: Department of Health, Office of Planning, Evaluation and Data Analysis, 245-4009 SC 205-4009

**Table A20.** Number of Crimes Committed by Type of Offense in the Northeast Florida Counties, 1999.

County	Murder	Forcible Sex Offenses	Robbery	Aggravated Assault	Burglary	Larceny	Motor Vehicle Theft
Clay	2	114	56	287	492	3,559	258
Duval	84	831	1,775	4,870	10,100	30,287	4,372
Putnam	4	61	90	593	1,310	2,126	208
St. Johns	2	52	65	441	856	2,828	232
Region	92	1,058	1,986	6,191	12,758	38,800	5,070
Florida	856	12,583	31,996	83,424	180,785	532,462	92,243

Source: Florida Department of Law Enforcement.

**Table A21.** Historic and Projected Number of Residential Homes and Private Housing Starts in Northeast Florida Counties, 1980-2015.

County	1980	1990	2000	2005	2010	2015
Residential homes (thousands)						
Clay	25	41	54	63	74	81
Duval	227	285	331	351	373	395
Putnam	24	32	34	36	37	39
St. Johns	23	41	59	71	85	98
Region	299	399	478	521	569	613
Florida	4,416	6,134	7,332	8,077	8,885	9,685
Private Housing Starts						
Clay	1,049	1,022	1,546	1,817	1,946	1,349
Duval	3,605	5,562	6,016	4,823	4,574	4,337
Putnam	526	253	190	170	134	189
St. Johns	1,296	1,082	2,524	2,506	2,362	2,185
Region	6,476	7,919	10,276	9,316	9,016	8,060
Florida	162,683	130,140	157,138	143,183	156,298	151,672

Source: Bureau of Economic Business Research, University of Florida.

**Table A22.** Local Government Revenues and Expenditures in Northeast Florida Counties, 2000 and Percent Change Since 1993 (\$1000)

Revenue or Expense Item	Clay		Duval (Jacksonville)		Putnam		St. Johns		Total Four Counties	
<b>Revenues</b>	<b>131,968</b>	<b>67%</b>	<b>2,734,630</b>	<b>43%</b>	<b>71,726</b>	<b>45%</b>	<b>174,283</b>	<b>92%</b>	<b>3,112,607</b>	<b>46%</b>
Ad Valorem Taxes	34,204	66%	282,765	36%	19,090	22%	51,701	103%	387,760	44%
Other taxes, fees, licenses	19,964	115%	262,396	114%	2,471	20%	8,846	25%	293,677	108%
Federal grants	1,372	311%	58,098	-19%	465	2494%	754	274%	60,689	-16%
State & other government sources	15,808	37%	154,183	12%	9,826	73%	17,078	85%	196,894	20%
Charges for services	9,707	-29%	1,239,270	34%	9,466	14%	36,713	95%	1,295,156	34%
Fines & forfeits	1,097	-2%	12,880	31%	613	0%	1,572	106%	16,163	31%
Special assessments and impact fees	3,681	1393%	458	na	4,876	49%	12,454	214%	21,469	187%
Other miscellaneous revenues	4,697	182%	398,637	53%	3,060	94%	7,667	114%	414,061	55%
Other sources & interfund transfers	40,472	96%	324,396	89%	21,071	69%	37,474	72%	423,413	87%
Court related revenues	967		1,546		787		25		3,325	
<b>Expenditures</b>	<b>128,696</b>	<b>69%</b>	<b>2,524,241</b>	<b>39%</b>	<b>74,243</b>	<b>48%</b>	<b>169,381</b>	<b>66%</b>	<b>2,896,560</b>	<b>42%</b>
General government	21,003	78%	321,260	34%	13,495	17%	19,152	-16%	374,910	31%
Public safety	33,979	89%	304,431	44%	16,375	56%	35,766	66%	390,550	49%
Physical environment	7,930	-6%	832,799	29%	5,255	-1%	17,789	72%	863,773	29%
Transportation	10,109	5%	285,843	65%	5,744	18%	16,724	151%	318,421	64%
Economic environment	1,033	44928%	72,654	-10%	3,961	4354%	1,094	692%	78,742	-3%
Human Services	2,776	13%	81,667	54%	2,331	27%	12,743	330%	99,516	65%
Cultural/recreation	3,330	23%	83,424	70%	1,363	38%	7,732	17%	95,848	62%
Debt service	4,900	121%	251,371	117%	2,309	-13%	10,174	5%	268,755	106%
Others Uses & Interfund transfers	40,385	93%	266,801	9%	20,868	68%	43,604	103%	371,659	24%
Court related expenditures	3,251		23,992		2,541		4,603		34,387	
<b>Net Balance</b>	<b>3,273</b>	<b>17%</b>	<b>210,388</b>	<b>121%</b>	<b>-2,517</b>	<b>331%</b>	<b>4,903</b>	<b>-144%</b>	<b>216,047</b>	<b>151%</b>

Source: Florida Department of Revenue

**Table A23.** Federal Government Expenditures in Northeast Florida Counties, 2000 (\$ Millions).

County	Total Expenditures	Retirement and Disability	Other Direct Payments	Grants	Procurement	Salaries and Wages
Clay	522	379	80	28	16	19
Duval	5,150	1,691	928	589	530	1,413
Putnam	376	194	96	76	2	8
St. Johns	569	323	117	79	24	25
Region	6,617	2,587	1,221	771	573	1,465
Florida	89,133	39,648	21,051	11,705	8,594	8,135

Source: US Department of Commerce, Bureau of the Census, *Consolidated Federal Funds Report for Fiscal Year 2000, State and County Areas*, issued April 2001.



**Table A24.** Ratio of costs to benefits for cost of community service studies\*

State - Community	Residential incl. farm home	Commercial and Industrial	Farmland, Forest and Open Land
Connecticut, Bolton	1.05	0.23	0.50
Connecticut, Durham	1.07	0.27	0.23
Connecticut, Farmington	1.33	0.32	0.31
Connecticut, Hebron	1.06	0.47	0.43
Connecticut, Litchfield	1.11	0.34	0.34
Connecticut, Pomfret	1.06	0.27	0.86
Idaho, Canyon County	1.08	0.79	0.54
Idaho, Cassia County	1.19	0.87	0.41
Kentucky, Lexington-Fayette	1.64	0.22	0.93
Maine, Bethel	1.29	0.59	0.06
Maryland, Carroll County	1.15	0.48	0.45
Maryland, Cecil County	1.12	0.28	0.37
Maryland, Frederick County	1.14	0.50	0.53
Massachusetts, Agawam	1.05	0.44	0.31
Massachusetts, Becket	1.02	0.83	0.72
Massachusetts, Deerfield	1.16	0.38	0.29
Massachusetts, Franklin	1.02	0.58	0.40
Massachusetts, Gill	1.15	0.43	0.38
Massachusetts, Leverett	1.15	0.29	0.25
Massachusetts, Middleboro	1.08	0.47	0.70
Massachusetts, Southborough	1.03	0.26	0.45
Massachusetts, Westford	1.15	0.53	0.39
Massachusetts, Williamstown	1.11	0.34	0.40
Michigan, Scio Township	1.40	0.28	0.62
Minnesota, Farmington	1.02	0.79	0.77
Minnesota, Lake Elmo	1.07	0.20	0.27
Minnesota, Independence	1.03	0.19	0.47
Montana, Carbon County	1.60	0.21	0.34
Montana, Gallatin County	1.45	0.16	0.25
Montana, Flathead County	1.23	0.26	0.34
New Hampshire, Deerfield	1.15	0.22	0.35
New Hampshire, Dover	1.15	0.63	0.94
New Hampshire, Exeter	1.07	0.40	0.82
New Hampshire, Fremont	1.04	0.94	0.36
New Hampshire, Groton	1.01	0.12	0.88
New Hampshire, Stratham	1.15	0.19	0.40
New Hampshire, Lyme	1.05	0.28	0.23
New Jersey, Freehold	1.51	0.17	0.33
New Jersey, Holmdel	1.38	0.21	0.66
New Jersey, Middletown	1.14	0.34	0.36
New Jersey, Upper Freehold	1.18	0.20	0.35
New Jersey, Wall	1.28	0.30	0.54

**Table A24.** Ratio of costs to benefits for cost of community service studies\*

State - Community	Residential incl. farm home	Commercial and Industrial	Farmland, Forest and Open Land
New York, Amenia	1.23	0.25	0.17
New York, Beekman	1.12	0.18	0.48
New York, Dix	1.51	0.27	0.31
New York, Farmington	1.22	0.27	0.72
New York, Fishkill	1.23	0.31	0.74
New York, Hector	1.30	0.15	0.28
New York, Kinderhook	1.05	0.21	0.17
New York, Montour	1.50	0.28	0.29
New York, Northeast	1.36	0.29	0.21
New York, Reading	1.88	0.26	0.32
New York, Red Hook	1.11	0.20	0.22
Ohio, Madison (V)	1.67	0.20	0.38
Ohio, Madison (T)	1.40	0.25	0.30
Ohio, Shalersville	1.58	0.17	0.31
Pennsylvania, Allegheny (T)	1.06	0.14	0.13
Pennsylvania, Bedminster (T)	1.12	0.05	0.04
Pennsylvania, Bethel (T)	1.08	0.17	0.06
Pennsylvania, Bingham (T)	1.56	0.16	0.15
Pennsylvania, Buckingham (T)	1.04	0.15	0.08
Pennsylvania, Carroll (T)	1.03	0.06	0.02
Pennsylvania, Maiden Creek (T)	1.28	0.11	0.06
Pennsylvania, Richmond (T)	1.24	0.09	0.04
Pennsylvania, Stewardson (T)	2.11	0.23	0.31
Pennsylvania, Straban (T)	1.10	0.16	0.06
Pennsylvania, Sweden (T)	1.38	0.07	0.08
Rhode Island, Hopkinton	1.08	0.31	0.31
Rhode Island, Little Compton	1.05	0.56	0.37
Rhode Island, Portsmouth	1.16	0.27	0.39
Rhode Island, West Greenwich	1.46	0.40	0.46
Texas, Hays County	1.26	0.30	0.33
Utah, Cache County	1.27	0.25	0.57
Utah, Sevier County	1.11	0.31	0.99
Utah, Utah County	1.23	0.26	0.82
Virginia, Augusta County	1.22	0.20	0.80
Virginia, Clarke County	1.26	0.21	0.15
Virginia, Northampton County	1.13	0.97	0.23
Washington, Skagit County	1.25	0.30	0.51
Wisconsin, Dunn	1.06	0.29	0.18
Wisconsin, Dunn	1.02	0.55	0.15
Wisconsin, Perry	1.20	1.04	0.41
Wisconsin, Westport	1.11	0.31	0.13

\*Source: Deller, 2002

