

RESOLUTION 2008- 196

A RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF NASSAU COUNTY ACCEPTING AND ADOPTING A NON-REGULATORY STUDY BY THE NATURE CONSERVANCY ENTITLED CONSERVING LAND AND WATER IN NASSAU COUNTY; PROVIDING FOR FINDINGS; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, on February 25, 2008 the Board of County Commissioners and The Nature Conservancy (TNC) entered into a contract to have TNC prepare a land acquisition inventory and feasibility study funded through a Rural Technical Assistance Grant from the Florida Department of Community Affairs; and

WHEREAS, TNC completed said study entitled *Conserving Land and Water in Nassau County* (the "Study") on time and within budget; and

WHEREAS, the Study provides an inventory and analysis of existing preservation areas and a factual analysis of the environmental value of various habitats and linkages; and

WHEREAS, the Study will assist Nassau County in its desire to create a Recreation Master Plan as part of its comprehensive planning efforts; and

WHEREAS, the Study can serve to make cost-effective public investments in environmental land acquisitions, improve the ability of Nassau County to secure grants and partner with private and non-profit entities for environmental preservation and, if authorized by the Board of County Commissioners and approved by the electorate, serve to guide a bond issue for an environmental land and water acquisition program.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF NASSAU COUNTY, FLORIDA:

SECTION 1

The Board of County Commissioners does hereby accept, adopt and generally affirm the final report of The Nature Conservancy to Nassau County dated June 30, 2008 and entitled *Conserving Land and Water in Nassau County* appended hereto as Exhibit A.

SECTION 2

The Board of County Commissioners finds that the Study can assist Nassau County in implementing certain recommendations contained in the 2008 Evaluation and Appraisal Report and the 2010 Comprehensive Plan.

SECTION 3

This Resolution shall become effective immediately upon its passage.


BOARD OF COUNTY COMMISSIONERS
NASSAU COUNTY, FLORIDA


BARRY HOLLOWAY
Its: Chairman

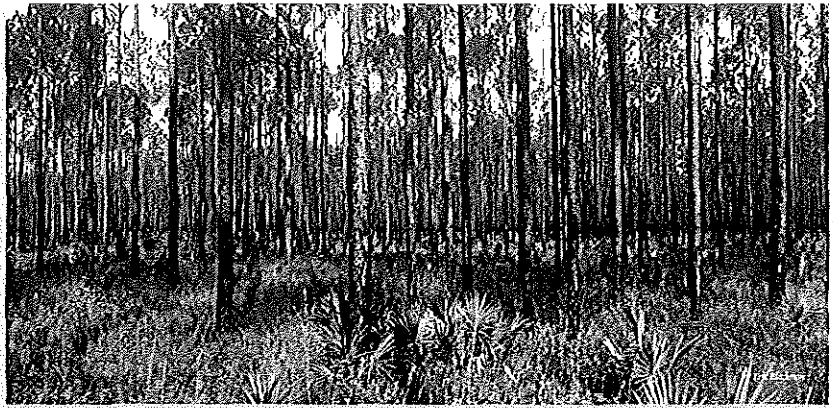
Attest as to Chairman's
Signature: *only*


JOHN A. CRAWFORD
Its: Ex-Officio Clerk

By 
Approved as to form by the
Nassau County Attorney


DAVID A. HALLMAN
County Attorney

The Nature Conservancy 
Protecting nature. Preserving life.™



JUNE 30, 2008

Conserving Land & *Water in*

Nassau County

FINAL

Land Acquisition Feasibility Study



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Introduction to The Nature Conservancy

The Nature Conservancy is a global organization that works in all 50 states in the United States of America and in 30 countries, including Canada, Mexico, Australia, and countries throughout the Asia Pacific region, the Caribbean and Latin America. The Conservancy's Florida Chapter works to fulfill the organization's mission in Florida and targeted areas throughout the southeast United States and the Caribbean.

The Conservancy's mission is to preserve plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. To date, the organization has protected more than 117 million acres of land and 5,000 miles of rivers around the world.

The Conservancy's framework for mission success, Conservation by Design, explains how we will conduct our work to accomplish the mission. It gives us a common purpose and direction – a compass bearing to align the worldwide organization in taking the most effective conservation action to achieve tangible, lasting results.

By 2015, The Nature Conservancy will work with others to ensure effective conservation of places that represent at least 10 percent of every Major Habitat Type on Earth.

In Florida, the Conservancy has helped protect more than 1.2 million acres of natural lands, advocated and supported public funding for conservation at the state and local levels, and influenced the management of conservation lands in public and private ownership. In spite of these successes, the future of natural Florida still hangs in precarious balance – dozens of native species and habitats could vanish forever without concerted action to save and restore more of Florida's natural areas.

Founded in 1961, the chapter's work is supported by more than 42,000 individuals, foundations, and corporations who share our conservation commitment. The Conservancy owns and manages more than 49,000 acres in Florida.

EXECUTIVE SUMMARY

Conservation Goals of Nassau County

The Nature Conservancy is pleased to work with Nassau County in the exploration of a land conservation program. Nassau County has a tremendous opportunity to map out its future growth and economic needs while taking into account how planning for conservation can shape and direct that growth such that the County remains a viable and sustainable community with a high quality of life far into the future.

Chapter 1 describes the economic benefits of land and water preservation in Nassau County. Since the economy is intrinsically linked to its natural resources it would benefit from a preservation program that would protect those resources while growing its tourism based economy. While the construction boom the state experienced from 2000 – 2006 has slowed significantly, the western portion of Nassau County finds itself at a decision point of urban sprawl or implementing an alternative vision which could simultaneously preserve natural resources while accommodating necessary growth.

The implementation of a protection plan for the county's green infrastructure will provide the residents with a better quality of life derived from ecosystem services and preserved recreational areas, while helping sustain the local nature based tourism industry. Additionally, it will preserve working landscapes which are a large contributor to the local economy and provide a protected landscape that is habitat for threatened flora and fauna.

It is difficult to quantify the exact dollar amount derived by preserving land and waters that in turn provide valuable ecosystem services as clean air and water. It is true however, that land preservation helps with flood protection and water quality enhancement which are more expensive for a county to retrofit later. Preserving the county's wetlands, coastal and estuarine areas will provide the county with a buffer against hurricane storm surge, wind and freshwater flooding threats. In addition, preserving the large forested areas help purifying air, removing nitrogen dioxide, sulfur dioxide, carbon monoxide, and ozone, and store or sequester carbon in wood.

Chapter 2 draws upon a series of detailed land use, geomorphologic, archaeological, managed area, hydrologic and biological resource (e.g., natural communities, species, forestlands, water features) maps to provide an overview of Nassau County in terms of the kinds and distribution of its natural resources and current land use patterns. A description of the existing conservation lands – both private and public, but particularly the state park and state forest system now in place – is provided that forms the basis for Nassau County's current conservation landscape, as well as a portion of its future conservation opportunities in terms of potential Florida Forever projects.

Nassau County encompasses a wide variety of important and ecological valuable natural resources, in terms of wildlife habitat, watersheds, and wetlands, among others. Given the significance of these resources on a statewide basis, a detailed examination of specific areas of the County is provided that are vital to supporting the economy through direct financial benefits, as well as providing the underlying suite of ecosystem services that allow the County to function on a sustainable basis. Four major areas are analyzed in terms of their natural communities, silvicultural/agricultural, hydrological resources (including areas important to both surface and ground water protection), rare species occurrences and the importance of conserving these varied resources: St. Marys River, Nassau River,

Amelia Island/Amelia River and the Interior Portion of Nassau County. In all, over 22 natural community types are described, as well as 19 animals and 9 plants that are considered rare within Florida.

Based upon the natural resources documented for Nassau County – in both text and in over 20, color-coded GIS-based maps – a series of recommendations is provided that could be utilized by the County for establishing a series of parks, watershed reserves, wildlife management areas, state and private working forests and greenways/trails. It is an underlying principle that this system of potential conservation lands will not negatively impact upon any individual's private property rights and that such a program should be pursued by Nassau County on a strictly willing seller basis. Ten areas are depicted and described that can form a possible conservation vision for Nassau County. It is suggested that areas can be conserved through both fee simple as well as less-than-fee (i.e., conservation easement) approaches and that, where possible, such a system of conservation lands be connected through a series of greenways and trails.

Chapter 3 addresses different land acquisition tools. It is by no means comprehensive but meant to explain some of the basic methods of land protection including fee acquisition, conservation easements, and conservation buyer programs. It further describes numerous available funding sources and mechanisms that the County could take advantage of while either leveraging their own dollars or with straight out grants.

Chapter 4 provides an analysis of finance options available to Nassau County to fund the acquisition and development of lands as parks, recreation facilities and open space. These public financing options include general obligation bonds, the local sales tax, the property tax, and less frequently used options. This chapter outlines two primary funding alternatives, to the current funding in Nassau County, in order to provide significant additional public monies for land and water conservation.

In summary, preventing water quality damage, protecting flood prone areas, and protecting intact forested blocks from fragmentation and urban sprawl are all less expensive government measures than the alternative costs of concurrency associated with development. Linking land use planning, environmental and local economic goals to preserve remaining natural areas and vital ecosystem functions will also benefit the county's most productive industries and its resident's way of life. Taking measures to preserve the county's natural areas will ensure healthy lands and waters that sustain nature, the community's quality of life, and a vibrant local economy.

Chapter One: Economic Benefits of Land & Water Preservation in Nassau County

1.1 Community Benefits Introduction

There are many social, economic, and health benefits that come with protecting natural resources. The state of Florida has a history of preserving its precious natural resources and, over the last eighteen years, has made more than a five billion dollar investment in the acquisition and protection of some of the state's most sensitive springs, riparian corridors, coastal areas, forests, and other Florida habitat types through the Preservation 2000 and Florida Forever state funding programs.¹

Despite government and environmental group's preservation efforts, fragmentation is unfortunately a story too common across the state. In 2006, University of Florida's (UF) GeoPlan completed a special growth management report with predictive modeling that concluded the state's urban areas will double by the year 2060 unless new changes in growth management policies are enacted.

Major recommendations by the UF 2060 study found that the successful state land acquisition program called Florida Forever must be continued and consistently funded to preserve the most sensitive conservation areas in the State. Further, the UF study recommended balancing maintenance and redevelopment of existing urban areas with new land development and countering urbanized places with protected lands to protect natural functions and create healthy environments for people. It is important to preserve the identity of Florida and simultaneously respond to a changing world and population.

Like the rest of the State, Nassau County finds itself at a juncture to either continue urban sprawl or implement an alternative vision which could simultaneously preserve natural resources while accommodating necessary growth. Luckily for Nassau County, there is still time to act to preserve the precious natural resources.

Growth pressures continue to increase annually. Along with population increases, come increased grey infrastructure needs, i.e. more roads, schools, sewer and utility lines, and emergency management needs like police and fire stations. All these grey infrastructure costs equate to more county capital improvement expenses.

Preserving Nassau County's green infrastructure means preserving waterways, wetlands, woodlands, wildlife habitats, and other natural areas including greenways for recreational purposes, parks, working tree farms, forests, wilderness and other open spaces that support native species. Green infrastructure also provides benefits to nature and people by maintaining natural ecological processes required to sustain clean air and water resources.

Many Florida coastal counties rely heavily on the nature based tourism that comes with being a 'destination' site, and Nassau County's economy is intrinsically linked to its natural resources. The service industry that caters to Nature Based Tourism (comprised of fishing, hunting, golf, and bird watching) is the major employer of local residents.

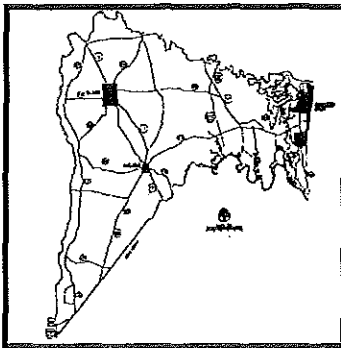
¹ Florida Department of Environmental Protection. Division of State Lands, 2006.

Implementing a protection plan for the county's green infrastructure will provide Nassau County and its residents with a better quality of life derived from health benefits afforded by ecosystem services² and aesthetic recreational areas that provide year round enjoyment. This will also help sustain the local nature based tourism industry, preserve working landscapes that are the second highest contributor to the local economy, and protect landscapes that provide valuable habitat for imperiled and threatened flora and fauna.

Nassau County should invest in green infrastructure expenses upfront, and find ways to spread the cost to the future users that will benefit from an enhanced quality of life. By doing so, Nassau decision makers will be making a direct investment in its resident's current and future quality of life and strengthening its local economy that relies so heavily on tourism and the forest products industry.

Location

Nassau County is a coastal county located in the northeastern corner of Florida at the Georgia border, just 30 miles north of downtown Jacksonville. The county is bordered on the north by Camden County, Georgia, to the west by Baker County, Florida, and the south by Duval County, Florida. The county comprises 652 square miles and is divided into three incorporated areas:



- *Town of Hilliard in the northwest region,*
- *Town of Callahan in the south mid-west and*
- *City of Fernandina Beach in the east.*

Nassau's Unincorporated Areas Include: Amelia City, American Beach, Andrews, Boulogne, Bryceville, Chester, Crandall, Crawford, Dahoma, Dyal, Evergreen, Franklinton, Glenwood, Gross, Hedges, Hero, Ingle, Italia, Keene, Kent, Kings Ferry, Lessie, Nassau Village-Ratliff, Nassauville, O'Neil, Verdrie, Yulee Heights, and Yulee.

The county boasts a mix of forested areas, three major freshwater river systems including the St. Marys, Nassau and Amelia Rivers and their associated tidal creeks, and significant coastal areas including barrier islands like Amelia Island and Tiger Island. An expansive area of estuarine marshes makes up the county's eastern border along the Atlantic Ocean. Forested areas dominate the upland portion of the county and infuse the local economy with its forestry and forest related products industry.

The county is fortunate to have many natural resources with both high ecological and recreational value. Nassau County is a destination area that attracts thousands of visitors annually and continues to grow in population because of the quality of life it provides.

² Humankind benefits from a multitude of resources and processes that are supplied by natural ecosystems. Collectively, these benefits are known as ecosystem services and include products like clean drinking water and processes like the decomposition of wastes. Services can be subdivided into five categories: *provisioning* such as the production of food and water; *regulating*, such as the control of climate and disease; *supporting*, such as nutrient cycles and crop pollination; *cultural*, such as spiritual and recreational benefits; and *preserving*, which includes guarding against uncertainty through the maintenance of diversity. As human populations grow, so do the resource demands imposed on ecosystems and the impacts of our global footprint.

The county is able to market itself as “the ultimate climate for business and life”³ because it is located in a unique area that can provide residents and thousands of visitors with milder summers than tropical Florida and a multitude of pristine recreational areas in the marine, riverine, forested, and large swampland areas, and of course its proximity to metropolitan Jacksonville.

The county’s natural resources are a main attraction and many major events revolve around the county’s beaches and coastal area such as the annual Shrimp Festival. The Amelia Island and Fernandina Chamber of Commerce recognize the importance of preserved natural resources for the recreational service they provide the community and local economy, routinely making the county’s natural amenities the cornerstone theme for the bulk of their marketing materials.

1.2 Economic Growth and Trends

Nassau County’s Growth

According to the US Census Bureau, Nassau County is the twentieth fastest growing county in the State. The County has experienced substantial growth in the last half-century; from less than 18,000 people in 1960 to approximately 69,671 people today.

The UF Bureau of Business and Economic Research (BEER) median population projections estimate the 2010 population of Nassau County as approximately 74,900 permanent residents at a 7% annual rate of growth. The County’s population is expected to increase by 33% by the year 2030 to 104,800 residents.⁴

County Growing Pains

As the county grows, so does the need to provide roads, schools, and emergency management like fire stations and hospitals. Like the rest of the State, Nassau experienced an extremely fast paced residential and commercial growth in the early part of the century up until 2006.

Although housing markets have dramatically slowed if not altogether halted in the state, Nassau County has still experienced steady construction activity. The Nassau County Building Department reports that for 2008, dwelling unit permits remained relatively comparable to 2007, but much lower than the building boom the county experienced up until 2006.⁵ (See Appendix A1)

A recent journal article in the Florida Trend Magazine reported that “Residential development is relatively healthy in the northeastern tip of Florida. But like the rest of the First Coast, Nassau has relied too much on residential growth.”⁶ It would be fair to say that although building levels have experienced a downturn, there is still a healthy market in Nassau County. A county that is in close proximity to an international airport, a major Port System, and natural amenities including clean beaches, major river systems and forested areas as well as a rich historic identity that affords a quaint coastal feel will continue to be a desirable relocation area.

³ Nassau Economic Development Board, April 21, 2008.

⁴ Nassau Growth Management Department, April 21, 2008

⁵ Nassau County Building Department. Personal communication April 17, 2008.

⁶ Florida Trend, “Northeast: Tidal Forces”, April 1, 2008. C. Barnett

Vacant and Developable Land

According to the Nassau County Property Appraiser's Office, approximately 42,564 acres in the unincorporated portion of Nassau County are classified as vacant. Table 1 shows vacant land in unincorporated Nassau County by Future Land Use Map (FLUM) category. (Classification of land was determined using the Nassau County Property Appraiser property use codes.)

Table 1 Vacant Land by Future Land Use Map Category

FLUM Category	Acres	Vacant Acres	Percent Vacant
Agriculture	314,263	21,421	6.6%
Recreation	978	174	17.8%
Low Density Residential	22,848	4,726	20.7%
Medium Density Residential	17,743	5,455	30.7%
High Density Residential	636	94	14.8%
Public Buildings and Grounds	1,272	325	25.6%
Commercial	2,348	1,653	70.4%
Industrial	861	638	20.6%
Total		42,564	

Source: Nassau County Property Appraiser's Office

In 2000, the U.S. Census Bureau estimated that there were 18,841 housing units in unincorporated Nassau County. This indicates that approximately 15,580 new residential units will need to be constructed in the County in order to accommodate the projected population growth between 2000 and 2030. Based on this analysis by the Nassau County Growth Management, it is likely that the majority of these new units could be accommodated on vacant land found in existing residential FLUM designations.

In addition to this vacant land, much of the agricultural land in Nassau County is considered developable, although it is not necessarily classified by the Property Appraiser as vacant. The number of potential units in the agriculture designation is shown in Table 2 (Appendix A2). Potential units were calculated by subtracting the acres of wetlands from the number of acres designated as Agriculture and apply the two density ranges that currently apply within Agriculture.

FLUM Category	Total Acres	Wetland (CSV #1)	Maximum Density	Net Developable Acres	Potential Units
Agriculture (AG) >= 320 ac	249,813	73,320	1du /20 acres	176,493	8,824
Agriculture (AG) < 320 ac	64,450	18,916	1du/acre	45,534	45,534
Total	314,263	92,236		222,027	54,358

Table 2 Residential Development Capacity in Agricultural Land
 Source: Northeast Florida Regional Council

When combined with the estimated development potential in the residential FLUM categories, this represents a surplus development potential of 60,365 dwelling units based on the UF Shimberg Center's⁷ estimates for housing needs in 2030.

⁷ The Shimberg Center for Affordable Housing was established at the University of Florida, in 1988 by the Florida legislature (Section 240.5111, Florida Statutes). The Shimberg Center for Affordable Housing was created as a multi-disciplinary center to facilitate an interdisciplinary approach required to understand housing affordability and to develop solutions to meet affordable housing needs.

The Nature Conservancy (TNC) performed a land use analysis comparing 1994 to 2004 land cover/land use changes.⁸ The analysis indicated that the land cover category with the largest percentage of increased change in this period was the Urban category which increased by .11%. In addition, the Transportation (.09%) and Water (.36%) categories also had increases in percentage of land cover (See Appendix A2). The increases in transportation and water categories seem to be linked to urbanization. The urbanization leads to increases in transportation and stored water needs and the water increases are due mainly to more reservoirs in 2004.

The land use cover category that decreased the most was Non-forested Uplands decreasing by 1.89%. The other categories that decreased were Forested Uplands by 1.71%, Silviculture by 1.49%, Wetlands .84%, and Agriculture which decreased by .07%. (See Appendix A2)

It is important to note that the data represent the percentage of acres in each Land Cover/Land Use category within Nassau County and does not capture the full construction boom since the reported information only goes through 2004. The analysis still illustrates the trend in the county of converting green space, working lands, and wetlands to urban use.

Increased in percent of land use cover 1994-2004:

Type	1994	2004	change
Water	4.48	4.84	↑ .36
Urban	7.88	7.99	↑ .11
Transportation	.84	.93	↑ .09

Decreased in percent of land use cover 1994-2004:

Type	1994	2004	change
Non-forested upland	3.24	1.35	↓ 1.89
Forested upland	9.93	8.22	↓ 1.71
Silviculture	41.59	40.10	↓ 1.49
Wetland	31.68	30.84	↓ 0.84
Agriculture	4.44	4.37	↓ 0.07

It would be strategic for the county to determine where the expected growth should take place. By creating a blueprint of what natural resources and other green infrastructure should be preserved, the county could systematically manage future growth away from environmentally sensitive areas.

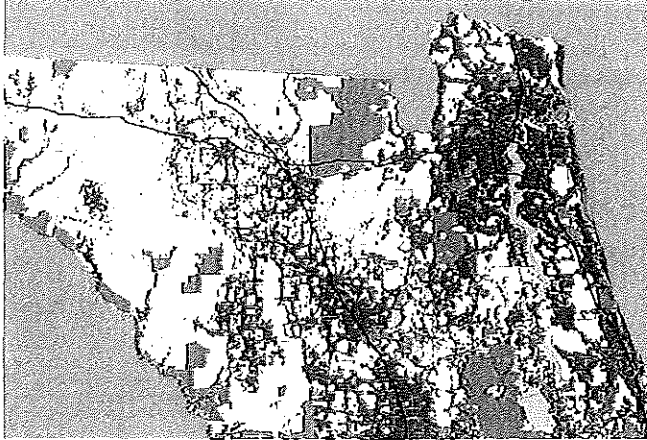
Chapter Two of this study will identify key areas that should be preserved and Chapter Three will outline various protection tools and financing methods that could help implement a protection plan.

Northeast Florida in 2060

It is no secret that Florida has historically been a fast growing state. However, population experts fear that continued growth pressures at the pace of 960 daily new residents- although lower than previous daily numbers, will have a negative impact on our natural resources and thus our future quality of life.

⁸ Land use analysis based on St. Johns River Water Management District's 1994 and 2004 Florida Land Cover and Land Use Classification System for Nassau County, Florida. S. Beville, April 2008.

In a special growth report done in 2006, the UF GeoPlan reported that “Between now and 2060 the State’s population is projected to more than double and consequently, without shifts in our policies, the additional land devoted to urban use will also more than double.”⁹ In other words, without appropriately conserving sensitive Florida lands and waters today, we risk doubling our urban areas by 2060- a fact that would have irreversible and negative impacts on the State’s biodiversity.



Growth modeling done by UF researchers, in that same report, predicted that the Jacksonville/Duval County metropolitan area is projected to have a far-reaching influence on Northeast Florida by 2060. Duval County is projected to be completely built out sometime after 2040, and by 2060 its population is anticipated to spill out into Nassau, Clay, St. Johns and Baker counties, forever changing their rural character.

Map Source: FL GeoPlan’s 2060 Report: 2060 Growth in NE FL Map

In addition, the Northeast Florida region (consisting of Alachua, Baker, Bradford, Clay, Columbia, Duval, Flagler, Putnam, St. Johns, Union and Nassau County), is projected to have the second largest percentage of urban land use (41%) of any region in the state by 2060.¹⁰ The 2060 report however did not take into account any potential growth pressures from Southeast Georgia (i.e. Camden County).

The UF Study only accounted for current conservation areas and could not include future conservation areas that should be protected. As indicated on the future 2060 map, proximity to transportation and waterfront areas will be the most heavily populated areas.

The results of the Florida 2060 research project conducted by the University of Florida show the state of Florida sits at a precipice in regard to land consumption for urban development. Soon, the footprint and pattern of development will be set and without immediate proactive initiatives, the result will be sprawling disconnected subdivisions spread from coast to coast that surround a few isolated wetlands; and the opportunity to build great communities and forever protect natural lands and open space will be lost. Today’s action, or the lack of action, will determine the legacy of future generations of Floridians—forever.

An Alternative Vision

In a follow up report to the 2060, 1,000 Friends of Florida and other partners made recommendations to avoid the urban sprawl and fragmentation that would be inevitable if proactive growth management policies were not implemented. Their recommendations focused on how the State and local governments could simultaneously accommodate such massive growth and preserve valuable natural resources. Their Growth Management Policy centered on the following four “P’s”:

⁹ FL Geoplan, FL 2060

¹⁰ FL Geoplan, FL 2060

- **Patterns:** The pattern of development refers to the spatial organization of developed lands. Patterns refer to the location, intensity, and variety of different land uses.
- **Preservation:** Preservation refers to the systematic protection of land for natural resource management, wildlife habitat, parks and recreation, and working lands.
- **Passages:** Passages refer to the ways in which places are connected. Passages can take the form of transportation systems, greenways, water systems, telecommunication networks, or anything that links places and people.
- **Places:** Places not only seek to safeguard the intrinsic qualities of Florida, but also focuses investment on existing cities and infrastructure.

Together, the four P's weave a complex web that shapes the environment in which Floridians live. They require balancing maintenance and redevelopment of existing urban areas, with new land development; countering urbanized places with protected lands to protect natural functions and create healthy environments for people; preserving the identity of Florida, while simultaneously forging its new image in response to a changing world and population.¹¹

In order to avoid haphazard growth and urban sprawl in Nassau, the county should take an alternative vision. The county should implement a plan to preserve its green infrastructure that would include the growth management vision outlined by the four Ps listed above: a system of connected reserves, preserves and water systems that provide valuable habitat for nature and provide people with recreational and aesthetic areas that benefit their quality of life and directly infuse the local tourism and forest products industry, and maintains the county's rural way of life.

1.3 Major Employers and Industries

The area's workforce is mostly Agriculture, Forestry and Fishing, and Service industries and boasts one of the youngest labor forces in the region.

Major Employer Totals from Nassau Economic Development Board, April 2008.

Nassau County School Board	1,485
Amelia Island Plantation	1,100
The Ritz-Carlton	620
Smurfit-Stone	581
FAA	430
Nassau County Government	400
Baptist Medical Center-Nassau	368
Rayonier	300
City of Fernandina Beach	282
White Oak Plantation	190

Nassau County's economy is diverse, ranging from agricultural activity (mostly in the form of tree farms) in the west and central areas, to a variety of activities closer to Amelia Island.

The service industry provides the most employment in the county, catering to the substantial tourism industry. The two largest service industry job providers in Nassau County are the Amelia Island Plantation and the Ritz Carlton.

Much of the land used for tree farming is owned by Rayonier, a major employer in the area, and the owner of a large pulp mill in Fernandina Beach. Historically, tree farming, trucking, and pulp production has also characterized a large portion of the local economy. Silviculture has long played a major role in the county's local economy but for various economic reasons, the amount of

¹¹ *A Time for Leadership: Growth Management and Florida 2060, 1000 Friends of Florida. August 2006.*

agricultural lands in forestry production has decreased in the county as shown in the TNC land use analysis in Section 1.2.

Fernandina Beach has been known for professional industries such as real estate, legal services, and medical care. The area is a premier destination area and has various lodging opportunities ranging from upscale resorts such as the Amelia Island Plantation and the Ritz Carlton to quaint Bed & Breakfasts and other Inns that maintain the downtown Fernandina area's historic and cultural aesthetics.

In the central area of the county, a private tract of land is owned by White Oak Plantation which combines an international wildlife conservation breeding and rehabilitation center with a conference center that employs almost 200 Nassau residents for its operations. In addition to employing a good amount of local residents, White Oak has been a committed supporter of preservation efforts on the St. Marys River, which runs directly through the world renowned Plantation.

Industry Areas of Growth

The Nassau Economic Development Board is targeting industries including: Advanced Manufacturing, Aviation and Aerospace, Corporate Headquarters, Distribution and Logistics, Finance and Insurance Services, Information Technology, and Life Sciences.¹² Many if not all of those industries desire a relocation area that offers their employees communities where they can work, live, and play.

The Northeast Florida region's economic activity has long centered around metropolitan Jacksonville in Duval County. For more than 20 years, surrounding northeast Florida counties including Nassau have struggled to not just be a 'bedroom' community. As a fast growing rural county however, it has had major challenges balancing transportation, economic development and environmental protection needs.

The entire Northeast community is working hard to tie their economic futures to Jacksonville's entry, in late 2008, into direct trade with Asia when a new shipping terminal will be added to expand the JaxPort facility.¹³ Nassau County is in an ideal physical position to leverage the booming JaxPort expansion to be located directly north of the Duval industrial location.

However, the tourism industry is very strong in Nassau County and its local economy derives a huge percent of its local revenue source from nature based tourism.¹⁴ The tourism industry can become a burdensome activity on the land but, if done well, can not only continue to infuse the local economy with sales tax revenue and direct lodging, retail and other income associated with travel, it can be less degrading to natural resources than industrial and commercial industries. Therefore, while it would be economically advantageous for Nassau County to benefit from the JaxPort expansion, the County should be cognizant of the value of its Tourism and forest products industry which have

¹² Nassau Economic Development Board. April 17, 2008

¹³ Japan-based Mitsui O.S.K. Lines is building a \$220-million container terminal in Jacksonville, and South Korea's Hanjin is negotiating to build a \$360-million terminal. The facilities by two of the world's largest shipping companies aim to capitalize on the expansion of the Panama Canal and anticipated increase in container traffic along the East Coast. Jaxport officials estimate a combined impact of almost \$2 billion for the regional economy and 12,000 direct and indirect jobs.

¹⁴ "Economic Contributions of Agriculture, Natural Resources, Food & Kindred Product Manufacturing, Distribution and Related Services in Northeast Florida Counties in 2005". Dr. Alan Hodges, University of Florida. April 3, 2008

proven to be solid contributor's to the local economy and find ways to maintain their long-term viability.

1.4 Local Economic Benefits of Preserving Natural Resources

4a. Green Infrastructure

Green Infrastructure- The World's Natural Life-Support System

The concept of "Green Infrastructure" is not new. Although terminology may change and research findings enhance land use planning every day, the idea of conserving natural resources while accommodating inevitable development has been around for more than 150 years. While green infrastructure occasionally is used interchangeably with "Low Impact Development" practices (i.e., a suite of design principles that work to benefit water quality and or/ LID simply meaning enhanced storm water design that benefits water quality), in this study, we are referring to the protection of key natural resources that provide multiple community benefits.

More specifically, green infrastructure is "a scientific approach to determining the best use of the land to support both the natural processes that exist on the landscape and the infrastructure and recreational needs of the people who live there".¹⁵ It takes into account the area's waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways for recreational purposes, parks, and other conservation lands; working farms, ranches, forest, wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources, and contribute to the health and quality of life for communities and people.

The State of Florida embraced green infrastructure planning in the mid 1990's when it created the "Florida Greenways System"- two related Geographic Information Systems (GIS) statewide networks. One network mapped out the ecological value of the land, and the other mapped recreational and culturally significant statewide areas.¹⁶ Many Florida counties have also undertaken such green infrastructure mapping exercises such as Duval County, Volusia County, and St. Johns County and utilized the findings to implement successful land acquisition programs that complimented their growth management and economic objectives.

By applying ecology principles to urban planning and landscape architecture, communities like Nassau County can balance necessary economic growth with just as crucial environmental protection. Green infrastructure can therefore help meet and enhance Nassau's quality of life for existing and future generations.

It is also much cheaper to preserve natural resources than restore them, as shown by the billions of dollars the Federal, State, and local governments have been required to pay for countless environmental restoration projects in Florida such as the St. Johns River. The 2006 St. Johns River Accord¹⁷ indicates that 700 million dollars will be necessary for restoration and water quality improvements in the Lower St. Johns basin alone.

¹⁵ Bendict, Mark A. *Green Infrastructure: Linking Landscapes and Communities*. 2006 Island Press. pg. 23

¹⁶ *Florida Statewide Greenways System Planning Project*. 1995

¹⁷ City of Jacksonville's River Accord Vision, July 2006.

While some restoration may always be necessary to maintain natural areas health (i.e., the need for long term adaptive management), the degree of restoration is not as intense and burdensome if the damage was not severe or avoided all together.

Environmentally sensitive lands and water may be lost through pollution and other degradation, fragmentation, and development. Loss of land from development is almost always irreversible. Implementing a blueprint of conservation areas that protects the county's biodiversity and creates a system of ecoregional corridors that provide both valuable habitat for native, threatened, endangered and rare species and compatible recreational uses is an all around environmental, social, and economical beneficial situation for the county.

What defines Green Infrastructure?

Conservation biology is the discipline that explores and applies biological and ecological principles to the conservation of biological diversity and related critical habitats. Green infrastructure is combining land use planning and conservation biology with ten main principles that shape green infrastructure:

Connectivity is crucial

Linkage is essential for natural systems to function and for wildlife to thrive. The strategic connection of ecosystem components- parks, preserves, riparian areas, wetlands, and other green spaces- is critical to maintaining the values and services of natural systems such as carrying and filtering storm-water runoff-, and to maintaining the health of wildlife populations. Green Infrastructure can help establish land acquisition priorities that ensure adequate connectivity among already preserved lands.

Ecoregional context & linkage

Counties can not make land use decisions without giving consideration to their surrounding areas. Green infrastructure dictates that you must consider how the county's natural resources contribute to, interact with, and are influenced by the ecosystems of neighboring areas. Strategically conserving priority conservation areas requires taking an integrated landscape approach that takes regional context into account.

TNC works to preserve critical conservation areas at landscape scale that provide habitats and keep rare, threatened and endangered species viable. See mapped ecoregional linkages for Nassau County in Chapter Two of this study.

Based on sound science & land use planning

Any green infrastructure project should aim to use scientifically sound information as the basis of its findings or conservation recommendations. The methodology for any green infrastructure project should include state heritage data, water resource information, accurate land use data, and comprehensive recreational and historic and cultural information.

The compilation of this cross discipline mapping exercise done by senior TNC ecologist Dr. Richard Hilsenbeck is found in Chapter Two of this study.

Used as a framework for conservation & development efforts

Green infrastructure planning can help communities prioritize their conservation needs and determine appropriate areas for development and new growth. Implementing this framework will ensure green space systems that can maintain essential ecological functions and provide an entire host of ecosystem services: clean air, clean water, and healthy forests.

Green Infrastructure should be planned & preserved before development

It is less expensive to take a proactive approach when preserving natural resources versus restoration of natural resources. In addition, man made or engineered solutions, while better than no solution often falls short of its natural functioning counterparts. Protecting key green infrastructure areas ensures that existing connected

forests, water systems, and working lands are preserved up front *before* they are left for development. Many studies have shown that smart growth (i.e., when planned out proactively to preserve functioning ecosystems) is more economically beneficial to local governments and will enhance a communities quality of life.

Is a critical public investment and should be funded up front like other capital improvements

Just as gray infrastructure (school, roads, utilities and sewer) are primary budgetary line items, green infrastructure needs should be invested into up front. Governments should plan, design, and invest in our green infrastructure following the same approaches that are used for built infrastructure.

The State of Florida has invested more than five billion dollars in the last 18 years to preserve Florida's special lands, waters, species, and recreationally or historically and culturally rich areas before they are developed through the Preservation 2000 and Florida Forever Program.

Surrounding northeast Florida counties have also invested in natural resource and ecosystem service projects such as Duval County's Preservation Project efforts. In 1999 then Mayor John Delaney created the Preservation Project- a land acquisition effort funded by a bond referendum that enabled the City of Jacksonville to invest 50 million dollars in acquiring conservation lands from willing sellers to help meet the county's growth management requirements, protect environmentally endangered lands, improve the quality of the City's waterways and increase access to natural areas by acquiring or otherwise preserving undeveloped lands.¹⁸ As a result of the Preservation Project's land acquisition efforts, Jacksonville now has the largest urban park system in the nation and is able to attract large corporations that desire a relocation area that affords both a work and play environment. See Chapter Three for an inventory of conservation finance mechanisms, and Chapter Four for an outline of Nassau County's financial capacity for any conservation finance program.

Benefits to Nature & People

Two very important benefits communities gain from implementing green infrastructure preservation efforts are ecosystem services health benefits, and the avoidance of natural hazards such as flooding, erosion, and wild fires. Green infrastructure preservation efforts determine the natural resource areas that should be preserved and directs growth towards appropriate areas which typically do not include floodplains and their associated wetland systems, coastal areas prone to erosion, sea level rise, and hurricanes, or natural fire prone areas. Ecosystem services that come from sustained ecological systems and functions include clean air, clean water, healthy soil and land.

People also get the added health benefits through the recreational opportunities provided by preserved green space and trails. The American Planning Association states in a series of papers dedicated to greenspace found that parks and preserves provide people with contact with nature and thus provides certain health benefits associated with physical activity opportunities (i.e., increase fitness and reduce obesity) as well as and enhance well-being.¹⁹

Respects the diverse needs and input of its local stakeholders

Preserving green infrastructure requires establishing good relationships with private landowners from the very beginning. Public, private and nonprofit concerns must all be addressed to ensure a desirable outcome representative of the different stakeholders. Stakeholders should have green infrastructure explained as initiatives that work to preserve not just important habitat types and species that depend on them, but the community's character as well through the preservation of its working waterfronts and lands such as tree farms and ranches. Willing seller philosophy should also be explained from the very beginning and throughout the process to avoid any unfounded concerns landowners would have about a county's preservation efforts.

Capitalizing on Various Community Initiatives

A preservation plan should compliment growth management objectives, flood mitigation efforts as found in the county's 'Local Mitigation Strategy' reports, and recreational development initiatives.

¹⁸ City of Jacksonville's Guiding Principles for the Jacksonville Preservation Project. www.coj.net.

¹⁹ 2003 by American Planning Association. Parks Series Forum- How City Parks Improve Health.

Green Infrastructure Efforts require Long Term Commitment

Implementing a successful protection plan to preserve the county's green infrastructure will require a long term commitment from the county. The county can ensure this commitment to conservation by making sure the process is bipartisan. In order to outlast administration and political changes the process should include private

stakeholders such as, local landowners, business leaders, nonprofit conservation organizations, regional planning members and other knowledgeable parties.

Source: Mark Benedict & Edward T. McMahon, "Green Infrastructure: Linking Landscapes and Communities." 2006 Island Press.

Working Forestry & Farms

Farm employment in the United States represents a declining share of total employment. This trend is true in Nassau County with Agricultural lands decreasing by .07% from the years 1994-2004.

Much of the Agriculture industry is in silviculture with the bulk of forested land owned and operated by Rayonier, a major employer in the area that also operates a large pulp mill in Fernandina Beach.

The UF's Food & Resource Economics Department reported total Agriculture dollars for Nassau County in 2006 totaled to \$973,500,000.²⁰ Total jobs created by the Agricultural industry in Nassau County for 2006 totaled 7,564.

Over the last 50 years, Nassau County has been successful in minimizing conversion of its remaining forest resources to developed land. However, the combination of population growth, an urban economy that supports a relatively affluent population, low-density zoning used to protect rural lands threatened, and the lure of natural forest beauty has caused fragmentation and parcelization of the County's remaining forests.

In general, privately owned forest land is more likely to be fragmented and with the conversion of large timberlands in the center part of the county, conversion rates will continue to dramatically increase. Deterring forest fragmentation also provides socioeconomic benefits to the county and its residents. Increases in wild land urban interface (WUI) areas²¹ make communities more vulnerable to wildfires. Homes built in the WUI are vulnerable to naturally occurring wildfires and the result from not buffering homes from the heavy underbrush areas in the woodlands. Regularly doing prescribed burning and implementing Firewise principles can drastically help the county deter wildfires, but the more strategic and safe land use planning approach should be to preserve the county's large forested blocks in a manner that facilitates regional connectivity to other large forested areas found in north Duval County and east Baker County.

²⁰ "Economic Contributions of Agriculture, Natural Resources, Food & Kindred Product Manufacturing, Distribution and Related Services in Northeast Florida Counties in 2006". Dr. Alan Hodges, University of Florida. April 3, 2008. pgs. 30-34.

²¹ Population deconcentration in the U.S. has resulted in rapid development in the outlying fringe of metropolitan areas and in rural areas with attractive recreational and aesthetic amenities, especially forests. This demographic change is increasing the size of the wildland-urban interface (WUI), defined as the area where structures and other human development meet or intermingle with undeveloped wildland. The expansion of the WUI in recent decades has significant implications for wildfire management and impact. The WUI creates an environment in which fire can move readily between structural and vegetation fuels. Its expansion has increased the likelihood that wildfires will threaten structures and people. -- The Federal Register, US Department of the Interior and US Department of Agriculture, 2001. (66:751).

In addition to the economic value added from the local forest products industry, ecosystem services provided by trees include purifying air humans breathe, removing nitrogen dioxide, sulfur dioxide, carbon monoxide, and ozone, and storing or sequestering carbon in wood.²² In a 2003 study done

by the UF's Institute of Food & Agricultural Sciences, Food & Resource Economics Department and School of Forest Resources and Conservation in Florida determined the economic impacts of the forest industry in Florida, finding that on a net annual timber growth volume of 716.9 million cubic feet, and an average of 0.0081 tons of carbon sequestered per cubic foot, it can be estimated that Florida forests would sequester 5.81 million tons of carbon annually. In such a potential market the avoided cost for pollution abatement was conservatively estimated at a price of \$5 per ton carbon, which would indicate a total value of \$29 million annually for this service. Because Nassau County was (and still is) considered one of the top 10 counties for their forest products industry, it would be fair to assume that Nassau County could theoretically receive a large amount of the estimated \$29 million.

There is also a cultural benefit to preserving Nassau's forest lands and silviculture industry. Nassau County is a rural county that has had a long history of tree farming. Although it's not certain how much timbering activity existed in Nassau County in Florida's early forestry history, (dating back to the 1500's near the St. Johns River²³), there are many multigenerational tree farmers that desire to maintain their way of life.

Sustainable forestry programs, (i.e., preserving the county's working forest lands) would therefore benefit the local economy, provide ecosystem services in the form of helping to purify the air residents breathe, maintain the community's rural character, and provide additional recreational areas that benefit resident's physical well being and overall quality of life.

A Premier Destination

Most people who live on Amelia Island throughout the year or have second homes value the quality of life they are afforded in Nassau County. They want a year-round mild climate; a laid-back, small-town lifestyle with big city perks close by, and find that all in the Nassau County community. Apart from the wonderful beaches and waterways, wooded forests, abundance of nature, charming historic district, and rural small town living, there is a sense of community found in all niches of the county. Most Nassau residents have a genuine pride in their hospitable rural communities and seek to maintain their way of life.

The county offers various amenities including small-town coastal living with clean sandy beaches, world-class golf and luxury resorts such as The Ritz-Carlton and Amelia Island Plantation, tennis courts, kayaking, boating, fishing, horseback riding, and close proximity to the Jacksonville International Airport - only 30-minutes away.

In addition to desirable coastal living, many new migrants are looking for the country living with city amenities that the Western part of the county can provide. The communities of Bryceville and

²² Benedict, Mark A. *Green Infrastructure: Linking Landscapes and Communities*. 2006 Island Press. pg. 63

²³ The University of Florida's "History of the School of Forest Resources & Conservation and the Austin Cary Memorial Forest." Florida's Early Forests 1502-1935.

Hilliard are two great examples of neighborhoods that have seen a surge in home prices as more Jacksonville residents look to purchase more house and land for less money than they can find in the city.

Nature based tourism:

Preserving natural resources is a central element for ensuring long-term conservation in Nassau County and provides sustainable economic opportunities for communities. Many jobs are available in the local economy, especially the eastern part of the county. Nassau County is a premier destination that attracts annually more than one million visitors (although total number of visitors was not available to account for golf, fishing or other beach activities, estimates for 2006 from Amelia Island State Park and Fort Clinch reported 407,973 visitors for 2006 through 2007).

The UF's Food & Resource Economics Department reported total Nature-based Recreation dollars that accounted for golf courses, hunting and trapping, and recreational fishing for Nassau County in 2006 totaled to \$20,900,000.²⁴ However, as shown in the table below, when you add other related services with all nature based tourism, for 2006, the Nassau County Tourist Department reported the tourism industry generated approximately \$274 million (or 35 percent) of the \$781.6 million in taxable sales in Nassau County¹³ and nearly \$17 million of the more than \$49 million of sales tax revenue collected in the county.

	TAXABLE SALES	SALES TAX
Restaurants/Lunchrooms	\$85,836,151	\$5,232,562
Taverns/Nightclubs	\$8,039,267	\$489,584
Hotels/Apt. Houses/etc.	\$152,085,488	\$9,325,367
Photographers, Photo Supplies	\$435,364	\$26,321
Gift, Card, Novelty Shops	\$6,092,052	\$367,658
Admissions	\$14,929,009	\$900,131
Rental of Tangible Property	\$3,301,240	\$198,706
Parking Lots, Boat Dockings	\$3,087,656	\$153,713
TOTAL TOURISM SALES	\$273,806,227	\$16,694,042
TOTAL TAXABLE SALES	\$781,621,030	\$49,257,160
Percentage of Total	35.03%	33.89%

Source: Florida Department of Revenue 2007/Nassau County Tourist Development Council - 2008.

The Nassau County economy is twice as dependent on tourism as the average Florida County. Major attractions include Amelia Island Plantation, Ritz-Carlton, White Oak Plantation, historic Fernandina Beach and American Beach.²⁵ Nature based tourism will continue to grow as visitors discover the two pristine rivers and long expanse of beaches. In any nature preservation plan the County should considered expanding its trail base (hiking, biking and paddling) as the trends show visitors are looking for those amenities

Jobs created by the Agricultural industry in Nassau County for 2006 totaled 113.

Collectively, tourism is the largest employer in Nassau County -- providing approximately 21% of all jobs (Florida Legislative Research).

New regional events have also recently been launched to continue to draw this demographic in with festivals such as the "Wild Amelia Festival" which was held for the second year in May of 2008. Both years had paid participation by more than two-hundred visitors and considered a success by the organizers and festival sponsors.²⁶

²⁴ "Economic Contributions of Agriculture, Natural Resources, Food & Kindred Product Manufacturing, Distribution and Related Services in Northeast Florida Counties in 2005". Dr. Alan Hodges, University of Florida. April 3, 2008

²⁵ Nassau County Growth Management Department. "Community Assessment Report", March 2008.

²⁶ Personal communication information from Wild Amelia Organizers, Kayak Amelia. April 18, 2008

4b. Flood Protection Benefits

Wetlands, estuaries, and forested areas provide valuable flood storage from rainfall and storm water runoff. They are a natural filtration system that retain and clean the runoff that comes from roads, rooftops, and concrete or paved areas. The filtration function is a result of the absorption that vegetative buffers provide. Many studies have been done to reflect the benefits of vegetative buffers. For example, a fact sheet produced by USFWS found that vegetative buffers that exceed 100 feet

help to maintain clean water quality and provide habitat for diverse stream invertebrates; buffers that are 300 feet provide bird corridors; and 1,000 foot buffers maintain reptile and amphibian habitat and habitat for interior forest species; with 1,500 foot buffers providing habitat for protected species historically found in the St. Marys River basin such as the Flatwood Salamander.²⁷

Wetlands form part of the natural system of land and water that help make human communities livable. Many wetlands help control flooding and reduce damage from storm surges. They trap sediments and pollutants that otherwise might enter waterways. Wetlands help to recharge groundwater in some areas. In tidal zones, wetlands provide nurseries for shellfish and fish. They also serve as habitat for birds, amphibians, and other wildlife and provide natural areas in urban and suburban environments.²⁸

More than a third of the county is considered an aquifer recharge area and has a considerable amount of wetlands and floodplains.²⁹ See Chapter Two for maps reflecting the county's wetland areas.

From 1994-2004, Nassau County lost .84% of its wetland cover (note: This percentage does not reflect any changes that occurred for the years 2005, 2006, or 2007).³⁰ Losing important wetland areas that serve as storage for storm runoff and help control flooding and minimize property damage from storm surges present county expenditures in the form of public works activities necessary to correct flooding problems and potential expenses associated with remedying cumulative water quality impacts. It is also not prudent to assume that Federal or State subsidizing for flooding problems through the National Flood Insurance Program will be available in the future.

Nassau County, like every other Florida county is required to develop a "Local Mitigation Strategy Report" (LMS)³¹ to reduce the vulnerability of Florida's communities to future disasters through a planning process that involves broad input from the public.³²

In Nassau County's most current LMS completed in 2004, the LMS Task Force undertook a comprehensive hazards look at what actions need to be taken in order to minimize potential damage that could occur when the next natural disaster strikes, e.g., hurricanes, storm surges, high winds, freshwater flooding, floodplain flooding, and wildfires to name a few and included project recommendations to prevent or alleviate consequences that result from disasters.

²⁷ Buffers: An Efficient Tool for Watershed Protection Fact Sheet. U.S. Fish and Wildlife Service. September 2001.

²⁸ Environmental Law Institute. Planner's Guide to Wetland Buffers. March 2008.

²⁹ Florida Aquifer Recharge Map. St. Johns River Water Management District, Water Resource Atlas. 2003.

³⁰ Land use analysis based on St. Johns River Water Management District's 1994 and 2004 Florida Land Cover and Land Use Classification System for Nassau County, Florida. S. Beville, April 2008.

³¹ The Florida Hazard Mitigation Strategy is a statewide initiative, under the direction of the Department of Community Affairs, to foster the development of a Local Mitigation Strategy (LMS) in each of Florida's 67 counties.

³² The LMS is a voluntary long term activity that is done in coordination with a local Task Force composed of various public and private stakeholders, the Florida Department of Community Affairs, and the Northeast Florida Regional Council - Nassau Local Mitigation Strategy. 2004.

The LMS is intended to supplement existing public community documents that previously addressed hazard mitigation and long term recovery and compiled from existing adopted Goals, Objectives, Policies, and Ordinances, all of which make up the LMS Guiding Principles. The Guiding Principles are not meant to provide a fixed master plan for the future development, but are intended to provide the guidelines for revision of development regulations and to focus future policy development on the LMS goals. LMS Goals aim to:

1. Protect the lives of the citizens of Nassau County
2. Minimize or eliminate damages to personal residences in Nassau County.
3. Insure protection of existing infrastructure in Nassau County.
4. Insure viability and continued operation of healthy care delivery.

Some Guiding Principles excerpted from the Nassau LMS that simultaneously support natural resource preservation and provide economic benefits to Federal, State and local government and county property are listed in Appendix A3.

The Nassau LMS report cited the three most damaging natural disasters (in order of most damaging) included hurricane/tropical storm; storm surge; and flooding. Areas most vulnerable to all three-disasters include the coast, inter-coastal waterway, and along the St. Marys and Nassau Rivers. These are the areas most vulnerable to the effects of hurricane storm surge, wind, and freshwater flooding.³³

Preserving the county's wetlands, coastal and estuarine areas, and a riparian corridor along the St. Marys and Nassau rivers would allow Nassau County to prevent losses to both lives and property while simultaneously preserving its most sensitive natural resources.

4c. Health & Environmental Benefits

People benefit from a multitude of resources and processes that are supplied by natural ecosystems. Collectively, these benefits are known as ecosystem services and include clean drinking water, clean air and processes like the decomposition of wastes.

Ecosystems provide "services" that: moderate weather extremes and their impacts; disperse seeds; mitigate drought and floods; protect people from the sun's harmful ultraviolet rays; cycle and move nutrients; protect stream and river channels and coastal shores from erosion; detoxify and decompose wastes; control agricultural pests; maintain biodiversity; generate and preserve soils and renew their fertility; contribute to climate stability; purify the air and water; regulate disease carrying organisms; pollinate crops and natural vegetation. As human population grows, so does the resource demand imposed on ecosystems.

It is difficult to quantify the economic benefits of ecosystem services without specific economic research or studies that document expenses incurred from flooding or water quality improvement programs. Nor can you project what the local economic benefits of carbon sequestration would be without doing a specific study of the potential for carbon sequestration projects in the county. However, preventing water quality degradation, protecting flood prone or erosion areas, and maintaining forested areas that purify the air we breathe have proven to be less expensive than the

³³ Nassau County Local Mitigation Strategy, 2004, pg. 33

social, environmental, and economical expenses of 'fixing' ecological systems that sustain our quality of life.

In addition to ecosystem services provided by functioning ecological systems, people derive other health benefits from protected natural areas. Health benefits afforded to people by the recreational opportunities communities provided by preserved green infrastructure include contact with nature, physical activity opportunities (i.e., increase fitness and reduce obesity) and enhanced well-being.

Chapter One Key Findings

Nature Based Tourism: Totaled to \$274,000,000 in 2006. Total jobs created by the Agricultural industry in Nassau County for 2006 totaled 113 (refer to Appendix A4 and previous Tourist Development Council table).

Forest Products Industry: Totaled to \$973,500,000. Total jobs created by the Forest Products industry in Nassau County for 2006 totaled 7,564 (refer to Appendix A4).

Total Economic Contributions of Nature Based Tourism and Forest Products Industry: Total \$1,247,500,000

Ecosystem Services: Although we can not put a value on clean air, clean water, or clean soil and land, many studies have shown that these valuable resources are directly linked to a community's quality of life. Following recommendations included in the Nassau LMS report would also benefit human life and property while simultaneously preserving natural resources. In addition, studies have shown that home buyers are more willing to pay for their green space view and thus impact a county's tax base.³⁴

³⁴ *Economic Impacts of the Forest Industry in Florida, 2003.* Alan W. Hodges, W. David Mulkey, Janaki R. Alavalapati, Douglas R. Carter and Clyde F. Kiker. University of Florida, Institute of Food & Agricultural Sciences, Food & Resource Economics Department and School of Forest Resources and Conservation. Revised January 7, 2005

Chapter Two: Conservation Goals of Nassau County

2.1 Introduction to Natural Resources of Nassau County

Nassau County has a tremendous, indeed perhaps unparalleled, opportunity for a county contiguous with one of Florida's largest and most vibrant population and cultural centers (i.e., City of Jacksonville/Duval County) to plan its future growth while taking into account how conservation lands can shape and direct that growth such that the county remains a viable, sustainable and livable community with a high quality of life far into the future.

As seen on the consolidated Nassau County Land Use maps (Appendix B1 & B2 – as based on St. Johns River Water Management District classification data), the County is currently dominated by both private and public silvicultural lands, mostly planted pinelands. This was true in 1995 and such forestry land uses still hold as the predominate pattern according to 2005 data. As noted in Chapter One, this commercial and industrial forestry land contributes enormously to the economy and character of life of Nassau County and represents an important asset that should be highly valued by residents throughout the County. A large number of wetland natural community types – from estuarine-influenced salt marshes to a variety of freshwater riverine and stream systems – are also significant natural resource attributes of Nassau County. Various forms of row crop and cattle ranching agriculture are scattered throughout the County, but are most substantial in the central and western portions of Nassau County. Urban and commercial land uses dominate Amelia Island (Fernandina Beach and southward) and continue through the eastern portion of the County along the major transportation routes of A1A and U.S. 17 (Yulee). While there is a break in this urbanization in central Nassau County, such urban, industrial and commercial development is apparent in the western portion of the County surrounding the economic centers of Callahan and Hilliard along U.S. Highways 1 and 301 (and extending eastward along A1A toward Yulee). Scattered, yet more limited, development is seen along C.R. 121 as it parallels the St. Marys River before intersecting with U.S. 1 and 301 at Boulogne.

This broad distribution of natural resource-based land uses and patterns of growth allow the leadership of Nassau County to plan for future growth and economic needs, while taking into account land conservation planning and practices that can protect the County's vital and renewable/sustainable natural resources. While many communities throughout Florida already exhibit an engrained pattern of land uses that threaten to fragment large blocks of habitat, encroach on riverine and stream corridors and other resources – including vast areas of ranchette type sprawl – Nassau County still has the opportunity to adequately plan for its future. While limiting the kind of sprawl that plagues many other counties, yet still allowing for further urban, commercial and industrial development and the establishment of varied economic engines, it can at the same time provide the Green Infrastructure to safeguard its key environmental resources. Although it is well-known that many people seek a rural life style and that they want to live on 5, 10 or 20 acres – this kind of life style is just one aspect of why Nassau County is so attractive to potential residents, as well as its clean, glittering beaches, high-end Island living and marsh-front lots – such growth can be accommodated through various planning and conservation techniques (see Chapter One) without detrimentally impacting its natural, life-sustaining resources.

The abundant natural and hydrological resources of Nassau County – if planned carefully and utilized wisely – can accommodate additional high-end real estate development that can capitalize on the natural beauty of the County's coastal marshes and rivers, while providing for ecologically meaningful setbacks and buffers to these fragile freshwater and estuarine resources. Nassau County can continue

to capitalize on its close proximity to the City of Jacksonville and become an even more desirable, destination community by offering a high quality of living and rural life-styles for those working in stressful urban environments. Clustering of home sites with large acreage set aside as natural resource and a recreational amenity for the residents is becoming an increasingly economically and environmentally efficient style of development. By engaging in such clustered, high-end developments, Nassau County should be able to increase its tax base while at the same time conserving the natural resources that make the County such a desirable place to live and work. Indeed, by capitalizing on its existing transportation routes, Green Infrastructure and physical location, Nassau County can continue to protect its environment, yet grow in a carefully planned way that will enhance it as one of the leading "Gateways" into Florida.

Physical and Geologic Setting

Nassau County lies within the Atlantic Coastal Plain province. Much of the County is underlain by rock of the "Charlton" Formation, Miocene age phosphatic clays and argillaceous and sandy limestones. Surficial layers are composed of Pleistocene period sediments deposited by marine and fluvial forces. At a finer level of detail, the region in which Nassau County is located has been divided, as based upon geomorphology, into five physiographic regions.³⁵ Most of Nassau County is almost equally divided between two physiographic provinces: the western portion is situated within in the region known as the Duval Upland of northeastern Florida, while the St. Marys Meander Plain lies contiguous with and just east of the Duval Upland (see Appendix B3). The Duval Upland is flanked immediately to its west by the northern portion of the high, sandy Trail Ridge physiographic province. A small portion of the Trail Ridge is found in the extreme southwestern portion of the County, while further west (in Georgia) the Okefenokee Basin is the dominant geomorphologic feature. At the mouth of the St. Marys River is the Sea Islands region, assignable to the Atlantic Beach Ridges physiographic province that is the prevailing formation along the extreme eastern portion of Nassau County.

The Duval Upland region is an extensive area extending from northern Putnam County, Florida, into southern Georgia. This upland system is generally characterized by rolling topography and mature stream dissection, particularly along its northern and western borders adjacent to the St. Marys River. The Duval Uplands range in elevation from 25 to 100 feet above mean sea level (MSL). Much of the Duval Uplands province was likely longleaf pine-dominated Mesic Flatwoods with interspersed swamp forests of hardwoods and cypress. Most of these uplands have also now been converted to commercial silvicultural operation (i.e., pine plantations). Along the western slope of this upland where the St. Marys River runs northward for some 40 miles, small tributary streams are numerous and drain much of this area.

The St. Marys Meander Plain, which is comprised of fluvial and marine sediments deposited during the Pleistocene, is generally low and flat with elevations ranging from 5 to 25 feet above MSL. This portion of Nassau County contains nearly level to gently sloping, moderately to poorly drained sandy soils. Some areas also exhibit level, poorly drained, saline, organic soils underlain by a clayey substrate. The poorly drained upland areas were vegetated with longleaf and slash pine Mesic Flatwoods, which today also have been replaced mostly with commercial pine plantations. Scattered live oak hammocks also commonly occur within this region. The Trail Ridge is a relic Pleistocene barrier ridge that ranges from 100 to 150 feet above MSL and was historically longleaf pine dominated Mesic Flatwoods and xeric Sandhills. Three other relic Pleistocene islands formations

³⁵ White W.A., 1970. Geomorphology of Florida Peninsula, Fla. Dep. Nat. Resour. Geol. Bull. #51.

occur in Nassau County, with two of these (Roses Bluff and Evergreen Hill) in the northern portion of the County just south of the St. Marys River, while the third (Yulee Hill) occurs near the town of Yulee.

2.2 Parks, Greenways & Recreational Lands

Nassau County currently has a significant array of state, local and private conservation lands (i.e., Managed Areas), as well ongoing projects on the current Florida Forever list.³⁶ This system of protected areas has contributed to the economy and quality of life of the County, particularly through tourism dollars, as well as continuing forestry operations of public lands that are managed by the Division of Forestry. Additionally, the presence of several, active Florida Forever projects well demonstrates the importance of the natural, hydrological and archaeological resources of Nassau County from a statewide perspective. The Nassau County Managed Areas and Florida Forever Projects map (see Appendix B4) depicts all of these protected lands in the County.

The 1,362-acre Ft. Clinch State Park at the northern tip of Amelia Island is a premier destination for tourists visiting this spectacular and ecological important barrier island. Established in 1935, Ft. Clinch State Park supports large areas of Maritime Hammock, Coastal Strand and large Beach Dunes. It also provides habitat for numerous Neotropical migratory bird species and is the site of the United States champion myrtle oak.

Along with Ft. Clinch, the 230-acre Amelia Island State Park at the extreme southern end of Amelia Island also affords numerous recreational opportunities for the citizens and visitors to Nassau County. Amelia Island State Park encompasses some of the remaining barrier island natural communities that once covered the entire Atlantic Ocean coastal portion of the County, including Beach Dune, Coastal Swale and Maritime Hammock. Excellent fishing is well-known to those who avail themselves the use of this outstanding park and conservation land (refer to George Crady Bridge Fishing Pier State Park below).

These two parks are both contiguous with established state Aquatic Preserves – the Ft. Clinch State Park Aquatic Preserve (Nassau County only) and the Nassau River-St. Johns River Marshes Aquatic Preserve (both Nassau and Duval counties) that extend into the Atlantic Ocean as well as into surrounding estuarine systems. At 9,000 acres and 85,000 acres, respectively, these two State of Florida Managed Areas provide an enhanced degree of protection to the aquatic and fishery resources along the coastline of Nassau County.

Besides these two State Parks, Nassau County has two additional, albeit much smaller, State Parks: George Crady Bridge Fishing Pier State Park at 1.53 acres managed by the Florida Department of Transportation and the 0.8-acre Fernandina Plaza Historic State Park managed by the Division of Recreation and Parks within the Florida Department of Environmental Protection.

Besides these four outstanding State Parks, Nassau County boasts a fine array of three State Forests. Cary State Forest (along with Pine Log State Forest in Bay County) was one of the first State Forests established sometime around 1930. At 11,911 acres, Cary State Forest in southwestern Nassau County (and extending into adjacent Duval County) supports several intact natural communities including Mesic and Wet Flatwoods, Dome Swamps, Baygalls, and Sandhills. It supports numerous game and non-game wildlife species including white-tailed deer, Sherman's fox squirrel and gopher

³⁶ Florida Forever program is a state-funded conservation program that acquires land only from willing sellers.

tortoise, as well as at least one rare plant species, the purple balduina. An environmental education pavilion was built there in 1972.

Ralph E. Simmons State Forest in northern Nassau County protects 6.7 miles of direct frontage along the St. Marys River. At 3,638 acres this State Forest protects significant areas of longleaf pine-dominated Sandhill and Mesic Flatwoods, as well as several high quality Seepage Slopes and Slope Forest natural communities. The property also supports two Oxbow Lakes along the river, as well as numerous cypress-dominated Dome Swamps. White-tailed deer and wild turkey are two of the prized game species on the property, while at least two rare plant species are also found (Florida toothache grass and purple balduina). Originally called the Hercules Tract, the property was purchased in 1992 with the assistance of The Nature Conservancy and eventually renamed the Ralph E. Simmons State Forest in 1996.

One of Florida's newest State Forests, the 10,221-acre Four Creeks State Forest is situated in south-central Nassau County along the northern bank of the Nassau River at the confluence of several significant creeks systems that will be described below.

The Florida Natural Areas Inventory's database identifies the Timucuan Ecological and Historic Preserve as occurring in both Nassau and Duval counties. This 46,019-acre managed area is jointly held by the federal government (National Park Service) in cooperation with the State of Florida who both own lands within its boundaries. The Preserve consists of an array of marsh and forest lands located between the Nassau River and the St. Johns River and includes several historic sites of national significance, including the Ft. Caroline National Memorial and Kingsley Plantation.

The St. Johns River Water Management District owns and manages the 395-acre Geiger Tract near Cary State Forest.

The 316-acre Egans Creek Greenway is located on Amelia Island and is owned by the City of Fernandina Beach. The greenway consists of a series of tidal impoundments that provide habitat for a variety of Neotropical migratory and wading birds (e.g., wood stork, roseate spoonbill, and snowy egret), while the uplands – consisting of Upland Hardwood Forest and Maritime Hammock – provide habitat for the gopher tortoise, Florida's newly designated State Tortoise.

Additionally, there are several established trails and/or greenways that exist in Nassau County including the Cary State Forest Hiking Trails, the Ft. Clinch State Park Trail, the Ralph E. Simmons State Forest Trails and the St. Marys River State Canoe Trail (see Appendix B5).

The Nature Conservancy (TNC) holds two perpetual conservation easements over portions of the privately-owned St. Marys River Ranch. Located just west of the Ralph E. Simmons State Forest in northwestern Nassau County, the St. Marys River Ranch represents a highly significant conservation land. Together, the two conservation easements protect nearly 1,200 acres of varied and high quality habitats, as well as over five miles of direct frontage along the St. Marys River. A third conservation easement on this ecologically important property should be completed during 2008.

TNC has been active in proposing Florida Forever projects in Nassau County for ecologically significant tracts.

The two Florida Forever projects (designed by TNC) in Nassau County include:

The 146,164-acre Northeast Florida Timberlands and Watershed Reserve project is located along the southwestern boundary of Nassau County. The majority of this large, landscape-level conservation project, however, occurs in Duval and Clay counties and the project was intended not only to provide long-term protection for the commercial forestry operations in the region, but also to buffer numerous creeks as well as protect some of the region's Floridan aquifer recharge areas. Additionally, the project was designed to provide a landscape-sized wildlife corridor that would connect important habitat from Four Creeks and Cary state forests, all the way south to Camp Blanding.

The 9,500-acre Baldwin Bay/St. Marys River project that is located in extreme southwestern Nassau County. As described below, this project encompasses some very significant natural resources, including Brandy Branch, an old-growth Bottomland Forest and some intact Mesic Flatwoods managed for long-rotation (i.e., saw log) timber.

Additionally, the Tiger Island/Little Tiger Island project represents a significant resource that should also become a Nassau County conservation priority. At 1,260 acres, this project will close a protection gap in a network of National and State Parks/Preserves stretching from St. Andrews Sound in Georgia to the St. Johns River in Florida. Approximately 75% of the project is Estuarine Tidal Marsh along the St. Marys River, Amelia River, and a series of smaller connecting rivers and creeks. The remainder is comprised of Maritime Hammock on the elevated islands in the Tidal Marsh ecosystem. Surveys by the Florida Natural Areas Inventory show one of the highest nesting concentrations of Worthington's marsh wren and MacGillivray's seaside sparrow along the entire Florida coast. The U.S. Fish and Wildlife Service have proposed the Cumberland Sound side of Tiger and Little Tiger Islands as critical habitat for the wintering populations of the piping plover. Other rare, threatened or endangered species found there include Roseate spoonbill, Great egret, Piping plover, White ibis, Southern lip fern, Atlantic Coast Florida lantana and terrestrial peperomia.

2.3 Lands That Safeguard Wetlands, Watersheds and Wildlife Habitat and the economic and environmental benefits they provide

Nassau County encompasses a wide variety of highly important and ecologically valuable natural resources (natural communities, species and hydrology). This section will describe specific areas of the County that are vital to supporting the economy through direct financial benefits, as well as providing the underlying suite of ecosystem services that allow the County to function and thrive on a sustainable basis. The Nassau County Element Occurrence data provided by the Florida Natural Areas Inventory (FNAI) indicate that there are 17 different natural communities, 19 rare animals and nine rare plant species documented from the County (see Appendix B6 & B7). The Nassau County Natural Communities map (Appendix B8), based upon Landsat³⁷ data from the Florida Fish and Wildlife Conservation Commission (FWCC), shows the distribution of numerous natural communities as well as developed (i.e., "Urban") areas throughout the County.

The St. Marys River

The beautiful and historic St. Marys River has its origin in the Okefenokee and Pinhook Swamp regions of southeastern Georgia and northeastern Florida. The St. Marys River runs 150 miles along

³⁷The Landsat Program is a series of Earth-observing satellite missions jointly managed by NASA and the U.S. Geological Survey.

Nassau County's western and northern boundary before forming a large and highly significant estuarine community near its mouth with the Atlantic Ocean. The St. Marys is one of the few

riverine systems in the southeastern United States that has escaped major disturbance and alteration. While most of these riverine systems have been dammed, the St. Marys is still mostly free-flowing and supports high water quality along most of its length. Factors that have degraded other rivers in the region include clearcutting of adjacent forested land and the potentially negative impacts of agricultural, silvicultural, industrial and residential effluents. The St. Marys River is fortunate in that while there has been considerable and economically valuable forestry practiced along its banks, including areas that were clearcut, most of these lands were immediately replanted to pine plantations, thus limiting detrimental runoff and soil erosion. As well, the St. Marys flows through a relatively low density, rural region where there is less industrial or urban development than found along many other regional rivers. This latter situation is rapidly changing, however, as more people move into Florida – and Nassau County – particularly those seeking riverfront homes often serviced by potentially water quality degrading septic tanks.

Blackwater Stream (FFWCC = Open Water)

The Blackwater Stream natural community is comprised of the St. Marys River itself. As discussed above, the headwaters of this river lie principally in the Okefenokee Swamp (most of which is encompassed in a National Wildlife Refuge in Georgia), with a lesser contribution from the drainage basin of the Osceola National Forest. The St. Marys River conforms to all of the characteristics of a Blackwater Stream as defined by the FNAI and the Florida Department of Natural Resources³⁸ in that it, "originates deep in sandy lowlands where extensive wetlands with organic soils function as reservoirs, collecting rainfall and discharging it slowly to the stream. The tea-colored waters of Blackwater Streams are laden with tannins, particulates and dissolved organic matter and iron derived from drainage through swamps and marshes. The dark-colored water reduces light penetration and, thus, inhibits photosynthesis and the growth of submerged aquatic plants." As a consequence, and coupled with the typically steep banks and seasonal fluctuations in water level, the presence of aquatic and emergent vegetation is mostly confined to shallower and slower moving sections.

The upper portions of the St. Marys River support very little in the way of emergent or floating aquatic vegetation. As well, no substantial growth of rooted or submerged vegetation occurs in upstream portion of the river. For the most part, the vegetation that does occur along the river is closely associated with the shoreline and will be described below under the terrestrial communities. Because large portions of both banks of the river are covered with natural vegetation, much of the river provides a true wilderness experience for canoeist, kayakers, small boats and freshwater anglers. The ecotourism benefits that can be better developed along the St. Marys River should allow for substantial revenues through enhanced economic activity with the river at its center.

The other natural communities found directly along the St. Marys River include numerous Floodplain Swamp, Floodplain Lakes, Floodplain Forest and Bottomland Forest/Slope Forest. Near its mouth, these communities give way to Estuarine Tidal Marsh and Maritime Hammocks that have many recreational and economic benefits, both direct and indirect in terms of the ecosystem services they provide. Together the suite of natural communities found along the St. Marys River provide tremendous economic benefits in terms of natural flood control, a vast commercial and sport fisheries nursery ground (including shell fish), are part of a nationally-recognized migratory bird route

³⁸ Florida Natural Areas Inventory and Department of Environmental Protection. 1990. Guide to the Natural Communities of Florida. p111.

(bird watching), production of wood-based building products and fiber/pulp supplies from commercial forestry activities, barriers against hurricane and other storm surges, protection of land

from erosion, carbon dioxide sink in salt marsh grasses and accumulating sediments, building land, wildlife habitat and production, hunting opportunities, canoe and kayak livery services and row crop-based food production. Indeed, with the prices of basic commodities escalating rapidly, such food, fiber and fuel (biofuel) production on valuable farmlands with rich soils adjacent to the river is more important than ever to our sustainability, at the local (i.e., Nassau County), regional and national levels.

Floodplain Swamp (FFWCC = Cypress Swamp, Hardwood Hammock)

Immediately contiguous with large stretches of the upper and middle St. Marys River is a well-developed Floodplain Swamp community. This community is characterized by an overstory of relatively dense growth of bald cypress (*Taxodium distichum* – many of them quite large and considered old-growth individuals), mixed predominately with individuals of swamp blackgum or tupelo (*Nyssa biflora*). Many of the trees of both species can be described as secondary old-growth, forming a canopy ca. 40-60 feet high with most individuals of both species well buttressed and having large diameters. Depending on the density of the canopy, the subcanopy may be either dense or consist of more scattered individuals of several hardwoods, including pop ash (*Fraxinus caroliniana*), red maple (*Acer rubrum*), ogeechee lime (*Nyssa ogechee*), plane tree (*Planera aquatica*), swamp chestnut oak (*Quercus michauxii*), water hickory (*Carya aquatica*), sweetgum (*Liquidambar styraciflua*), stiff cornel (*Cornus foemina*), bluebeech or musclewood (*Carpinus caroliniana*) and diamondleaf oak (*Quercus laurifolia*). At several places within the floodplain, often on slightly elevated hummocks or ridges, large individuals of loblolly pine (*Pinus taeda*) are occasionally found.

The groundcover and/or shrub layer is typically poorly developed (due to intense shading) but often supports many individuals of little bluestem (*Sabal minor*), buttonbush (*Cephalanthus occidentalis*), sebastian bush (*Sebastiania fruticosa*), lizard's tail (*Saururus cernuus*), titi (*Cyrilla racemiflora*), wax myrtle (*Myrica cerifera*), twinflower (*Dyschoriste humistrata*), false nettle (*Boehmeria cylindrica*) and spikegrass (*Chasmanthium latifolium*) and chainfern (*Woodwardia areolata*). A prominent vine, rattan vine (*Berthemia scandens*), also occurs commonly in these forests. Although no true old-growth stands occur within this community (a few old-growth individuals do occur, however), the fact that it has not been logged or otherwise disturbed in many years (estimated at 50-60+ years), establishes this area as a high quality example of this community type.

Brandy Branch

A significant and high quality example of the Floodplain Swamp natural community in southwestern Nassau County is represented by the Brandy Branch system. This Floodplain Swamp drains a large area just south of Cary State Forest and runs westward to the St. Marys River where it forms a vast Floodplain and "Riverine" Swamp at its confluence with the river. This single forested wetland system alone encompasses almost 4,000 acres of an intact, high quality Floodplain Swamp natural community. Because of its high quality, the area was included in The Nature Conservancy's Baldwin Bay/St. Marys River Florida Forever conservation land acquisition project.

The Floodplain Swamp at this location is characterized by an overstory of a relatively dense growth of bald cypress (*Taxodium distichum*) – some of which are huge, old-growth

individuals – mixed with individuals of swamp blackgum (*Nyssa biflora*) and red maple (*Acer rubrum*). Many of the trees can be described as secondary old-growth, forming a canopy 40-60 feet high with many individuals of all three species well buttressed and having good diameters. Depending on the density of the canopy, the subcanopy may be either dense or

consist of more scattered individuals of several hardwoods, including pop ash (*Fraxinus caroliniana*), ogeechee lime (*Nyssa ogeeche*), plane tree (*Planera aquatica*), water hickory (*Carya aquatica*), and diamondleaf oak (*Quercus laurifolia*). At several places within the floodplain, often on slightly elevated hummocks or ridges, large – both in height and diameter – individuals of loblolly pine (*Pinus taeda*) are not uncommon.

The groundcover and/or shrub layer is typically poorly developed but may support a few individuals of bluestem (*Sabal minor*), buttonbush (*Cephalanthus occidentalis*), sebastian bush (*Sebastiania fruticosa*), false nettle (*Boehmeria cylindrica*), lizard's tail (*Saururus cernuus*), sedge (*Carex* spp.), southern shield fern (*Thelypteris kunthii*) and chainfern (*Woodwardia areolata*). A prominent vine, rattan vine (*Berchemia scandens*), also occurs commonly in these forests. Although only a few old-growth bald cypress occur within this community, the fact that the majority of this area has not been logged or otherwise disturbed in many years (estimated at 50+ years), establishes this area as a high quality example of this community type that should be conserved.

Numerous vertebrates use the floodplain corridors along and adjacent to the St. Marys River, particularly American alligator, bald eagle, osprey, wild turkey and occasional Florida black bear, among others. High quality, little disturbed Floodplain Swamp communities provide excellent habitat for many species dependant on this forested wetland system. The contribution that the largely undeveloped St. Marys River frontage makes to continued high water quality, ecological integrity and aesthetic/recreational values of Nassau County and the entire surrounding region is of high importance.

Floodplain Lake/Oxbow Lake

There are numerous good to high quality Floodplain Lakes that occur within Nassau County, most all in association with the St. Marys River. These lakes are likely former river channels (i.e., oxbow lakes) that have been cut-off from the present channel by the process of stream meandering. These are typically located within the floodplain and are confluent with the river during flood stages, or even in times of moderately high water levels in the river. These lakes are little disturbed in terms of their overall ecological context, being embedded mostly within the Floodplain Swamp natural community.

The vegetation surrounding these Oxbow Lakes is very similar to that of the encompassing Floodplain Swamp community being dominated by bald cypress, ogeechee lime (or tupelo), and pop ash around the immediate periphery, with red maple, sweetgum, water (*Q. nigra*) and diamondleaf oak, stiff cornel (*Cornus foemina*) and swamp blackgum completing the overstory away from the lake edges. There may also be a well-developed shrub layer consisting of titi (*Cyrilla racemiflora*), dog-hobble (*Leucothoe racemosa*), Virginia willow (*Itea virginica*), little bluestem, sebastian bush, wild azalea (*Rhododendron canescens*) and wax myrtle (*Myrica cerifera*). The groundcover is sparse but includes chainfern and rush (*Juncus* spp.) among a few others. The lakes themselves support a few emergent aquatic plants including mud plantain (*Heteranthis dubia*) and spatterdock (*Nuphar luteum*), as well as floating duckweed (*Lemna* aff. *obscura*).

These communities are an important component of the riverine aquatic ecosystem. Besides receiving periodic inputs and flushing of nutrients during times of flooding, the Floodplain Lakes are important breeding grounds for numerous vertebrates, including fishes, amphibians, reptiles, and birds. These lake systems often serve as important feeding areas for many wading birds and others

such as kingfishers (*Megaceryle alcyon*), wood ducks, white ibis (*Eudocimus albus*), great blue herons (*Ardea herodias*) and great egrets (*Casmerodius albus*).

Floodplain Forest (FFWCC = Hardwood Hammock, Mixed Pine-Hardwood Forest)

The Floodplain Swamp may grade abruptly – toward the river – into a unique kind of Floodplain Forest community along portions of the rivers edge. This particular shift in community type is due to higher elevations and a better drained substrate, coupled with a lower accumulation of organic material that is either the result of frequent overwash, periodic fire, or both on the levee.

A pronounced, sandy river berm or levee typically occurs parallel to the river, often as part of, and/or just behind, a relatively high bank system. This community type also falls under the broader FNAI classification of Floodplain Forest as stated in the 1988 Lynch and Baker report for a site along the central St. Marys River, "A broad natural levee adjacent to the river contains a distinctive community of statewide significance". Staff from The Nature Conservancy has also documented this community type from additional locations along the St. Marys River.

The community is herein termed the **River Berm/Levee Forest** and supports a tall, but partially open canopy of numerous tree species. The emergent trees of this forest include loblolly and spruce (*P. glabra*) pines, many of them 60-80 feet tall, with large diameters. Beneath the pines, is a well-developed stratum consisting of live and laurel oaks (*Quercus virginiana* and *Q. hemisphaerica*, respectively), swamp blackgum, overcup oak (*Quercus lyrata*), water oak, sweetgum and red bay (*Persea borbonia*), with occasional individuals of red maple. A short, open canopy comprised mainly of Carolina willow (*Salix caroliniana*) and river birch (*Betula nigra*) may also occur where this community grades toward the river in low spots. The subcanopy is well populated with titi, wild azalea, American holly (*Ilex opaca*), sparkleberry (*Vaccinium arboreum*), sebastian bush, wax myrtle, parsley haw (*Crataegus marshallii*) and wild olive (*Osmanthus americanus*). A shrubby stratum dominated by saw palmetto (*Serenoa repens*), with scattered individuals of highbush blueberry (*Vaccinium corymbosum*) and St. Andrew's-cross (*Hypericum hypericoides*). Occasional patches of cane (*Arundinaria gigantea*) may also occur. Several vines such as fox grape (*Vitis rotundifolia*) and catbrier (*Smilax bona-nox*) are also found. The groundcover varies from sparse to dense, consisting of redbud panicum (*Panicum rigidulum*), spikegrass, innocence (*Hedyotis procumbens*) and woods basketgrass (*Oplismenus setarius*), among a few others.

This aesthetically pleasing community is apparently confined to river levees along the St. Marys River, although a very similar community has also been noted at several places with high, sandy banks along the Suwannee River. Its apparent uniqueness along Blackwater Streams originating in the Okefenokee-Pinhook Swamp system should make the preservation of high quality examples of this community type a priority for Nassau County conservation efforts. Other floodplain communities occurring on river levees in Florida are known to provide excellent habitat for a diverse array of vertebrate species, particularly migratory and breeding birds.

In terms of what can be termed a Floodplain Forest, there is an additional kind that occurs along the upper and central reaches of the St. Marys. This community type is a riverine-influenced system that

is defined as much by its species composition – i.e., a plant community – as by its geographic, edaphic and localized microsite conditions. This community occurs directly along the low, sandy shores of the river where there is ample and frequent flooding, associated with the deposition of river-carried sand and silt. In some instances the community is probably an developing river berm or levee, depending upon future shifts in the meander plain of the river. These overwash areas within the floodplain support a sparse, early successional forest that staff within The Nature Conservancy

have termed a *Sandy Overwash Plain* community. This community is dominated by relatively few tree species including Carolina willow, river birch (*Betula nigra*), overcup oak (*Quercus lyrata*) and pop ash. Because of frequent overwash, any shrubby understory is usually very sparse, if it exists at all. The few herbaceous species that do occur include switchgrass (*Panicum virgatum*), boneset (*Eupatorium serotinum*), cyperus (*Cyperus* aff. *brevifolius*), micranthemum (*Micranthemum umbrosum*), mikania (*Mikania scandens*) and whitegrass (*Leersia virginica*).

Bottomland Forest/Slope Forest (FFWCC = Bottomland Hardwood Forest, Hardwood Hammock)

There are several areas of high quality Bottomland Forest in close association with the St. Marys River (and at potentially other locations with Nassau County). This community is usually found just upslope from the Floodplain Swamp and just downslope from the River Berm/Levee Forest, in areas that are low enough to be seasonally moist, not so much as from an occasional large-scale flood event as perhaps from retention of precipitation on their richer, organic- and clay-based soils. This community type appears to develop best on deeper, heavy soils that exhibit some saturation because of their proximity to the water table. Another factor contributing to the mesic/hydric conditions of this community appears to be the infrequent hydrologic input from Seepage Streams that run through these areas and may have their defined channels terminate near these bottoms or occasionally flood into this community. Whatever the reasons fostering their development, these systems also support a diverse tree stratum.

Several well-developed, virtually closed canopy Bottomland Forests occur within Nassau County and consist predominately of large individuals of several hardwoods including, pignut hickory (*Carya glabra*), swamp chestnut oak (*Q. michauxii*), American elm (*Ulmus americana*), tulip tree (*Liriodendron tulipifera*), sweetgum, red maple, laurel oak, swamp blackgum, and occasional, large live oaks. Impressive but scattered individuals of two conifers, spruce pine and loblolly pine, also occur in the high canopy. There is a well-developed subcanopy/shrub stratum of smaller trees that typically includes water, diamondleaf and overcup oaks, red bay, bluebeech (*Carpinus caroliniana*), parsley haw (*Crataegus marshallii*), red buckeye (*Aesculus pavia*) and stiff cornel. The groundcover is sparse and open with a few species such as little bluestem, southern shield fern (*Tbelypteris kunthii*), twinflower (*Dyschoriste humistrata*), spikegrass (*Chasmanthium latifolium*), sensitive fern (*Onoclea sensibilis*), woods basketgrass, savannah panicum (*Panicum* aff. *gymnocarpon*), Eastern gamagrass (*Tripsacum dactyloides*) and cane, among a few others. There are also a few needle palms (*Rhapidophyllum hystrix*) in the widely spaced, shrubby stratum of this community – typically on somewhat higher ground or on slightly sloping areas.

Baldwin Bay/St. Marys River

An incredible, high quality example of the Bottomland Forest community type occurs in the north-central portion of the Baldwin Bay/St. Marys River Florida Forever project.

Reminiscent of what some might term an “Old Florida Hammock,” the vegetation is somewhat intermediate between several community types, including Bottomland Forest, Hydric Hammock and Upland Hardwood Forest. The, often very large diameter, canopy species of this community include swamp chestnut oak, live oak, southern magnolia (*Magnolia grandiflora*), sweetgum (*Liquidambar styraciflua*), American elm (*Ulmus americana*), basswood (*Tilia americana*), water oak, pignut hickory (*Carya glabra*), laurel oak (*Q. laurifolia*) and swamp tupelo (*Nyssa sylvatica*). The subcanopy includes such species as red bay (*Persea*

borbonia), hophornbeam (*Carpinus caroliniana*), American holly (*Ilex opaca*) and scattered cabbage palms (*Sabal palmetto*). The open, shrubby understory includes such species as needle palm (*Rhapidophyllum hystrix*), little bluestem, wax myrtle and witch hazel (*Hamamelis virginiana*), southern fox grape (*Vitis rotundifolia*), cross vine (*Bignonia capreolata*), cat brier (*Smilax bona-nox*), wild pine (*Tillandsia setacea*) and resurrection fern (*Polypodium polypodioides*), among a few others.

The Nassau River

The Nassau River in south-central Nassau County is formed by the confluence of four prominent creek systems: Thomas Creek (with its headwaters near Cary State Forest), Alligator Creek (with headwaters near Callahan), Mills Creek and Snell Swamp (with headwaters forming east of Hilliard) and Plummer Swamp Creek (with headwaters south of County Road 108 and west of I-95). All of these creeks have their origins in north-central Nassau County. These creeks are the namesake of the relatively new Four Creeks State Forest and all are prominently featured on the FNAI’s Potential Natural Areas map (Appendix B9). Almost from its inception, however, the vegetation along the Nassau River is dominated by the Estuarine Tidal Marsh and Maritime Hammock natural communities.

Because the eastern portion of Nassau County has the Nassau River as its boundary line between Duval and Nassau counties, areas along this river have experienced more growth, development and population pressure than has the St. Marys River. For example, the Jacksonville International Airport in Duval County is in close proximity to both the Nassau River and one of its major tributaries, Thomas Creek. Partially because of this growth pressure in the area, recent conservation efforts along the Nassau County side (as described above) have sought to buffer this important natural and hydrological resource.

The natural communities along the Nassau River include Estuarine Tidal Marsh, Freshwater Tidal and some Maritime Hammock. Because the Nassau River has its origin in the several creeks mentioned above, this section will also describe the Creek Swamp natural community.

Estuarine Tidal Marsh (FFWCC = Salt Marsh)

The Estuarine Tidal Marsh natural community dominates a very large proportion of the area lying behind Amelia Island, and formed by the confluence of the combined St. Marys, Nassau and Amelia rivers. In fact, this community comprises the largest single acreage of any single community type in Nassau County, with the exception of the FFWCC’s Pinelands classification. This community is not only extensive, but is very well-developed and exhibits characteristics indicative of very high quality examples of this community type. This vast estuarine system is one of the most ecologically and economically significant along Florida’s northeastern coast.

Dominant species in the Estuarine Tidal Marsh community include smooth cordgrass (*Spartina alterniflora*) in what are often termed “low marsh” areas and black needle rush (*Juncus roemerianus*) and sawgrass (*Cladium jamaicense*) in what are often termed “high marsh” areas. Interspersed among these brackish water marsh systems are various small islands of what might be more appropriately termed “Coastal Flatwoods” – a variant of Wet Flatwoods with some maritime influence and a conspicuous understory of cabbage palms and southern red cedar (*Juniperus silicicola*). As well, a few succulent halophytes are found on sandy, salty, open flats throughout this area of Nassau County.

This community is highly significant as a nursery for many game and commercial fish species, important and economically valuable for hundreds of invertebrate species and as prime feeding grounds for a variety of avifauna, some of them rare and endangered. Although at least somewhat protected through regulatory means, the long-term conservation of this community type is not strictly assured. The cost of placing these resources into public ownership should be relatively small. The issue of the sovereignty of these habitats is beyond the scope of this ecological description and must be settled in the acquisition arena.

As noted immediately above, embedded within the Estuarine Tidal Marsh community, and typically positioned within the ecotone between it and the Coastal Flatwoods, are areas of the salt flat – or “salt pan”/“salt tern” – community. These botanically and ecologically interesting areas may support a variety of succulent plant species such as sea purslane (*Sesuvium portulacastrum*), glasswort (*Salicornia virginica*), marsh elder (*Iva frutescens*), sea oxeye (*Borrchia frutescens*), saltbush (*Baccharis halimifolia*), sea lavender (*Limonium carolinianum*), seaside goldenrod (*Solidago sempervirens*), salt grass (*Distichlis spicata*), narrow-leaved saltbush (*Baccharis angustifolia*), marsh hay (*Spartina patens*), sedge (*Cyperus* aff. *lecontei*), beachgrass (*Panicum amarum*), brown fimbriatylis (*Fimbristylis castanea*), morning glory (*Ipomoea sagittata*), cowpea (*Vigna luteola*), hairawn muhly (*Muhlenbergia capillaris*), camphorweed (*Pluchea rosea*), marsh pink (*Sabatia grandiflora*), gerardia (*Agalinis* aff. *filifolia*), fingergrass (*Chloris petraea*) and foxtail grass (*Setaria* aff. *geniculata*), among several others.

Freshwater Tidal Swamp (FFWCC = Mixed Wetland Forest?)

Overall, the Freshwater Tidal Swamp community occurs in association with the tidal and fresh water influences of small creeks and has an open canopy of southern red cedar (*Juniperus silicicola*) mixed with a sparse growth of laurel oak (*Quercus laurifolia*), cabbage palms an occasional slash pine, and under conducive environmental conditions (e.g., sufficient freshwater flows), red maple, red bay and swamp magnolia (*Magnolia virginiana*). Several shrubs are often located in this estuarine-influenced community, including Christmas berry (*Lycium carolinianum*), yaupon holly (*Ilex vomitoria*), wax myrtle (*Myrica cerifera*) and groundsel (*Baccharis halimifolia*). The sparse groundcover is often dominated by Carolina sea lavender, sea oxeye, sea purslane as well as several ferns (e.g., royal fern = *Osmunda regalis*).

Floodplain/Creek Swamp (FFWCC = Hardwood Swamp)

Several, extensive swamp and creek systems are found throughout the northern and central portions of Nassau County. While these may either be Blackwater or Seepage Streams, the vegetation along many of these is, perhaps, best characterized as Floodplain Forest that in places grade to Floodplain Swamp depending upon hydroperiods and the actual flow of water through the systems. As well, in areas surrounding the swamp or creek system, and that exhibit only infrequent water flows and/or flooding, a Hydric Hammock/Baygall community intergrade may develop. Overall, forested wetland (or “swamp”) vegetation in Nassau County is quite variable but may be generally characterized by having a tall (ca. 50-60 feet), closed canopy dominated by a diverse mixture of hardwoods. The

canopy dominants include red maple, swamp blackgum (*Nyssa biflora*), red ash (*Fraxinus pennsylvanica*), basswood (*Tilia americana*), American elm (*Ulmus americana*), swamp chestnut oak (*Q. michauxii*), diamond-leaf oak, water oak, sweetgum and bald cypress (*Taxodium distichum*), among a few others. The typically well-developed subcanopy of these systems consists of saplings and smaller individuals of the above-mentioned species as well as musclewood (*Carpinus caroliniana*), cabbage palm, stiff cornel, red bay, and some pop ash (*Fraxinus caroliniana*).

A shrubby understory, varying from mostly open to occasionally dense patches, may also occur and includes buttonbush (*Cephalanthus occidentalis*), dog-hobble (*Leucothoe axillaris*), Virginia willow (*Itea virginiana*), large-fruited gallberry (*Ilex coriacea*), and several others. An often luxuriant herbaceous groundcover occurs and includes rush (*Carex* spp.), cinnamon fern, southern cutgrass (*Leersia hexandra*), spikegrass (*Chasmanthium nitidum*), panicgrass (*Dicanthelium* aff. *dichotomum*), smartweed (*Polygonum hydropiperoides*), netted chainfern (*Woodwardia areolata*), beakrush (*Rhynchospora miliacea*), and lizard's-tail (*Saururus cernuus*), among others.

The often open to shrubby understory includes such species as needle palm (*Rhapidophyllum hystrix*), little bluestem (*Sabal minor*), wax myrtle and witch hazel (*Hamamelis virginiana*), among a few others. The herbaceous/ground layer, epiphyte and vine strata support nutrush (*Scleria* aff. *triglomerata*), beakrush (*Rhynchospora miliacea*), false nettle (*Boehmeria cylindrica*), southern shield fern (*Thelypteris kunthii*), cane (*Arundinaria gigantea*), prairie iris (*Iris hexagona*), lizard's tail (*Saururus cernuus*), pickerelweed (*Pontederia cordata*), sedge (*Carex* spp.), firweed (*Erechtites hieracifolia*), swamp mallow (*Hibiscus grandiflorus*), southern fox grape (*Vitis rotundifolia*), cross vine (*Bignonia capreolata*), cat brier (*Smilax bona-nox*), wild pine (*Tillandsia setacea*) and resurrection fern (*Polypodium polypodioides*), among others.

The ecological, and hence economic, importance of these varied creek and stream systems to Nassau County's natural resource base is enormous. Not only do they provide significant wildlife habitat, they flow into the larger riverine systems that feed and support the renowned estuaries of the St. Marys, Nassau and Amelia rivers. Without the protection of the lands that encompass the watersheds – often various kinds of pine flatwoods (see below) – that provide slow release of groundwater into these creeks and streams, the sustainability of Nassau County's timberlands and estuarine-based economic activities will be diminished.

Amelia Island/Amelia River

Amelia Island is widely recognized as one of the most important – and beautiful – barrier islands in northeast Florida. The significance of having a portion of this barrier island conserved in Ft. Clinch and Amelia Island state parks, and of having another portion accessible to the public through the City of Fernandina Beach's Nassau County's Egans Creek Greenway, cannot be overstated. Along with Cumberland Island to the north in Georgia, Amelia Island is part of the famed Sea Islands province. The island affords enormous recreational, tourism and residential/commercial opportunities, many of which have already been realized. Amelia Island is critical to the economy of Nassau County and having clean beaches has undoubtedly contributed enormously to the success of Amelia Island as a desirable destination and community. Barrier Islands are vital to lessening the impact of storm surge from hurricanes to adjacent inland areas and can potentially reduce property damage in such inland areas by millions of dollars. The beach dune systems found there are also important to the proper functioning of barrier islands in protecting the inland and coastal residents from such storm surges. As sea turtle nesting grounds, shore bird habitat and foraging areas, and as habitat for a large variety of Neotropical migratory birds along a renowned migration route, this is one of the finest natural resources in Nassau County.

Natural communities found on or in association with Amelia Island include Maritime Hammock, Beach Dune, Coastal Interdunal Swale and Mesic Flatwoods (this latter community type will be described in the next major section below).

Maritime Hammock (FFWCC = Hardwood Hammock, Live Oak Hammock, Mixed Pine-Hardwood Forest?)

The Maritime Hammock community represents a relatively small, but exceedingly important, prominent and characteristic feature of this region of Nassau County. Typically, Maritime Hammocks are found behind the Beach Dune community but between a zone of flatwoods and/or fringing Upland Mixed Forest community and the extensive Estuarine Tidal Marshes of the County. Maritime Hammocks within Nassau County are dominated by a canopy of mixed hardwoods, including live oak (*Quercus virginiana*) - the branches often supporting a luxuriant growth of resurrection fern (*Pohpodium polypodioides*) and Spanish moss (*Tillandsia usneoides*) - laurel oak (*Q. hemisphaerica*), southern magnolia (*Magnolia grandiflora*), hackberry (*Celtis laevigata*), black cherry (*Prunus serotina*), loblolly pine (*P. taeda*) and an occasional pignut hickory (*Carya glabra*). The subcanopy supports red bay, American holly (*Ilex opaca*), cabbage palm (*Sabal palmetto*) and sweetgum. An open, but shrubby, understory may include horsesugar (*Symplocos tinctoria*), Hercules'-club (*Zanthoxylum clava-herculii*), Cherokee bean (*Erythrina herbacea*), winged sumac (*Rhus copallina*), saw palmetto (*Serenoa repens*), beautyberry (*Callicarpa americana*), yaupon (*Ilex vomitoria*), sparkleberry (*Vaccinium arboreum*), scattered gallberry (*Ilex glabra*), poison ivy (*Toxicodendron radicans*), fox grape (*Vitis rotundifolia*), yellow jessamine (*Gelsimum sempervirens*), elephant's foot (*Elephantopus carolinianus*), panicgrass (*Dicanthelium dichotomum*) and catbrier (*Smilax bona-nox*), among others.

Beach Dune and Coastal Interdunal Swale (FFWCC = Coastal Strand, and sometimes showing up as "Urban")

The Beach Dune and Coastal Interdunal Swale communities will be described together since they are so well integrated and occur in close contiguity to each other. Both community types are well vegetated and exhibit such species as sea oats (*Uniola paniculata*), saltmeadow cordgrass (*Spartina patens*), beach grass (*Panicum amarulum*), hairawn muhly (*Muhlenbergia capillaris*), salt bush (*Baccharis angustifolia*), honeycomb head (*Baldwinia angustifolia*), sand squares (*Paronychia erecta*), seaside bluestem (*Schizachyrium maritimum*), spiderwort (*Tradescantia hirsutiflora*), Adam's needle (*Yucca flaccida*), blue curls (*Trichostema setaceum*), railroad vine (*Ipomoea pes-caprae*), tread softly (*Cnidocolus stimulosus*), sea rocket (*Cakile constricta*), milk pea (*Galactia microphylla*), telegraph weed (*Heterotheca axillaris*), October flower (*Polygonella polygama*), southern gaura (*Gaura angustifolia*), panicgrass (*Dicanthelium erectifolium*), ground-cherry (*Physalis* aff. *angustifolia*), seaside goldenrod (*Solidago sempervirens* var. *mexicana*), beach pennywort (*Hydrocotyle bonariensis*), hairy spurge (*Chamaesyce hirta*), cat briar (*Smilax auriculata*), frostweed (*Helianthemum arenicola*) and yellow-eyed grass (*Xyris caroliniana*), among others.

Interior Portion of the County

The interior portion of the County will be described in this single section, not because it is considered less important in terms of its natural resource base, but rather because it is more uniform in its overall natural community mosaic and the interrelationships of its communities. Much of the western 85% of Nassau County is dominated by vast timberlands, or commercial forestry/silvicultural (i.e., pine plantation) operations. Such timberlands have been a mainstay of the Nassau County economy - and the entire region - for decades, and one that should become evermore appreciated because they represent a truly sustainable natural resource. Having a high potential for becoming an even more "green" industry with continued long-term economic impacts,

silviculture can become an even more clean, environmentally friendly industry, and one that also helps to offset damaging carbon dioxide releases from fossil fuel consumption into the Earth's atmosphere.

Although pulp wood production will be needed for the foreseeable future, the opportunity to convert some areas of the County's timberlands to longer-term rotations for the growth of high dollar (particularly longleaf pine) saw timber will not only provide longer term financial returns to

their owners, but can lessen the environmental impact of frequent rotations, and the energy costs associated with harvesting, hauling, replanting and fertilizing. Such lands and the forestry activities conducted on them can also sequester more carbon dioxide from the atmosphere (especially on some of the finer, timber-producing soils throughout the central and western portions of the County). The emerging "Cap and Trade" markets in carbon credits may make it extremely lucrative for certain owners to begin utilizing their timberlands as such long-term carbon sequestration tracts.

Timberlands provide a vast array of ecosystem services and other economically valuable activities to their owners (besides just the wood/fiber production). These include: the fact that flatwoods are the major community type that form the terrestrial base of watersheds, wherein these pine/palmetto-based communities catch, store and slowly release rainfall thereby contributing to the formation of the County's productive and ecologically important creeks (and downstream, to its rivers and estuaries). Not only does much of this captured and stored rainfall seep into the ground to recharge local aquifers, thereby maintaining groundwater/drinking water supplies that are critical to the County's human population, but such a system of collection, storage and slow release is a major contributor to flood control efforts on a regional basis. Prevention of soil erosion, maintenance of soil productivity, wildlife habitat and production, oxygen production, hunting and other outdoor recreational opportunities and pine straw harvesting are quite lucrative enterprises. As well, these vast timberland tracts require very little in the way of traditional (and costly) governmental services such as schools, health care, utilities, road maintenance, police and fire protection, yet pay taxes and provide many jobs.

Overall, the interior areas of Nassau County can be characterized as having a flatwoods matrix through which other forested upland and wetland systems are interspersed. Most areas of these once dominant flatwoods now, however, exist mostly as remnant patches or have experienced significant alteration from the intensive silvicultural activities described above. The majority of the inland areas in the County in natural or semi-natural vegetative cover are typically planted in vast stretches of North Florida slash pine (*Pinus elliotii* var. *elliotii*) or loblolly pine (*P. taeda*) plantations, consisting of all age classes and various rotations, that have been planted in either areas of former *Mesic-Wet Flatwoods*, former *Wet Prairie* and/or former *Seepage Slopes*.

Although pine plantations now cover much of the interior portion of the County, the community structure and species composition of the former natural communities over which they were established are still reasonably intact and readily recognizable. Fortunately, because many of these Mesic-Wet Flatwoods/Wet Prairie/Seepage Slope systems have been only lightly bedded it would be relatively easy, if desired, to restore these systems back to their original community species composition and structure. It is also important to note that because flatwoods of all types in Florida are fire-adapted communities, their native species composition and structure thrive on periodic fire.

There are four distinct kinds of flatwoods that may be found within Nassau County, including North Florida slash pine (*Pinus elliotii* var. *elliotii*)-dominated Wet Flatwoods, pond pine (*P. serotina*)-dominated Wet Flatwoods, longleaf pine (*P. palustris*)-dominated Mesic Flatwoods, and longleaf pine-

dominated Scrubby Flatwoods. Most of these flatwoods, and some interspersed Sandhill areas, have been either logged and/or fire suppressed to varying degrees over the years. It is of note that "Pine Flatwoods" are recognized as an Under-represented Natural Community by FNAI for the purpose of evaluating Florida Forever projects, among other uses (see Appendix B10).

Wet Flatwoods (FFWCC = Pinelands)

The understory of slash pine-dominated Wet Flatwoods is mostly comprised of a thick growth of saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), wax myrtle (*Myrica cerifera*), winged sumac (*Rhus copallina*), and several other species. The predominately herbaceous groundcover consists of scattered clumps of wiregrass (*Aristida stricta*), although this species is not nearly a dominant member of the groundcover in such Wet Flatwoods, while such species as goldenrod (*Solidago fistulosa*), St. Johnsworts (*Hypericum cistifolium* and *H. tetrapetalum*), bracken fern (*Pteridium aquilinum*), broomsedge (*Andropogon virginicus*), meadowbeauty (*Rhexia mariana*), sabatia (*Sabatia macrophylla*), yellow-eyed grass (*Xyris elliotii*), panicgrass (*Dicanthelium* spp.), dog fennel (*Eupatorium mohrii*), and catbrier (*Smilax auriculata*), among many others occur commonly.

The remaining (i.e., often remnant, depending on level and type of site preparation techniques) groundcover is often dominated by a high density and cover of Florida dropseed (*Sporobolus floridanus*). Other herbaceous species in this diverse stratum include boneset (*Eupatorium aromaticum*), milk pea (*Galactia elliotii*), blackberry (*Rubus cuneifolius*), pineland daisy (*Chaptalia tomentosa*), blue-eyed grass (*Sisyrinchium* aff. *nashii*), longleaf violet (*Viola lanceolata*), sunflower (*Helianthus radula*), maidencane (*Panicum hemitomon*), elephant's foot (*Elephantopus caroliniana*), dicanthelium (*Dicanthelium* spp.), catbrier (*Smilax auriculata*), golden aster (*Pityopsis graminifolia*) and black senna (*Seymeria cassioides*), among several others.

The slash pine-dominated Wet Flatwoods are sometimes invaded by a series of hardwoods that include red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), sweetbay (*Magnolia virginiana*), red bay (*Persea borbonia*), and water oak (*Quercus nigra*), among several others. Within these flatwoods, there is typically evidence of good reproductive success with the establishment of many seedlings and saplings. Although this community type is now dominated by North Florida slash pine, it is probable that it was historically a predominately longleaf pine system and scattered individuals of this species may still be found scattered throughout.

Pond Pine Flatwoods (FFWCC = Pinelands)

Some good to high quality stands of pond pine-dominated Wet Flatwoods also occur throughout Nassau County. This community type represents a floristically and ecologically interesting kind of an increasingly rare and underappreciated community type in Florida. As implied, the canopy of this system is dominated by a good growth of pond pine (*Pinus serotina*), a close-coned species that requires periodic fire³⁹ to open the cones and release the seeds for the recruitment of the next generation. Such forest stands typically have a well-developed subcanopy of loblolly bay (*Gordonia lasianthus*), mixed with some red maple, sweetgum, and water oak. The understory (i.e., shrub stratum) is very dense and includes a thick matrix of saw palmetto, fetterbush (*Lyonia lucida*), gallberry, cinnamon fern (*Osmunda cinnamomea*), and bracken fern. Few grasses or other herbaceous species occur within the dense shading of this vegetative layer.

³⁹ A fairly long cycle or return interval - probably greater than 35 years.

Mesic Flatwoods (FFWCC = Pinelands)

The dominant canopy species present in this community mosaic historically was longleaf pine (*P. palustris*), although most pine plantation areas established on this natural community type are now planted with various off-site pine species (e.g., loblolly pine). Whatever the canopy, but depending on degree and kind of site preparation, the low subcanopy is often comprised of a diverse mixture of

small shrub and herbaceous taxa including gallberry, fetterbush, staggerbush (*L. fruticosa*), wax myrtle, doghobble (*Leucothoe axillaris*), saw palmetto, deerberry (*Vaccinium stamineum*), blueberry (*V. myrsinites*), huckleberry (*Gaylussacia frondosa*), sweet pepperbush (*Clethra alnifolia*), sand cypress (*Hypericum fasciculatum*), southern dewberry (*Rubus trivialis*), yellow colic root (*Aletris lutea*), yellow-eyed grass, redroot (*Lacnathes caroliniana*), bog buttons (*Eriocaulon compressum*), wiregrass (*Aristida stricta*), hoardhound (*Eupatorium mohrii*), blackroot (*Pterocaulon pycnostachyum*), candyroots and bachelor's buttons (*Polygala lutea* and *P. nana*), hatpins (*Lachnocaulon anceps*), toothache grass (*Ctenium aromaticum*), coreopsis (*Coreopsis* spp.), meadow beauty (*Rhexia marshallii*), coinwort (*Centella asiatica*), clubmoss (*Lycopodium alopecuroides*), panicgrass (*Dicanthelium erectifolium*), maidencane (*Panicum hemitomon*), bracken fern, Virginia chain fern (*Woodwardia virginica*), cinnamon fern and false foxglove (*Agalinis fasciculata*), among others.

An important remnant of the once dominant natural community within interior Nassau County lies within the Baldwin Bay/St. Marys River proposal. Approximately 4,500 acres of intact **Mesic-Wet Flatwoods** comprise the northwesterly portion of this active Florida Forever project. This tract has been identified by the FNAI as one of the largest remaining contiguous parcels of intact pine flatwoods communities still under private ownership. This tract consists almost entirely of uneven-aged, naturally-regenerated stands of mixed slash and longleaf pine with ages appearing to exceed 50 years. The understory contains good to excellent quality native groundcover components.

As noted above, it is important to realize that for purposes of ranking Florida Forever projects, the state's Acquisition and Restoration Council and the FNAI considers Mesic Flatwoods as an "under-represented" natural community, meaning that less than 15% of the Mesic Flatwoods in the entire State of Florida are either still extant or are now located in protected areas (see Appendix B10). As such, forestry-based Florida Forever protection projects with intact Mesic Flatwoods are accorded extra consideration in the ranking and selection process.

Scrubby Flatwoods (FFWCC = Pinelands)

Also scattered throughout the County on higher, sandier upland sites are areas of Scrubby Flatwoods. This community type has a canopy of widely spaced (to in places more dense) longleaf pines above a low "subcanopy" or shrub layer dominated by sand live oak (*Q. geminata*), myrtle oak (*Q. myrtifolia*), Chapman's oak (*Q. chapmanii*), runner oak (*Q. minima*), tarflower (*Besleria racemosa*), staggerbush (*Lyonia fruticosa*), shiny blueberry (*Vaccinium myrsinites*), and some gallberry. The groundcover is often sparse, but includes wiregrass, paintbrush (*Carphephorus corymbosus*), bracken fern, and bottlebrush threeawn (*Aristida spiciformis*), among others. Indeed, portions of some Scrubby Flatwoods are close to being considered a true Scrub natural community except for a scattered longleaf pine overstory and wiregrass groundcover. Scrubby Flatwoods are becoming increasingly scarce because their typically high, dry, and sandy substrate makes them ideal for housing developments and others kinds of landscape conversions. This community type is ranked G3 by the FNAI which means that it is considered globally rare.

Interspersed throughout the flatwoods mosaic are forested and herbaceous wetland systems that form much of the habitat important to wildlife populations in Nassau County and the region. Many of streams that traverse the County are considered to be *Blackwater Streams*. These flowing aquatic systems originate in deep, sandy lowland swamp areas where the organic soils function as reservoirs, collecting rainfall and discharging it slowly into the stream. The waters of these streams are characteristically tea-colored due to the presence of tannins, particulates and dissolved organic matter and iron derived from drainage through swamps and marshes. A few streams located in the

western reaches of the County, in areas where the Sandhill natural community is common, can be termed *Seepage Streams* since they receive their water from rain percolating through the sandy upland soils before seeping laterally out into stream channels. Many Seepage Streams and their associated hardwood communities have become increasingly degraded due to intensive silvicultural operations on adjacent uplands.

Dome Swamp (FFWCC = Cypress Swamp)

A large number of cypress-dominated Dome Swamps are found throughout western and northern Nassau County. This community is typically dominated by pond cypress (*Taxodium ascendens*), but sometimes with a co-dominant growth of swamp blackgum (*Nyssa biflora*) and/or red maple (*Acer rubrum*) in which case they may be called "Gum Ponds" and can potentially show up as another FFWCC community type (e.g., Shrub Swamp). Dome Swamps often support a heavy growth of titi (*Cyrilla racemiflora*) around the periphery. There may also be scattered or clumped individuals of slash pine (*Pinus elliotii* var. *elliotii*) and loblolly pine intermixed along the periphery or on small hummocks in the interior. The understory varies depending upon the density of the canopy, and thus, the amount of light penetrating to the shrub stratum. Typical understory species include titi, wax myrtle, Virginia willow, buttonbush, sebastian bush, fetterbush (*Lyonia lucida*) and sweet gallberry (*Ilex coriacea*). A few ferns, grasses, sedges and mosses (and abundant patches of sawgrass) may also occur in the ground layer vegetation. Dome Swamps are extremely important as breeding habitat to a wide variety of reptiles and amphibians.

Baygall and Basin Swamp (FFWCC = Bay Swamp, Mixed Wetland Forest, Hardwood Swamp)

Baygalls (and small Basin Swamps) are scattered throughout western Nassau County where acidic seepage appears to emanate from adjacent, sandy ridges. Baygalls possess a distinctive suite of species that make them easily recognizable. Their often tall, typically closed, canopies are dominated by several hardwoods, most notably sweetbay magnolia (*Magnolia virginiana*), swamp bay (*Persea palustris*), tulip tree (*Liriodendron tulipifera*), swamp blackgum, loblolly bay (*Gordonia lasianthus*), sweetgum and red maple. This community type may also support North Florida slash and some loblolly pines. Because of low light intensities beneath the canopy, the subcanopy is often not well-developed but may include red bay and dahoon holly (*Ilex cassine*), as well as an occasional myrtle-leaved holly (*Ilex myrtifolia*). A dense understory may support fetterbush, dog hobble (*Lencotboe racemosa*), titi, sweet pepperbush, bamboo vine (*Smilax laurifolia*), large gallberry (*Ilex coriacea*), southern arrowwood (*Viburnum dentatum*) and wax myrtle. The groundcover forms a low stratum, varying from dense to sparse depending on soil saturation and light levels, with sphagnum, cinnamon fern, royal fern, Virginia and netted chain fern (*Woodwardia virginica* and *W. areolata*, respectively) and downy shield fern (*Thelypteris* aff. *interrupta*), among a few others.

Baygalls are partially maintained by near-constant saturation with groundwater and good examples are found along the downslope interface of several kinds of upland and wetland communities. Classic Baygall vegetation may also form along the fire shadow or fire suppressed edges of Seepage

slopes that occur upward from the base of Sandhills. Baygalls may also be present as short, forested ecotonal areas between Mesic Flatwoods, Wet Prairie and Floodplain Swamp. Because of their close physical association with all of these other communities, Baygalls naturally share many species and exhibit many intergradations.

The interface of Baygalls with adjacent upland communities, especially where these are Sandhills, Mesic/Wet Flatwoods, or Seepage Slopes, are not only especially species rich, but they often harbor rare species -- particularly two globally rare plant species: *Hartwrightia floridana* and

Purple Honeycomb-head (*Balduina atropurpurea*). These species are easily crowded out by the encroachment of woody species from the Baygall and are highly dependent upon frequent fires to maintain their specialized habitat along these community interfaces. Even hot, growing season fires in a well-managed (i.e., regularly burned) tract should extinguish themselves after burning a short distance into a saturated Baygall.

Many smaller Baygalls and Basin Swamps have been "planted through" during past, pine-based silvicultural activities and exist now only as remnants. Other areas, however, support reasonably intact examples of these communities that still retain large volumes of timber in their canopies. One particularly impressive example of a large, high quality Basin Swamp within Nassau County is Baldwin Bay in the extreme southwestern portion of the County. This system alone encompasses approximately 800 contiguous acres of mostly long undisturbed Basin Swamp community. This feature formed one of the cornerstones of the Baldwin Bay/St. Marys River Florida Forever project proposed by The Nature Conservancy several years ago in an effort to conserve some of the highest quality natural areas that buffer the St. Marys River and contribute to forming both a new conservation "hub" in the region and providing for an interconnected wildlife habitat and hydrological corridor. To date, no land in the Baldwin Bay/St. Marys River project has been protected.

Sandhill (FWCC = Sandhill)

A few areas of remnant Sandhills occur in the northwestern and southwestern portions of Nassau County. This natural community type is found on higher, xeric ridges comprised of deep, well-drained, yellowish sands. It is likely that many other areas of Sandhill historically occurred in the County, but most have long ago been cleared and placed into uniform pine plantations, or been used as prime development sites. Sandhills were one of North Florida most important natural communities because of their dominant longleaf pine timber (the southern yellow pine is said to have been the "Pine that built America") and because of their very high Floridan aquifer recharge capacity. They also supported a wide variety of mammals, reptiles and birds, including the highly significant suite of species closely associated with gopher tortoises and their burrows.

Historically, the longleaf pine/wiregrass-dominated Sandhill community occupied virtually all of the xeric upland areas and ridges of the County, defined as those areas having deep, excessively well-drained, sandy soils. As stated above, most areas of Sandhill have been impacted by silvicultural and associated site preparation techniques and the planting of off-site slash, loblolly and/or sand pines. As such, these silvicultural activities have eliminated much high quality Sandhill community from its former dominance within portions of western Nassau County.

Sandhills are easily recognized by the presence of several characteristic, indicator species. If intact, Sandhills have a longleaf pine canopy that typically towers above a lower canopy containing such species as turkey oak, blue jack oak and sand post oak (*Quercus laevis*, *Q. incana* and *Q. stellata* var.

margaretta, respectively). A few blackjack oaks (*Q. marilandica*) may also be found. Black cherry is also a scattered canopy or subcanopy tree. There is typically a scattered shrub stratum component composed of deerberry, sparkleberry, persimmon, winged sumac (*Rhus copallina*), dwarf pawpaw (*Asimina pygmaea*), scattered clumps of saw palmetto and a few others.

The groundcover is variable and is composed of scattered clumps of wiregrass (*Aristida stricta*) and, frequently under certain circumstances, pineywoods dropseed (*Sporobolus junceus*). Other indicator species include wild buckwheat (*Eriogonum tomentosum*), twinflower (*Dyschoriste oblongifolia*), gopher apple (*Licania michauxii*), milkweeds (*Asclepias humistrata* and *A. tuberosa*), carphophorus (*Carphophorus*

corymbosus), queen's delight (*Stylingia sylvatica*), blazing star (*Liatris tenuifolia*), beargrass (*Yucca flaccida*), golden aster (*Pityopsis graminifolia*), elephant's foot (*Elephantopus elatus*) and tread softly (*Cnidioscolus stimulosus*), dicantherium (*Dicantherium* aff. *ovale*), sky-blue lupine (*Lupinus diffusus*), blackroot (*Pterocaulon pycnostachyum*), butterfly-pea (*Centrosema virginianum*), goat's-rue (*Tephrosia spicata*), flax (*Linum floridanum*) and bracken fern (*Pteridium aquilinum*), among several others.

It is important to note that Sandhills are also considered by the state's Acquisition and Restoration Council and the FNAI as an "under-represented" natural community, meaning that less than 15% of the Sandhills in the entire State of Florida are either still present or are now located in protected areas. As such, forestry-based Florida Forever protection projects with intact examples of Sandhill are accorded extra consideration in the ranking and selection process (see Appendix B10).

Seepage Slope (FFWCC = Freshwater Marsh/Wet Prairie)

Several areas of remnant Seepage Slope community are documented by FNAI and are depicted on the Element Occurrences map (Appendix B6). Most of these have been located by staff from The Nature Conservancy during conservation easement work. Seepage Slopes derive their name from their gently sloping topography and their formation near the base of Sandhills (or sometimes Mesic and/or Scrubby Flatwoods) where they receive shallow, acidic, lateral groundwater seepage that produces this unique community. This community is easily recognized by the presence of several characteristic species, the most conspicuous of which is often the hooded pitcher plant (*Sarracenia minor*). Other characteristic – or indicator species – include meadow beauty (*Rhexia alifanum*), clubmoss (*Lycopodium alopecuroides*), bigelowia (*Bigelowia nudata*), yellow colic root (*Aletris lutea*), bog buttons (*Eriocaulon compressum*), toothache grass (*Ctenium aromaticum*), spagnum moss (*Sphagnum* spp.), deer tongue or vanilla plant (*Carphophorus odoratissimus*) and bamboo vine (*Smilax laurifolia*), among others. Much of the Seepage Slope areas have been planted through with off-site loblolly or slash pines that, from an ecological viewpoint, should be removed as soon as feasible over the full extent of this increasingly rare and fragile community type. It is also of note that "Seepage Slope/Bog" is recognized as an Under-represented Natural Community by FNAI for the purpose of evaluating Florida Forever projects, among other uses (see Appendix B10).

Depression Marsh/Wet Prairie (FFWCC = Freshwater Marsh/Wet Prairie)

According to the FFWCC's Natural Communities map (Appendix B8), several, rather extensive, **Wet Prairie** systems are found in western and northwestern Nassau County. This community is, at least, seasonally inundated, and often saturated with a high ground water table during much of the year. Like Seepage Slopes, many areas of Wet Prairie have also been planted in off-site slash or loblolly pine plantations, most of which are readily recognized since the pines are typically performing poorly on these saturated and often inundated soils. When intact, this community supports a variety of herbaceous species including sawgrass (*Cladium jamaicense*), beakrushes (*Rhynchospora tracyi* and *R.*

inundata), Florida dropseed (*Sporobolus floridanus*), hatpins (*Lachnocaulon anceps*), maidencane (*Panicum hemitomon*), water dropwort (*Oxypolis filiformis*), muskmint (*Hyptis alata*), yellow-eyed grasses (X. aff. *smalliana* and *Xyris* aff. *ambigua*), sugarcane plumegrass (*Erianthus giganteus*), nutrush (*Scleria reticularis*), redroot (*Lacnanthes caroliniana*), coinwort (*Centella asiatica*), panicgrass (*Dicanthelium erectifolium*), bluejoint panicum (*Panicum* aff. *tenerum*) and broomsedge (*Andropogon virginicus* var. *glaucus*), along with scattered individuals of buttonbush, odorless wax myrtle (*Myrica inodora*) and St. Johns wort (*Hypericum fasciculatum*). These freshwater systems are also important to numerous species of wildlife throughout the year and conservation measures aimed at protecting some of these areas within an upland matrix should be pursued.

Upland Mixed Forest (FFWCC = Mixed Pine-Hardwood Forest, Hardwood Hammock?, Live Oak Hammock?)

Areas of Upland Mixed Forest occur primarily as an ecotonal community between the broad xeric ridges supporting Sandhill and the mesic slopes grading to Mesic/Wet Flatwoods. Some areas may also develop adjacent to Creek Swamps and various other forested wetland community types. Some examples of this community are also likely derived from Sandhill that have been long fire suppressed. This community may have also developed in response to an environmental gradient in terms of soil moisture and nutrient content, as well as a result of some protection from natural fire because of its location (see Appendix B8). It appears from the FFWCC's Natural Communities map that several good examples of this community occur in Nassau County along the central portion of the St. Marys River (south and west of the Ralph E. Simmons State Forest), as well as on the mainland near its mouth.

This community can be characterized as having a dense to moderately open growth with a canopy dominated by several species of oak, including laurel, water and live oaks, southern magnolia (*Magnolia grandiflora*), black cherry (*Prunus serotina*), pignut hickory (*Carya glabra*), tulip tree, sweetgum, scattered loblolly pine and red maple. Florida dogwood (*Cornus florida*), redbud (*Cercis canadensis*), red mulberry (*Morus rubra*), persimmon (*Diospyros virginiana*), devil's walking-stick (*Aralia spinosa*), buckeye (*Aesculus pavia*), red bay and American holly may all occur in the subcanopy. The shrub stratum may include beautyberry (*Callicarpa americana*), small-flowered pawpaw (*Asimina parviflora*), wax myrtle, horse sugar (*Symplocos tinctoria*), deerberry (*Vaccinium stamineum*), saw palmetto, buckthorn (*Bumelia reclinata*) and maple-leafed arrowwood (*Viburnum acerifolium*).

The often sparse herbaceous or groundcover layer includes such species as partridge berry (*Mitchella repens*), ebony spleenwort (*Asplenium platyneuron*), wood's basketgrass (*Oplismenus setarius*), elephant's-foot (*Elephantopus carolinianus*) and wild sarsaparilla (*Smilax pumila*), among few others. Vines may include poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*) and cross vine (*Bignonia capreolata*). Overall, these typically little disturbed, diverse and good quality hardwood forest systems are important for buffering larger swamps and xeric uplands and for providing habitat and foraging areas for several vertebrate species.

Agricultural Lands (FFWCC = Agriculture/Bare Soil/Pasture/Crops)

Overall, Agricultural Lands/Pasture/Crops are highly important to the overall economic mix and sustainability of the County and the region. As noted above, such lands are mostly scattered throughout the central and western portions of the County.

Species

There are 19 animals and nine plant species that are considered rare by the FNAI that are documented to occur in Nassau County. The Elemental Occurrences map (Appendix B6) shows the overall distribution of these as well as natural communities⁴⁰ with the animal occurrence records scattered throughout the County and the plants more or less documented in the western portion of the County – often along major roads, or also clustered along the St. Marys River. It should be noted that the precise locations of these species (and natural communities) can be obtained by

contacting the Florida Natural Areas Inventory in Tallahassee, Florida. As an overview, these species include:

Reptiles and Amphibians

1. The Gopher tortoise (*Gopherus polyphemus*) is a State Threatened Species. This species is typically present within the Sandhills of the County (and several other habitats). It is well-documented that the deep burrows that this fossorial reptile excavates provide habitat and refuge for numerous other rare and/or declining species, such as the Florida pine snake (*Pituophis melanoleucus mugilus* – but with this latter species not documented by FNAI records as occurring in the County).
2. The Eastern indigo snake (*Drymarchon corais couperi*) is found in Sandhills, Mesic Flatwoods, Maritime Hammocks and several other habitats.
3. Loggerhead turtles (*Caretta caretta*) are occasionally found nesting on the beaches of Amelia Island.
4. American alligator (*Alligator mississippiensis*) is found in forested and herbaceous wetlands, creeks and other such habitats throughout the County.
5. The Many-lined Salamander (*Stereochilus marginatus*) is found in specialized creek and swamp habitats in the County.
6. A population of the Timber rattlesnake (*Crotalus horridus*), most unusual for Florida, is also documented in Nassau County.

Birds

7. Woodstork (*Mycteria americana* - listed as both state and federally [USFWS] endangered), is found in a wide variety of coastal and inland freshwater sites throughout the County.
8. Bachman's sparrow (*Aimophila aestivalis*) is found in several habitats in the County, but particularly various kinds of intact flatwoods.
9. Black-crowned night-heron (*Nycticorax nycticorax*) prefers dense wetland forest types along rivers and creeks and coastal tidal marshes.
10. Lest Tern (*Sterna antillarum*) is a species predominately found on the sandy beaches of Amelia Island and within estuarine tidal marsh habitats.
11. Wilson's Plover (*Charadrius wilsonia*) also a coastal species found primarily on and around Amelia Island.
12. American Oystercatcher (*Haematopus palliatus*) prefers both open sandy beaches and estuarine tidal marsh habitats.

⁴⁰ The natural communities clustered mostly along the St. Marys River because of their documentation in Lynch, J. Merrill and W. Wilson Baker. 1998. Natural Areas Inventory of the St. Mary's River Georgia-Florida. A report prepared for The Nature Conservancy, Southeast Regional Office, Chapel Hill, North Carolina.)

13. Red-Cockaded Woodpecker (*Picoides borealis* – listed as federally endangered) and occurs only in open, old-growth pine forests where suitably aged trees allow it to excavate nest cavities. It is the only North American woodpecker that builds its nest cavities in living pine trees.
14. Little Blue Heron (*Egretta caerulea*) is a resident of both coastal and freshwater habitats throughout the County.
15. Snowy Egret (*Egretta thula*) is a resident of both coastal and freshwater habitats throughout the County.
16. Great Egret (*Ardea alba*) is a resident of both coastal and freshwater habitats throughout the County.

Additionally, there are at least 119 bird species documented as occurring during the breeding season (i.e., March–September) in the greater St. Marys River basin.⁴¹ The variety of habitat provided by the St. Marys makes a strong contribution to the continued existence of the majority of these species. As well, such important game bird species as northern bobwhite (*Colinus virginianus*), wild turkey (*Meleagris gallopavo*) and wood duck (*Aix sponsa*) are well represented in Nassau County.

Mammals

17. Sherman's fox squirrel (*Sciurus niger shermani*) – a federal Category 2 candidate species for listing – may be found in the Sandhills, Flatwoods and hammocks of the County in still good numbers, although this subspecies has suffered from much habitat loss, habitat fragmentation and its numbers have declined greatly in recent years throughout Florida.
18. Perhaps the most unusual species found in Nassau County (i.e., the coastal waters of the County) is the North Atlantic Right Whale (*Eubalaena glacialis*).
19. Southeastern Weasel (*Mustela frenata olivacea*) occurs sparingly in various terrestrial and palustrine habitats including pine flatwoods, floodplain forests and swamps and bottomland forests.

In terms of other mammalian diversity, Nassau County supports numerous common species such as white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*) and gray fox (*Urocyon cinereoargenteus*), among many others. It is also known that at least two rare species occasionally inhabit the riverine and associated floodplain corridor of the St. Marys River: West Indian manatee (*Trichechus manatus*) and Florida black bear (*Ursus americanus floridanus*).

Although not documented by FNAI, the following species also have been observed in Nassau County by staff from The Nature Conservancy:

- Southern bald eagle (*Haliaeetus leucocephalus* - listed as state and federally threatened by the FFWCC and the U.S. Fish and Wildlife Service [USFWS], respectively).
- Osprey (*Pandion haliaetus*) is found in many habitats, particularly those including open fresh and/or salt water resources.
- Southeastern American kestrel (*Falco sparverius paulus*) found in numerous, open agricultural and woodland habitats.

The Wildlife Habitat Ranking map prepared from data supplied by the FFWCC (Appendix B11) indicates that the most important wildlife habitat – at least that documented in their database – in

⁴¹ Lynch, J. Merrill and W. Wilson Baker. 1998. Natural Areas Inventory of the St. Mary's River Georgia-Florida. A report prepared for The Nature Conservancy, Southeast Regional Office, Chapel Hill, North Carolina.

Nassau County occurs around: 1) the Four Creeks State Forest; 2) Cary State Forest; 3) Brandy Branch and the Upper St. Marys River contiguous with that feature; 4) in the vicinity of Ralph E. Simmons State Forest and; 5) in the Estuarine Tidal Marsh system at the mouths of the Nassau and St. Marys rivers, as well as along the Amelia River.

Plants

1. Florida toothache grass (*Ctenium floridanum*) is found very rarely in Florida, but with several localities in Nassau County. This species inhabits various kinds of flatwoods natural communities including Mesic, Scrubby and Wet Flatwoods.
2. Purple honeycomb-head (*Baldinia atropurpurea*) is also an extremely rare plant species in Florida with several good locations in Nassau County – in which it is the only county in Florida where it is found. This species occurs only within intact, little disturbed Seepage Slope and Wet Prairie natural communities in the ecotone between Sandhills, Flatwoods and Baygalls.
3. Hartwrightia (*Hartwrightia floridana*) is found in several counties in Central Florida and then has several well-documented populations in Seepage Slope and adjacent habitats in Nassau County.
4. Yellow sunnybell (*Schoenolirion croceum*) is found wet savannas (open, Wet Flatwoods), bogs and Seepage Slope habitats and is considered rare in Florida. It is found (in Florida) only in the northern portions of the panhandle, but with a small population known for Nassau County.
5. Silver buckthorn (*Sideroxylon alachuense*) typically inhabits calcareous (i.e., limestone closely underlies the soil) hammocks – including areas of Bottomland Forest and Upland Hardwood/Slope Forest – and is known from only a few counties in northeastern Florida.
6. Ciliate-leaf tickseed (*Coreopsis integrifolia*) is considered rare in the state and is known from only a few counties in Florida where it may be found in Floodplain Forests along rivers.
7. Heartleaf (*Hexastylis arifolia*) is a species of deep Slope Forest habitats in northern Nassau County. It is also considered rare in Florida.
8. Florida merrybells (*Uvularia floridana*) is found in Slope Forest, Bottomland Forest and Floodplain Forest natural communities in northern Nassau County. It is known from only five counties in Florida, with the remaining four in the panhandle.
9. Southern milkweed (*Asclepias viridula*) is known from only 11 Florida counties where it may be found in Mesic/Wet Flatwoods, Wet Prairie and Seepage Slope habitats.

Surface Hydrological Resources

Several maps have been prepared that show the statewide importance and ranking of various kinds of hydrological resources within Nassau County. These data have been compiled by FNAI and are utilized for a variety of statewide conservation prioritization and ranking exercises, most notably for assessing Florida Forever projects and for analysis of lands and waters under the Century Commission's Critical Lands and Waters Identification Project (CLIP) process.

Significant Surface Waters (Appendix B12) – There are six priority tiers for all such Surface Waters across the state and Nassau County contains waters assignable to each of the six categories. According to these data, the highest priority (Priority 1) waters are those estuarine-influenced areas of

the St. Marys, Nassau and Amelia rivers. Priority 2 waters include the lower portions of those creeks feeding into the Four Creeks State Forest, as well as the Thomas Creek drainage further south.

Natural Floodplain (Appendix B13) – these data are divided into three priority tiers with the highest priority (Priority 1) in Nassau County being, again, the creeks that feed into the Four Creeks state Forest area and the Nassau River, the Little St. Marys River in north-central Nassau County and the Brandy Branch drainage in the extreme southwestern portion of the County.

Functional Wetlands (Appendix B14) – these data exhibit four priority levels with the highest priority (Priority 1) wetlands being those associated with Brandy Branch, Thomas Creek, the various creeks draining through the Four Creeks State Forest (and others that drain to the Nassau River) and the Little St. Marys River. Additionally, the estuarine systems of the Amelia, Nassau and St. Marys rivers are considered as Priority 1 functional wetlands under this classification.

Groundwater Resources

Because of increased land development and population growth, water usage within Nassau County has increased. Protecting aquifer recharge areas and capture zones is, therefore, extremely important. The western one third of Nassau County (i.e., that portion occupying the Duval Uplands) is identified as providing 0-4 inches of water recharge per year to the Floridan aquifer, the source of the public fresh water supply for most of Florida.⁴² Please refer to Appendix B15 prepared from data supplied by the St. Johns River Water Management District. As well, a portion of northeastern Nassau County is also identified as providing 0-4 inches of recharge to the Floridan aquifer. Protection of at least portions of these areas is therefore important to the future groundwater supplies and water quality of the County.

In contrast, basically the central and southeastern portions of the County are identified as an area of water discharge. As noted on several of the maps, this central zone of Nassau County is where numerous creeks have their headwaters before flowing eastward to the Nassau or St. Marys rivers. Protection of these interconnected hydrological systems will have far reaching benefits for the natural systems, wildlife and the public.

2.4 Lands That Safeguard Key Environmental Resources

As can be discerned from the extensive section above, there is much overlap between this category and the preceding one (i.e., Lands that Support Important Industries). In fact, much focus, with specific information on, the lands necessary to safeguard key environmental resources has already been provided. In that spirit, TNC wishes to utilize this section of the Report to provide information and suggestions on what could become an overall conservation vision for Nassau County (see Appendix B16).

Indeed, Nassau County has an excellent start on a system of such conservation lands. The County is bordered on its western and northern sides by the St. Marys River, along much of its southern boundary by the Nassau River (or a system of existing conservation lands, including Cary and Four Creeks state forests) and along its eastern boundary by Amelia Island with its system of world-class

⁴² Edward A. Fernald and Elizabeth D. Purdum, eds. 1998. Water Resources Atlas of Florida. Institute of Science and Public Affairs, Florida State University. p.312.

Estuarine Tidal Marsh so well-developed along the Amelia River. As such, the opportunity to encircle and buffer the County with a series of conservation lands is within relatively easy reach. Such an “Emerald Necklace” concept to conservation has been attempted – or dreamt of – in only a few other Florida counties (e.g., Alachua County, Duval County), but has been made far more difficult since they do not have the existing natural resource spatial configuration and distribution that Nassau County possesses. With proper foresight and planning by County leaders, a vision for both conservation and growth in Nassau County can emerge and become a reality, one that could make the County an even more desirable place to work, live and enjoy a more rural lifestyle, but one that has numerous urban amenities and economic opportunities as well.

A Potential System of Regional Parks, Reserves, Forests and Wildlife Management Areas

What could be established through the foresight of Nassau County’s leaders is a series of parks, reserves (including watershed reserves protecting headwater wetlands and creeks), wildlife management areas, state forests and greenways/trails that can contribute in myriad ways to environmental resource – and Ecosystem Services – protection and provide for a sustainable economy. Such a natural resource protection plan will not impact negatively upon any individual’s private property rights and will allow for much future economic growth and development, especially through clustered and compact communities that will maintain the open, rural feel, lack of congestion and high quality, healthy recreationally-based lifestyles found in Nassau County that are now being sought by so many of Florida’s residents. While some areas can be protected for future generations through fee simple purchase and ownership – and provide for continued outdoor and hunting and fishing opportunities for the County’s citizens – other areas, such a river and creek frontage buffers and productive, sustainable timberlands can be adequately safeguarded through the purchase of development rights (establishment of conservation easements) through various less-than-fee techniques and with the financial assistance of numerous conservation partners and funding agencies. It should be a guiding principle of Nassau County that any land conservation endeavors are based strictly upon a willing seller approach.

1. A potential system of Parks and Recreation Areas could begin in the southwestern portion of the County with implementation of the Baldwin Bay/St. Marys River project – a project on the current Florida Forever list as originally proposed by TNC in 2002. This property supports Brandy Branch (and Brandy Branch Swamp) that is a tributary of the St. Marys River, an old-growth hardwood hammock and large Baygall (Baldwin Bay), and a large and significant block of mostly intact and ecological significant flatwoods that are well-managed as productive timberlands. The establishment of a series of conservation lands in this area of the County could assist in maintaining aquifer and surface water supplies lessen the need for the County to provide costly infrastructure to serve future development of the area. There are also many fine, and very well managed older-growth timberlands surrounding the project – especially to the north. This entire area ties in nicely with existing Cary State Forest and Cary State Forest Hiking Trails complex (and recent TNC purchase of the Foster-Milne tract⁴³) and strategic protection measures in the area would form a landscape-scale “Conservation Hub” in the southwestern portion of the County.

⁴³ Foster-Milne tract is represented as “Other Potential Natural Area” on Appendix B8 and is part of the Northeast Florida Timberlands and Watershed Reserve Florida Forever project.

2. The second major area of focus for Nassau County should be to protect as much of the St. Marys River frontage as possible – i.e., that flanking the existing St. Marys River State Canoe Trail. It is the contention of The Nature Conservancy that much of the St. Marys River frontage – a Natural Greenway and Wildlife Corridor – can be protected through less-than-fee acquisition of conservation easements (including, potentially, the donation of some of these easements). It would be desirable to also gain some additional river access points, as negotiated with the private landowners along this stretch of the St. Marys River. Much of the area is a FNAI Potential Natural Area (PNA) – both St. Marys River and Other (see Appendix B6) – and protection should be sought as far north as the northern end of the State Canoe Trail and joining with the extensive Ralph E. Simmons State Forest Trails system. Such a protection effort would make for a very nice, two to several day canoeing and hiking experience for outdoor recreational enthusiasts and ecotourists (as it does now, would only be enhanced by greater protection along the river and even more access points). Such an effort would also encompass the two conservation easements held by The Nature Conservancy on the St. Marys River Ranch that currently protect about five miles of direct river frontage just west of the Ralph E. Simmons State Forest. Natural resources in this region of the County include some high quality Hardwood (with mixed Cypress) Swamp, some large and regionally significant Bottomland/Slope Forest and Upland Mixed Forest natural community complexes that begin along the river almost due west of Hilliard (shows as Hardwood Hammock and Mixed Pine-Hardwood Forest on the Natural Communities map), blocks of intact, longleaf-pine dominated Sandhill, small areas of intact Mesic Flatwoods, and some regionally significant Seepage Slope complexes encompassing at least two globally rare plant species (*Balduina purpurea* and *Hartwrightia floridana*), although this latter community type cannot be discerned by the LandSat-based map.
3. Although not thoroughly ground-truthed by TNC staff, a third area might include the large complex of lands depicted as a FNAI Habitat Conservation Priority (Levels 1, 3 and 6) and as a FFWCC Strategic Habitat Conservation Area (SHCA – Priority 6), that is located southwest of Callahan (between Keene and Dahoma and mainly east of U.S. Highway 301) near the Nassau/Duval County line (see Appendix B17 & B18). This area is centered on Thomas Creek, Ben Branch and, perhaps, Braddock Creek and from LandSat data, appears to encompass a mosaic of Hardwood Swamp and Mesic/Wet Flatwoods (and important silvicultural lands), with embedded Cypress and Bay Swamps.
4. Possibly the largest single Potential Natural Area (PNA) in contiguous extent in Nassau County – but not qualifying for FNAI Habitat Conservation Priority or FFWCC Strategic Habitat Conservation Area status (SHCA) – is located along the reaches of a complex series of creeks northeast of Callahan and extending from just southeast of Hilliard all the way east of I-95 and U.S. Hwy 17. All appear to drain southeastward toward the Nassau River and serve as important tributaries just near the point that the Nassau River begins to show estuarine influenced as evidenced by the presence of Estuarine Salt Marsh vegetation. This area has already been cited in the above section as highly important for watershed protection for these tributaries of the Nassau River near Four Creeks State Forest. According to the Natural Communities LandSat (Appendix B8), PNA (Appendix B9) and SJRWMD's Land Use/Land Cover data (Appendix B1 & B2), these creeks appear to have varying widths of extant floodplain-type vegetation assigned as mostly Hardwood Swamps or Wetland Forest types. These creeks are embedded in a series of mostly silvicultural lands, although a few PNAs are present indicating intact blocks of Mesic to Wet Flatwoods. This area represents the kind of important watershed (mosaic of flatwoods and silvicultural areas that collect and

slowly release rain water to a system of interconnected creeks that drain toward larger rivers and estuaries) that with proper planning and foresight – and through work with willing landowners – should be preserved in the County for providing vital ecosystem services (e.g., flood control, maintaining water supplies, allowing for a sustainable forest-resource base and providing wildlife habitat and recreational opportunities), among other important attributes.

5. The Little St. Marys River drainage and watershed is similar to the area described in number 4 above. Much of this area is also a PNA and portions are an SHCA. This conservation complex would run to and along White Oak Plantation that is a huge environmental and wildlife amenity for the County. As well, White Oak Plantation provides numerous jobs and substantially contributes to the overall economy, cultural aspects and visibility of the County in many ways that, perhaps, cannot be fully appreciated in a conservation context alone.
6. There is a large and important FNAI PNA along the lower reaches of the St. Marys River (large mosaic of pinelands, creeks, cypress and bayheads) that grades eastward to the large St. Marys Estuarine Tidal Marsh system. This area is both a PNA and a SHCA and encompasses some important, and apparently extant, Maritime Hammocks and intergrades between Upland Mixed Forest near Chester and Pirates Wood (i.e., north of A1A at the terminus of Old Chester Road). This is also adjacent to Tiger Island/Little Tiger Island that lies between the mainland and Amelia Island. Although this may be some of the most desirable and developable property in the County, it may also represent a unique resource of coastal-influenced hammock lands that is not well protected elsewhere in the County. This area is worth serious consideration for protecting those lands west of Old Chester Road and stretching northwestward toward I-95, as this potentially represents one of the most important blocks of terrestrial habitat to conserve (including through the use of conservation easements) in the County.
7. The vast Estuarine Tidal Marsh and Maritime Hammock island systems formed at the confluence of the Nassau and St. Marys rivers (and along the Amelia River) are depicted as significant in the PNA (Appendix B9), SHCA (Appendix B18) and the Wildlife Habitat Ranking (Appendix B11) maps and as having state and regional importance. Additional efforts to protect these resources should be pursued by Nassau County in conjunction with state and federal partners. It should be relatively easy to protect some of these areas, however, because they are often wetland systems with many sovereign lands implications and any potential development there is likely to be highly regulated by the state and federal governments (i.e., SJRWMD, DEP, ACOE). Some of these areas are shown on the Fragile Coastal Resources map (Appendix B19) as both Coastal Upland and Coastal Wetland resources.
8. The area of Crane Island, just east of the Intracoastal Waterway and Kingsley Creek and west of Amelia Island, is noted as a separate PNA by FNAI, and could be investigated as a possible Florida Community Trust (FCT) project if it has a willing seller. This would entail working with two different landowners for the island and could be potentially very costly.
9. Protection of additional conservation areas on Amelia Island – including the acquisition of the Tiger Island/Little Tiger Island Florida Forever project by the State of Florida – could prove to be extremely worthwhile conservation pursuits that could pay large tourist dividends in the future. There is little doubt that such recurring financial returns have been realized through both Fort Clinch State Park and its Trail and by the Egans Creek Greenway

on Amelia Island. Both of these conservation features add enormous quality of life, recreational and health benefits for the citizens of Nassau County.

10. Conserving Nassau County's vast, inland timberlands in productive, sustainable and economically viable silviculture for generations to come is a key step in maintaining the rural character of the community and the local forest products industry. Although we are not specifying any exact area of the County's timberland resource base to be conserved, we suggest that, where possible, such timberland conservation be accomplished through the less-than-fee approach through the establishment (i.e., purchase and donation) of perpetual conservation easements over these forested working landscapes in the central and western portions of the County. These conservation easements would be vital pieces of the regional network of natural areas and could help sustain the forestry industry. Forest resources of statewide importance are documented as Sustainable Forest Management on Appendix B20.

It, perhaps, goes without stating directly that this potential system of parks, wildlife management areas, state forests, watershed reserves and working forestlands (among other conservation designations) should be connected – where at all practical – by a series of Greenways and Trails. Unfortunately, the data depicted on the Nassau County Ecological Greenways Network are not very helpful in regard to actually establishing such a series of connections on the Nassau County landscape. We suggest that rather than attempt to utilize the Ecological Greenways and Trails Network as a blueprint for such a system (although it may be useful as a broad guide) that Nassau County planning staff hold a series of workshops around the County to receive local input on where and how a system of greenways and trails can be achieved. While the level of detail seen on most of the other maps in this report can serve as an excellent resource for planning and establishing these kinds of conservation connections, TNC would also be glad to assist with further refinement and location of (and participate in workshops) a Greenways and Trails network in Nassau County.

As well, since it is the larger areas that are more readily analyzed by staff from TNC utilizing the variety of data sources depicted on the maps, it is of course realized that there are many smaller areas that do not form landscape-level or watershed protection areas. It is many of these smaller areas that are known by and important to the people of Nassau County that will undoubtedly be put forth for local conservation efforts. Our intent was to provide Nassau County with a "Big Picture" approach of what are their significant regional resources and broad conservation goals and priorities that would compete best within statewide funding programs. As well, smaller areas can always be taken from what we have detailed above to form both regionally significant and statewide priority-type projects, as well as more locally-based projects such as enhanced riverine access or trail systems as just two examples.

2.5 Historical and Cultural Resources

Nassau County has an extensive archeological and cultural history which has been outlined in the above sections. Please refer to Appendix B21a- 21c and B22 that identify these sites.

Chapter Three: Conservation Funding Sources & Land Protection Tools

3.1 Potential Conservation Funding Sources

Funding for Conservation

The Nature Conservancy (TNC) works with conservation supporters and partner organizations to create funding for conservation worldwide using a variety of creative methods. We seek to create market incentives for conservation, such as debt for nature swaps. We also strive to increase funding for public land acquisition and management through appropriations and public finance campaigns.

Payments for Ecosystem Services

Nature provides a range of critical ecosystem services that yield tangible economic benefits yet the economic value of these services has traditionally gone unrecognized. One of the most important developments in conservation finance in recent years is the idea that key beneficiaries should be paying for these critical ecosystem services, such as the clean water, flood control and carbon storage services provided by intact natural landscapes.

Watershed Conservation Payments:

There is perhaps no other resource so valuable to humanity and yet so threatened as water. In response to this problem, innovative and cost effective means of providing clean and safe water that rely on the conservation of threatened watersheds are beginning to be tested and developed around the world. At the heart of this approach lies the idea that healthy ecosystems such as intact forests also provide valuable hydrological services (such as slowing rainfall runoff, enabling ground water recharge, and reducing erosion). Convincing key water users that the protection and maintenance of healthy watersheds provides real economic value to them is the essence of watershed conservation payments. By understanding the benefits of watershed conservation and the potential impacts of watershed degradation water users develop policies, sustainable financing options and conservation practices that will maintain and perhaps even improve water quality.

Carbon Offset Projects:

In terms of the development of markets and payment systems, forest sequestration is by far the most advanced of the ecosystem services. Forests store (sequester) carbon whereas deforestation releases carbon dioxide into the atmosphere which makes reforestation and forest conservation important elements of a strategy to combat global climate change. There are national voluntary markets in place such as the Chicago Climate Exchange (CCX), and although national legislation is still not in place to regulate a cap and trade system, the State's recently passed Florida Energy Bill (HB 7135) mandates for Florida D.E.P. to adopt a cap trade system rule by 2010. Energy industry and other green house gas emitting companies will be able to meet their target emission levels in part by investing in reforestation and forest conservation projects as a cost effective means of offsetting their carbon emissions. Therefore, as a land protection strategy, large forest blocks can be preserved by providing ecosystems services and creating an additional income stream for tree farmers by selling carbon credits.

Public Finance Campaigns

For more than ten years, TNC has worked in the U.S. at the state and local level with conservation supporters and partner organizations to create public funding for conservation. These public finance campaigns have generated more than \$24 billion dollars for conservation throughout the country. Even in tough economic times, voters have continued to support conservation at the ballot box. Focusing on these collaborative efforts, we can leverage private donations by magnitudes of over 300 to 1. American voters continue to demonstrate that they consider the conservation of natural resources to be a government priority-even in the face of a tough economy.

These local initiatives assure a better quality of life for Florida citizens now and for future generations by keeping water clean and flowing, and by protecting beaches, bays and coastline. Also the success of these measures shows that conservation of land and water is among the core values held by diverse voters. The measures are often endorsed by conservation, public safety, and health organizations, business associations, labor and government officials from both parties. Despite an economic downturn and a county funding challenges voters in many parts of Florida have agreed that they want continued investment in land and water resources. Particularly in a state like Florida, where rapid growth affects our quality of life by impacting important natural areas and resources, including water quality and quantity, conservation needs to be addressed at a scale which will focus on these threats and develop a constituency which will provide enduring support for a healthy environment.

Ballot initiatives are a critical tool in conservation action, because for every dollar raised privately, local governments have the potential of leveraging up to \$100 dollars in public funding for land and water conservation. By working with public officials and other key partners to design these measures, develop successful campaigns, and monitor and influence their implementation, a county can achieve high leverage conservation at scale.

Typically, the funds needed to pay to acquire the land or easements or to pay for habitat management costs will come from one of three sources. In the first category of projects, the County will solicit tax-deductible charitable contributions from individuals, corporations and/or foundations which will be used to cover conservation project costs.

In a second category of projects, the County will find the funds needed by selling land subject to conservation restrictions to a private buyer. These transactions are called conservation buyer transactions and often, in order for the County to be made whole financially, the County will need to raise other charitable funds to cover its full costs in such transactions.

Finally, in the third category of cases, the County will find the needed project funds by working in cooperation with a government agency. There are numerous federal programs that can provide funding for land acquisition including: the Land and Water Conservation Fund, Forest Legacy, Partners for Wildlife, the Farmland Protection Program, and Coastal and Estuarine Land Protection to name a few. Many Florida counties have taken advantage of all of these Federal funding programs and by leveraging Federal, state, and local resources, managed to launch and maintain their land acquisition programs.

Counties can also leverage their local funds by receiving match dollars from the state through the Florida Forever Program, a model land conservation program in the nation. In April of 1999, Florida authorized the Florida Forever Program using a bonding mechanism which provides for \$300 million annually for conservation through 2010. In the recent 2008 legislative session, legislators

reauthorized the Florida Forever Program resulting in a Successor Program that will run through 2020 with funding made available for Florida Forever acquisitions for fiscal year 2009.

3.2 Inventory of Land Protection Tools

Private land conservation is an innovative tactic that leverages the increasing interest of the private sector to take part in conservation. TNC works with landowners, communities, cooperatives and businesses to establish local working partnership that can protect land. Some of the main tools used to achieve these goals include land trusts, conservation easements, private reserves and incentives.

Fee Purchases:

In the United States, TNC uses land acquisition as a principal tool of its conservation effort. TNC has helped to protect approximately 15 million acres in the United States and works with local governments to encourage the protection of ecologically-sensitive land.

Conservation Easements:

Conservation easements are one of the most powerful, effective tools available for the permanent conservation of private lands. Their use has successfully protected millions of acres of land while keeping it in private hands and generating significant public benefits.

A conservation easement is a restriction placed on a piece of property to protect its associated resources. The easement is either voluntarily donated or sold by the landowner and constitutes a legally binding agreement that limits certain types of uses or prevents development from taking place on the land in perpetuity while the land remains in private hands. Conservation easements protect land for future generations while allowing owners to retain many private property rights and to live on and use their land, at the same time potentially providing them with tax benefits.

Conservation Buyer:

In recent years, TNC has begun working with private, conservation-minded individuals, or "conservation buyers," interested in acquiring and protecting ecologically-valuable lands. Through this program, TNC identifies and purchases target properties within priority conservation areas or in zones that buffer and surround core natural areas. The Nature Conservancy then widely and publicly markets the property, seeking a buyer committed to protecting the property's important natural values and willing to ensure the land's long-term conservation by placing a conservation easement on the land. The value of the land before and after the conservation easement restrictions is established by professional, independent appraisals. This also allows scarce conservation dollars to be reused through a revolving fund thereby leveraging resources.

Partnerships would allow for Nassau's local resources to be leveraged and there are many opportunities for both land acquisition *and* land management funding. In the establishment and maintaining of Nassau's land acquisition program, strategic partnerships could be developed with federal government agencies, such as the Environmental Protection Agency (EPA), the U.S. Department of Agriculture (USDA), the U.S. Department of the Interior (DOI), and the National Park Service (NPS) to name a few. In addition to working with the Florida Forever Program, strategic funding partnerships should be developed with state agencies such as the Department of Community Affairs, and the Water Management District.

Mitigation Banking:

Mitigation is process by which developers offset the impacts to natural systems that occurs during the building process. A mitigation bank is an attempt to consolidate the offsets into one ecosystem size project that will be more likely to replicate - at scale- the ecological services of the impacted property. If done well, these mitigation banks can become part of a larger system and provide environmental benefits to the area.

The following information was quoted or paraphrased from the Environmental Protection Agency's website (<http://www.epa.gov/owow/wetlands/facts/fact16.html>). This was the most concise definition found for mitigation banking:

A mitigation bank is a site where wetlands or other aquatic resources are restored, enhanced, created, or preserved to compensate for impacts to wetlands permitted under Section 404 or similar state or local wetland regulations. The 1995 Banking Guidance established a structure for banking that is characterized by four distinct components:

- *The bank site: the physical acreage restored, established, enhanced, or preserved;*
- *The bank instrument: the formal agreement between the bank owners and regulators establishing liability, performance standards, management and monitoring requirements, and the terms of bank credit approval;*
- *The Mitigation Bank Review Team (MBRT): the interagency team that provides regulatory review, approval, and oversight of the banks; and*
- *The service area: the geographic area in which permitted impacts can be compensated for at a given bank.*

The value of a bank is defined in "compensatory mitigation credits." A bank's instrument identifies the number of credits available for sale and requires the use of ecological assessment techniques to certify that those credits provide the required ecological functions. Mitigation banks are a form of "third-party" compensatory mitigation, in which the responsibility for compensatory mitigation implementation and success is assumed by a party other than the permittee.

Four types of mitigation programs are available in the state of Florida: Permittee Responsible Mitigation, Mitigation Banking, In-lieu fee programs, and Regional Offsite Mitigation Areas. Specific details relating to the establishment and operation of mitigation banks are included in Federal Guidance on the Establishment, Use, and Operation of Mitigation Banks, in Section 373.4136, F.S., and in Chapter 62-342, F.A.C. These details are not included in this document.

To locate the existing four mitigation banks in Nassau, refer to either Florida D.E.P.'s Mitigation website (<http://www.dep.state.fl.us/water/wetlands/mitigation/mitbanks.htm>), or the St. Johns River Water Management District's Mitigation Banking site (<http://arcimspub.sjrwmd.com/website/mt/>)

One of the largest banks in Nassau exists in the western part of the County. The Longleaf Mitigation Bank is comprised of three ecologically and hydrologically related tracts totaling 3,021 acres (see Appendix C1). The Northwest tract contains waters and wetlands of Crosby Bay and Mill Creek. The East Site contains headwater wetland systems of Thomas Creek and Mill Creek. The South Site contains waters and wetlands associated with Deep Creek, Brandy Branch and Crosby Bay. Crosby Bay is a large, headwater wetlands system that connects the three bank tracts. The site is dominated by a densely planted slash pine plantation. Wetlands on the site include pine plantation, along with cypress sloughs, hardwood sloughs and creek bottomlands.

Specific objectives of the bank include re-establishing surface water flows and wetland hydroperiods; elimination of pine plantations; regeneration of converted and previously harvested wetlands and uplands to a natural condition; planting and other steps to improve habitat quality; eliminating

hunting pressure caused by the issuance of hunting leases; control of nuisance plants and animals; headwater and stream restoration of channelized systems; drainage-structure abandonment; and introduction of prescribed burns within a preserved landscape.

Mitigation banks when placed in locations contiguous with conservation corridors and managed to provide significant environmental enhancement, can be a means to manage growth and provide a conservation benefit.

3.3 Land Management, Greenway, and Sustainable Development Partnerships

In any good land acquisition program it is important to work in cooperation with private landowners and local stakeholders, such as ranchers, farmers and fishermen, to ensure good ecological management while continuing to support the local economy.

TNC works with the business community to find common ground between conservation and industry. We accept their financial and land donations, engage in cause-related marketing, foster direct conservation action, and participate in event sponsorship. TNC always seeks to develop creative partnerships with corporations that result in tangible, lasting conservation. Farming and conservation go hand-in-hand to reach mutual goals. Conservation practices help farmers, ranchers and other landowners continue their traditional ways of life by protecting the natural resources and habitats that are vital for productive agricultural yields. The United States has a long tradition of supporting conservation on private lands through federal agricultural policies. The 2007 Farm Bill presents an opportunity to continue and strengthen that tradition, and the local Counties can design projects that might be eligible for these funds and protect a long term traditional way of life.

Keeping natural areas healthy is also important to ensure their long term viability. There are many existing land management opportunities the County has already taken advantage of and new ones to consider. Locally there are many existing interagency partnerships that are working to address the threat of invasive species in natural areas, maintaining good water quality, introducing prescribed burns to critical areas that need fire to remain healthy, and other unique partnerships that are working together to promote sustainable development.

Chapter Four: Fiscal, Demographic, & Electoral Analysis

4.1 Introduction

The Nature Conservancy contracted with the Trust for Public Land (TPL) to provide an analysis of Nassau County's financial capacity to pursue a variety of funding mechanisms for a conservation lands program. The Trust for Public Land conserves land for people to improve the quality of life in our communities and protect our natural and historic resources. TNC and TPL are part of The Conservation Campaign (TCC) which mobilizes public support for ballot measures and legislation that create public funds to protect land and water resources. TCC supports a wide range land conservation strategies, from acquisition of urban parks and playgrounds, to the purchase of development rights to protect working forests and farmlands. They are completely bipartisan and work cooperatively with elected officials, along with farmers and ranchers, the business community, developers and realtors, and many other groups.

Given the substantial investment of time and resources required for a successful conservation finance initiative, preliminary research is essential to determine the feasibility of such an effort. The objective for this study is to research the most viable local public options for funding parks creation and land conservation in Nassau County, Florida and provide analysis of which local options and funding levels are economically prudent and likely to be publicly acceptable. This research provides a fact-based reference document that can be used to evaluate available financing mechanisms from an objective vantage point. TPL provided the analysis in Chapter four as a sub-contract to TNC's contract with Nassau County.

4.2 Executive Summary

The Trust for Public Land has undertaken an analysis of finance options available to Nassau County to fund the acquisition and development of land as parks, recreation facilities and open space. Nationwide, a range of public financing options has been utilized to fund parks and open space preservation. These include general obligation bonds, the local sales tax, the property tax, and less frequently used mechanisms such as special assessment districts, real estate transfer tax, impact fees, and income taxes. In Florida, local government funding options for land conservation have primarily taken the form of budget appropriations, general obligation bonds backed by property taxes or the infrastructure sales tax. Many communities also impose impact fees on new development to help fund additional parks infrastructure needs. Currently, in Nassau County, funding for parks, recreation, and protection of environmentally sensitive lands largely comes from general county ad valorem taxes, the one-cent sales tax fund, and impact fees.

The Trust for Public Land finds that the county has two primary funding alternatives available to provide significant additional public monies for land conservation purposes:

1. Bond issuance, backed by the Ad Valorem Tax;
2. Appropriation of the Ad Valorem Tax (County tax or Municipal Services Tax Unit).

Bonds

A general obligation (G.O) bond would provide a robust source of revenue for the county. For example, the county could issue \$20 million in bonds with a tax increase of approximately \$0.2/\$1,000 of assessed value. This would cost the average homeowner roughly \$23 per year.

Although a G.O. bond would provide a large and immediate source of funds for land conservation and parks development, it does require majority voter approval. While it may seem to be a very difficult task to gain such approval, local land conservation ballot measures have continued to enjoy strong public support across the country. Historically, since 1996, 76 percent of state and local conservation finance measures were successful nationwide. In Florida, 59 state and local land conservation measures have been approved at the ballot (80 percent) during this time period.

Ad Valorem Tax

As an initial step, the Board of County Commissioners could consider increasing the county ad valorem tax to support regional parks and open space programs and operations. Such an effort may require voter approval. A fairly small increase in the tax rate would generate significant funds for parks and open space. For instance, an additional 0.25 mill increase would generate approximately \$2 million annually, at a cost of just under \$30 per household.

4.3 General Background⁴⁴

Overview

Nassau County is one of four counties included in the Jacksonville Metropolitan Statistical Area. It is located in the northeast corner of Florida at the Georgia border, just 30 miles north of downtown Jacksonville. Nassau County comprises 652 square miles and is divided into three incorporated areas: Hilliard in the northwest region, Callahan in the south mid-west and Fernandina Beach in the east. Yulee, Bryceville, and Amelia Island are among the largest of the unincorporated areas.

The county landscape is a blend of rural, wooded areas to the west and rivers, bays, beaches and the Atlantic Ocean to the east. The local economy is based primarily on a combination of service, manufacturing, and construction and trade industries. Federal, state or local governments employ nearly 21 percent of the county's workforce. The county's unemployment rate for 2007 was 3.4 percent, which is below the state and national averages of 4.3 percent and 4.5 percent, respectively. The average per capita personal income in the county was \$29,639, somewhat lower than the statewide average for 2007 of \$37,058.

Nassau County's population has shown steady growth in recent years, increasing from 57,663 residents in 2000 to an estimated 65,850 in 2006 (representing a 14.2 percent increase during those years). The largest city in the county is Fernandina Beach, which had a 2006 population of 11,815. More than three-quarters of the population (52,064) live in unincorporated areas of the county. The total county population is projected to reach 80,000 by the year 2015.

Currently, the county housing market has been suffering through a severe slump after record-breaking activity from 2001 through 2005. In Northeast Florida, the peak year was 2005 when the four-county Jacksonville area averaged 1,479 housing permits a month, according to figures

⁴⁴ Information in this section is largely excerpted from county documents and web pages including the FY06/07 CAFR, and the Nassau County Economic Development Board website.

compiled by the Northeast Florida Builders Association. The number of permits dropped to 927 a month in 2006, and through November of this year, activity has slowed to 588 permits monthly.⁴⁵

Government

Nassau County is governed by a five-member Board of County Commissioners. Commissioners are elected at-large, but represent separate geographic districts. Each member serves a four-year term of office. Three commission seats will be up for election in 2008.

Nassau County Board of County Commissioners

District	Commissioner	End of Term
1	Jim B. Higginbotham	2008
2	Michael H. Boyle	2010
3	Tom Branan	2008
4	Barry Holloway	2010
5	Marianne Marshall	2008

Fiscal Overview

The financial statements for the fiscal year 2007 report a generally positive financial outlook for the county. Among the highlights are: county assets exceed liabilities, revenues exceeded expenses, and that the general fund reported an operational surplus for the fourth consecutive year. The county has stated a commitment to reducing debt and is aggressively paying off early both its line of credit and a 1999 refunding bond. The positive outlook is tempered somewhat by the stagnant real estate market and general widespread slow down in the U.S. economy, as well as by the recent property tax reforms in the state of Florida (covered in greater detail on p. 11).

County services and programs are funded through revenue that is derived from many different sources. While some revenues may be spent on any town service, some revenue sources are limited to a specific program or service. The total projected revenues and expenditures for Nassau County in the FY 2007/2008 adopted budget were \$147 million. The primary general government revenue source is ad valorem taxes (50 percent of total revenues), followed by charges for services (14 percent), sales taxes (12 percent), and operational grants (9 percent). The budget for parks and recreation is approximately \$4.6 million.

The Capital Improvements Plan calls for expenditures of \$25 million over 5 years. Planned expenditures for parks and recreation are estimated at approximately \$3 million.

The county is currently carrying about \$87 million in outstanding debt, largely made up of revenue bonds backed by specific revenue sources. The county has no general obligation debt outstanding.

County Planning

The Growth Management Department provides technical planning support to the Board of County Commissioners, County Coordinator, and other County Departments. The department performs the daily operations associated with the implementation of the Nassau County Comprehensive Plan.

⁴⁵ Florida Times Union, December 29, 2007. New Home Sales Spiral Downward Economist Says It's the One Sector of the Economy That Shows No Signs of Life

In 2007, Nassau County and the Amelia Island-Fernandina Beach-Yulee Chamber of Commerce initiated a countywide visioning process. The yearlong Vision 2030 process, facilitated by MGT of America, Inc. will involve a series of public meetings and workshops designed to create a shared

vision plan for the next 25 years. The Vision Plan will guide capital budget decisions, future facilities siting and revisions to the county Comprehensive Plan. Results from the 8 public involvement meetings and public workshop indicate that growth and protection of open space and environmentally sensitive lands are among the participants' top priorities for the county. Continued rapid growth in population has put pressure on the county school system and transportation networks, as well as natural resources and parks.

The adopted level of service (LOS) goal for parks in the county is 14 acres per 1,000 residents. The current actual LOS is about 4.5 acres / 1,000. In 2007, the Trust for Public Land conducted a survey of Florida counties to explore their state and regional parks needs. Nassau County Parks and Recreation responded that 771 additional land acres are needed for parks, recreation and open space purposes in the county. The estimated cost for this land is \$19.2 million. The county further identified some \$3 million in renovation needs and \$2 million for new facilities.

Two recent park development and land acquisition projects are worthy of note here. At the end of 2007, the county approved the use of public funds (primarily impact fees and sales tax revenue) to purchase the 107-acre "Mizell" tract for use as a regional park, and for construction of the Goffinsville/Nassau River Park.

In addition, in March 2008, Governor Crist and the Florida Cabinet voted to acquire more than 1,100 acres in Nassau County as part of the Northeast Florida Timberlands and Watershed Reserve project. Funding for this project comes from the Florida Forever fund. The land area will be added to more than 60,000 acres of conservation land spanning from Osceola to the Ocala National Forest.

Conservation Referendums

In April 2001, voters in Fernandina Beach approved a \$6 million bond measure for land conservation, wildlife, beach access, and city parks.

4.4 Revenue Options for Open Space

Overview

Nationwide, a range of public financing options has been utilized to fund parks and open space preservation, including general obligation bonds, the local sales tax, and the property tax. Less frequently used mechanisms have included special assessment districts, real estate transfer tax, impact fees, and income tax. In Florida, local government funding options for land conservation have primarily taken the form of general obligation bonds backed by property taxes, or, in fewer cases, the infrastructure sales tax.

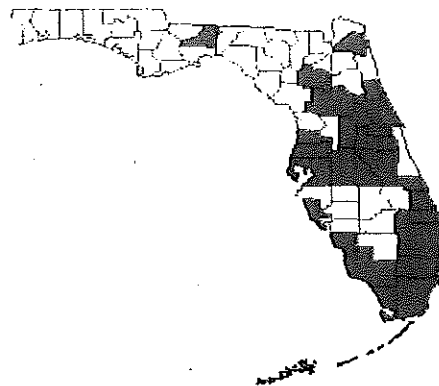
However, conservation finance measures are not right for every local government or they might not be the right approach at the moment. Budget appropriations and other revenue sources that can be implemented through the legislative process may well serve as short-term funding options while parks and conservation proponents develop a strategy and cultivate broad support for longer-term finance options.

The Trust for Public Land believes Nassau County has two primary funding alternatives capable of generating significant public money for the purchase of open space.

1. Bond issuance, backed by the Ad Valorem Tax;
2. Appropriation of the Ad Valorem Tax (County tax or Municipal Service Tax Unit).

At least twenty-six counties in Florida have established dedicated sources of revenue for the acquisition and management of environmentally sensitive lands, parks, and open space. Many of these programs were created by voter-approved referenda. Since 1996, voters in eighteen Florida counties have approved funding measures for land conservation, parks, and recreation. See the appendix for a list of recent local conservation finance ballot measures.

Counties w/ Voter-Approved Conservation Finance Programs



Conservation Finance Measures Approved by Counties since 1996 by Finance Mechanism	
Bond	21
Property Tax	5
Sales Tax	8
	34

General Obligation Bonds

Background

The Board of County Commissioners has the authority to issue general obligation bonds for parks and open space purposes. It may also determine the amount of bonds required for a particular purpose, the rate of interest, and the time when the principal and interest are due.⁴⁶ The state statutes do not place specific limits on the amount of debt that can be incurred, but do limit the duration of the bonds to a period not exceeding 40 years. County bonds require a referendum and must be approved by a majority of votes of voters residing in the county⁴⁷.

Proceeds from a general obligation bond issuance may not be used for ongoing expenses, such as maintenance; however, a county may choose to include a voted millage question on the bond referendum ballot. In this case, it is permissible to ask the voters to approve a millage rate that would raise revenue in excess of that necessary for debt service. The surplus revenue may be used for any purpose solely related to the capital project for which the voted millage was approved, including operations and maintenance. The portion of the voted millage necessary to pay debt service is exempt from the 10-mill cap on property taxes, but the excess portion must be treated as

⁴⁶ Section 130.01, F.S..

⁴⁷ Section 130.03, F.S. Refunding bonds do not require a referendum.

general millage subject to the limit.⁴⁸ The cap is discussed further in the next section on ad valorem taxes.

Issuing Bonds for Parks and Open Space

The chart on the following page illustrates the debt service and millage for bond amounts that could potentially be issued. For instance, a bond issue for \$20 million would add roughly \$2 million to the county's annual debt service and cost the average homeowner approximately \$23 per year in additional property taxes.

The per household cost estimate assumes that the county would levy additional property taxes to pay the debt service on the bond, though the county could choose to use other funds for this purpose. As the county tax base grows the individual tax burden will likely decrease. TPL's bond cost calculations provide a basic estimate of debt service, tax increase, and cost to the average homeowner in the community of potential bond issuances for parks and land conservation. Assumptions include the following: the entire debt amount is issued in the first year and payments are equal until maturity; 20-year maturity; and 5 percent interest rate. The property tax estimates assume that the jurisdiction would raise property taxes to pay the debt service on bonds; however other revenue streams may be used. The cost per household represents the average annual impact of increased property taxes levied to pay the debt service. The estimates do not take into account growth in the tax base due to new construction and annexation over the life of the bonds. The jurisdiction's officials, financial advisors, bond counsel and underwriters would establish the actual terms of any bond.

Nassau County Bond Financing Costs			
<i>Assumes 20-year bond at 5.0% interest rate; Total Assessed Valuation (AV)= \$7.98 billion</i>			
Bond Issue	Annual Debt Svce	Prop Tax Increase	Cost/ Year/ Avg Home*
\$10,000,000	\$802,426	0.1005	\$12
\$20,000,000	\$1,604,852	0.2010	\$23
\$30,000,000	\$2,407,278	0.3014	\$35
\$50,000,000	\$4,012,129	0.5024	\$58

*Based on estimated taxable value of average homestead \$116,222 (incl \$50K exemption).

Enactment Procedures

The County Commission must call a referendum election prior to the issuance of bonds.⁴⁹ There must be at least 30 days notice published in the local newspaper of general circulation.⁵⁰ Bond elections may be held concurrently with any general or primary election.⁵¹ General elections are held on the first Tuesday after the first Monday in November of each even numbered year.⁵²

⁴⁸ Section 200.181(3), F.S.

⁴⁹ Section 100.211, F.S.

⁵⁰ Section 100.342, F.S.

⁵¹ Section 100.361, F.S.

⁵² Section 100.031, F.S.

Special elections may also be called after the supervisor of elections consents.⁵³ In any special election or referendum not otherwise provided for there shall be at least 30 days' notice of the election or referendum by publication in a newspaper of general circulation in the county. The publication shall be made at least twice, once in the fifth week and once in the third week prior to the week in which the election or referendum is to be held.

The ballot for bond referenda must be printed on plain white paper with a description of the bonds to be voted on as prescribed by the local government calling the vote. A separate statement of each issue of bonds to be approved, giving the amount of the bonds and the interest rates, and "other information necessary to inform the voters," must also be on the ballot. The body of the measure must not exceed 75 words in length. The ballot title shall consist of a caption, not exceeding 15 words in length, by which the measure is commonly referred to or spoken of.⁵⁴ This information must be followed by the choices: "For Bonds" and "Against Bonds".⁵⁵ If any bond order fails at referendum, then no other referendum for the approval of bonds for the same purpose may be called for at least six months.

Advantages & Disadvantages

Advantages

- Provides a large pool of funding which allows immediate purchase of land while it is still available, and presumably at a lower price than in the future.
- Distributes the cost of acquisition over time so that future beneficiaries also share in the burden.

Disadvantages

- Interest on debt increases total costs.
- Funds may only be used for capital improvements (e.g. acquisition of park land, construction of park improvements) and not for on-going operations and maintenance, unless a provision to levy additional millage is included in the ballot.⁵⁶
- The county currently has no general obligation debt outstanding; therefore, this may be an unfamiliar or unpopular tool for funding capital improvements in the county.

Ad Valorem (Property) Tax

Background

Ad Valorem taxes, commonly referred to as property taxes, are the single most important revenue source for local governments in Florida, funding schools and locally provided government services. Property taxes account for approximately 38 percent of local government funding. Property taxes

⁵³ Section 100.151, F.S.

⁵⁴ Section 101.161, F.S.

⁵⁵ Section 100.341, F.S.

⁵⁶ Except that a county may choose to include a voted millage question on the bond referendum ballot. In this case, it is permissible to ask the voters to approve a millage rate that would raise revenue in excess of that necessary for debt service. The surplus revenue may be used for any purpose solely related to the capital project for which the voted millage was approved, including operations and maintenance.

are levied by counties, municipalities, schools, and various special taxing authorities such as water management and fire districts.

The average total millage (tax) rate in Florida counties is 20.24 mills (equals \$20.24 per \$1,000 of taxable property value). This rate includes school districts and special districts. The general millage is set by the governing body of the local taxing authority. Cities, counties, and school districts are subject to a constitutional limit of 10 mills each for operating purposes. Exceptions authorized by local voters, include debt service millage and a voted millage not to exceed a period of two years.

During the past year, several changes have been introduced to the Florida property tax system as described below.

Statutory Rollback and Cap: HB 1B

In 2007, the Florida Legislature adopted a significant property tax reform plan during Special Session B that consists of two components. HB 1B statutorily rolls back property tax rates levied by counties, municipalities and independent special districts and caps them on a going forward basis. These provisions do not apply to school taxes (which represent approximately 40 percent of the property tax bill in most jurisdictions).

Future millage increases after FY 2007-08 for cities, counties and special districts will be limited to the "rolled-back rate," (rate that produces same taxes as the prior year, exclusive of taxes from new construction) plus growth in personal income.

Amendment 1

The other component offered a constitutional amendment to the electorate at the Presidential Preference Primary. On January 29, 2008, the electors of Florida approved Constitutional Amendment 1, which made several major changes to the local property tax structure in the state. The constitutional revisions include: doubling the homestead exemption (from \$25,000 to \$50,000); allowing for the portability of the Save Our Homes assessment differential; providing an exemption of \$25,000 for tangible personal property and providing an assessment cap of 10% for non-homestead property. The additional homestead exemption does not apply to school levies.

Overrides

The caps may be overridden by an extraordinary vote of the governing body or by referendum. The provisions for an override differ for each of the next couple of years, they are described in greater detail in appendix B of this report. To date only a handful of counties have imposed a millage above the limits with an extraordinary vote. Uncertainty about the impacts of the reforms and potential political ramifications may limit widespread use of this option.

The Property Tax in Nassau County

The 2007 general county levy was 5.3115 mills. Nassau County's tax rate is lower than its neighbors (Baker, 7.3597 and Duval, 20.6223). The total countywide levy, including schools, was 12.7655. In addition, the three municipalities and several special districts within the county levy their own millages on property. The county levy generated roughly \$50 million in 2007, nearly half of all revenue for governmental activities.

The recent changes to property tax laws in Florida could be expected to decrease the amount of revenue the county will collect from property taxes over the next several years. The county estimates the annual loss of revenue at approximately \$2.7 million.⁵⁷

Using the Property Tax for Parks and Open Space

Nassau County is well below the Constitutional limit of 10 mills, so, with regard to that limit, the county has ample room to utilize property taxes to fund open space purchases. The chart below illustrates the revenue and cost of various millage amounts. For instance, based on the county's total taxable value of \$7.9 billion estimated for FY 2009, an additional 0.25 mill increase would generate approximately \$2 million annually for parks and conservation.

Revenue and Cost of Property Tax			
Total Taxable Value = \$7.98 billion			
Millage Increase	Estimated Annual Revenue	Cost/ Year/ \$100,000 of Taxable Property Value	Cost/ Year/ Average Homeowner*
0.05	\$399,292	\$5	\$6
0.10	\$798,585	\$10	\$12
0.25	\$1,996,462	\$25	\$29
0.50	\$3,992,925	\$50	\$58
1.00	\$7,985,850	\$100	\$116

*Based on estimated taxable value of average homestead \$116,222 (incl \$50K exemption).

Enactment Procedures

The county financial staff and advisors would need to determine the requirements for approval of any proposed increase/override in the general millage based on the recent property tax reforms. Such a change could require either a supermajority vote of the Board of County Commissioners and/or a public referendum.

An increase in the general millage does not represent a permanent dedication of funds for parks and open space purposes. The millage may be used for other purposes as determined by the commissioners. The county may choose to include a non-binding referendum on the question of an ad valorem tax increase.⁵⁸ For example, in 1996, Lee County asked voters to approve a county levy of up to ½ mill annually for seven years for the purpose of purchasing and managing conservation lands. Voters indicated strong support and the county commissioners established the Lee County Conservation 2020 Program, funded by a ½ mill ad valorem tax.⁵⁹

Alternatively, Nassau County could impose a voted millage not to exceed a period of two years. A voted levy must be approved by majority vote of the qualified electors in the county or district voting

⁵⁷ Nassau County CAFR 2007, p. 60. At present, there is no accurate way to determine the impact of the portability and assessment cap on nonhomestead property provisions in terms of potential loss of property tax revenues.

⁵⁸ Counties may place questions or propositions on the ballot at any primary, general, or special election with a majority vote of the governing body. No special election may be called for the purpose of conducting a straw ballot. [FSA 125.01 (1)(y)].

⁵⁹ For more information about this approach, contact Conservation 2020 Program Coordinator, Linda Riley.

in an election called for such purpose. Such an election may be called by the governing body of any such county or district on its own motion or by a citizen petition. The petition must specify the amount of millage sought to be levied and the purpose for which the proceeds will be expended and contain the signatures of at least 10 percent of the persons qualified to vote in such election, signed within 60 days prior to the date the petition is filed.⁶⁰

Advantages & Disadvantages

Advantages

- Relatively easy to implement.
- May not require voter referendum, except for dedicated increases.
- Permitted uses are flexible, i.e., can fund operation costs as well as acquisition.

Disadvantages

- May not provide a large pool of funding up front to facilitate acquisition of lands (depending on the size of the levy).
- Does not necessarily provide dedicated funding for land acquisition over time;
- Funding level may be altered or eliminated by the Board of County Commissioners based on a change in priorities.

Municipal Service Taxing Units

County governments also have the authority to establish municipal service taxing units (MSTU) for any or all of the unincorporated area of the county in order to provide essential facilities and municipal services. Within the limits fixed for the taxing unit, the county may levy additional ad valorem taxes of up to 10 mills. MSTUs are subject to the property tax reforms discussed in the previous section. It is not clear if the creation of a new MSTU would require a public vote under these tax provisions. The county attorney should be consulted for further guidance if an MSTU is considered a potential option for funding land conservation.

A municipal service taxing or benefit unit may include all or part of the boundaries of a municipality if the governing body of the municipality agrees in writing. In this case, the millage levied on any parcel of property for municipal purposes by all municipal service taxing units and the municipality may not exceed 10 mills in the aggregate. Currently the county has a municipal service fund, which levies 1.5906 mills in the unincorporated areas. This levy is expected to generate just under \$10 million in 2008. The current millage rates in Nassau County municipalities range from 0.4388 mill in Hilliard to 4.068 mills in Fernandina Beach. The special districts in the county each levy less than 1 mill.

The chart below illustrates the estimated revenue and average annual per household cost of various millage rates levied in the unincorporated area of the county. (See the section on property taxes above for estimates for a countywide MSTU that includes all of the county's municipalities.)

⁶⁰ Section 200.091, F.S.

Revenue and Cost of MSTU Property Tax			
Unincorporated areas only			
Millage Increase	Estimated Annual Revenue*	Cost/ Year/ \$100,000 of Taxable Property Value	Cost/ Year/ Average Homeowner**
0.11	\$665,178	\$11	\$12
0.22	\$1,330,356	\$22	\$24
0.32	\$1,995,535	\$32	\$37
0.53	\$3,325,892	\$53	\$62
1.00	\$6,651,785	\$100	\$116

*Based on FY08 budgeted revenues for existing MSTU.
 **Based on estimated taxable value of average homestead \$116,222 (incl \$50K exemption).

Infrastructure Sales Tax

Local governments are authorized to levy several types of local option sales surtaxes subject to eligibility requirements, rate limits, and certain authorized purposes. Counties with a total population of 50,000 or less are authorized to levy the Small County Surtax at a rate of 0.5 or 1 percent. Nassau County currently levies the Small County Surtax at the maximum rate of 1 percent. This tax is imposed without a specified sunset (i.e. until repealed).

As of FY 2007, the tax has generated about \$6.8 million, some of which has been spent on parks and land acquisition. Parks and conservation supporters could advocate for more funds for open space purposes from these revenues through the capital improvement budget process. Competition for funds is likely to be strong.

Impact Fees

Impact fees may be levied by a county or municipality according to its home rule authority.⁶¹ Impact fees are charges imposed by local governments against new development to fund infrastructure needs that are a result of the development. Local governments in Florida have levied impact fees to fund road improvements, school facilities, water and sewer projects, and park expansion. There is no state law that governs the structure and application of impact fees. The guidelines are found in case law. The two concepts that generally govern impact fees are nexus and proportion. In other words there must be a reasonable connection between the proposed need for capital facilities and the growth generated by the new development, and the fee must be in proportion to the benefits accruing to the new development.

Nassau County currently imposes several impact fees to support infrastructure needs including parks and recreation. In 2007, the Growth Management Department commissioned an examination of the county's impact fees. The report prepared by James Nicholas, noted expert on impact fees with the

⁶¹ The Growth Management Act of 1985 requires local agencies to maintain adequate service levels for public facilities and prohibits approval of development that would cause a reduction in service level for existing users. The act also requires the local government to provide public facilities that are consistent with the community's land-use plan. The act does not specifically allow impact fees, since the courts have ruled that the authority to levy such fees is a function of the Florida Constitution. But "concurrency" as a development rule accomplishes much the same purpose.

University of Florida's Department of Urban and Regional Planning, concluded that the county's current fees are inadequate related to the costs and that the county should consider increasing the fees, particularly the roads impact fee. To date, the county has not acted on this recommendation due to several factors including the current real estate slump and the existence of significant fund balances in the impact fee funds.

4.5 Elections

Results and Turnout

Election results can often be helpful in gauging voter support for capital projects and tolerance for public spending; however, there have been no countywide public finance measures on the ballot in Nassau County in recent years. Therefore, a public opinion survey may be particularly important to determine public priorities and willingness to commit government funds to parks and land conservation among current residents of the county.

Nassau County voters showed strong support for Amendment 1 in January, approving the property tax reforms with 63.8 percent of the vote (just below the statewide average approval rate of 64.2 percent).

In April 2001, voters in Fernandina Beach approved a \$6 bond referendum for parks, natural areas and greenways. The measure was approved with 53 percent support.

Fernandina Beach Bond Referendum

NATURAL AREAS, NEIGHBORHOOD PARKS, AND EGANS CREEK GREENWAY PRESERVATION MEASURE

To purchase and preserve Natural Areas, improve city parks, recreation centers, and the Egans Creek Greenway, and to seek matching funds from state programs for these purposes, shall the City of Fernandina Beach be authorized to issue general obligation bonds in an amount not exceeding \$6,000,000, with interest not exceeding the maximum legal rate, with a maturing not exceeding twenty years, payable from unlimited ad valorem taxes, with project spending subject to annual independent audit?

Voter Registration & Turnout

Republican	22,709	52%
Democrat	14,653	33%
Other	6,426	15%
Total	43,788	

Year	Presidential Preference		General Election
	Primary	Primary	
2004	13%	39%	79%
2006	*	29%	51%
2008	49%		

Summary of Options

Local Revenue Options Matrix

Revenue Option	Description and Generating Potential	Implementation Process	Comments												
Property Tax	<p>Nassau County could raise revenue for parks and open space acquisition by increasing the county property tax rate for that purpose through a general millage increase or a voted levy.</p> <table border="1"> <thead> <tr> <th>Tax Rate</th> <th>Revenue Raised per Year</th> <th>Annual Cost for Avg House*</th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>\$798,585</td> <td>\$12</td> </tr> <tr> <td>0.25</td> <td>\$1,996,462</td> <td>\$29</td> </tr> </tbody> </table> <p>*\$116,222 taxable value incl. Exemptions.</p>	Tax Rate	Revenue Raised per Year	Annual Cost for Avg House*	0.1	\$798,585	\$12	0.25	\$1,996,462	\$29	<p>An extraordinary (2/3rds or unanimous, see p. 18) vote of the Commissioners or a referendum may be required.</p>	<p>Pro: A property tax would create a significant funding source for parks and conservation. Con: A general levy is not permanently dedicated to a specific purpose. A voted levy may be imposed for two years only. Con: Recent property tax reforms will impact the county revenues from this source. Additional changes may occur in the next year or so that would further reduce or restrict this mechanism.</p>			
Tax Rate	Revenue Raised per Year	Annual Cost for Avg House*													
0.1	\$798,585	\$12													
0.25	\$1,996,462	\$29													
Property Tax (MSTU)	<p>Nassau County could raise revenue for parks and open space acquisition by creating a Municipal Services Taxing Unit and increasing the property tax rate for that purpose in the unincorporated portion of the county.</p> <table border="1"> <thead> <tr> <th>Tax Rate</th> <th>Revenue Raised per Year</th> <th>Annual Cost for Avg House</th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>\$665,178</td> <td>\$12</td> </tr> <tr> <td>0.22</td> <td>\$1,330,356</td> <td>\$24</td> </tr> </tbody> </table>	Tax Rate	Revenue Raised per Year	Annual Cost for Avg House	0.1	\$665,178	\$12	0.22	\$1,330,356	\$24	<p>It is not clear if an extraordinary vote (2/3rds or unanimous, see p. 18) and/or a referendum is required to create a new MSTU under the current property tax reforms. The County would need to seek counsel.</p>	<p>Pro: A Parks MSTU would create a source of dedicated funds for parks and conservation. Con: Recent property tax reforms will impact the county revenues from this source. Additional changes may occur that would further reduce or restrict this mechanism.</p>			
Tax Rate	Revenue Raised per Year	Annual Cost for Avg House													
0.1	\$665,178	\$12													
0.22	\$1,330,356	\$24													
Issuing G.O. Bonds	<table border="1"> <thead> <tr> <th>Bond Issue</th> <th>Debt Service</th> <th>Tax Req'd</th> <th>Avg. House</th> </tr> </thead> <tbody> <tr> <td>\$10 million</td> <td>\$802,425</td> <td>0.1</td> <td>\$12</td> </tr> <tr> <td>\$20 million</td> <td>\$1,604,852</td> <td>0.2</td> <td>\$23</td> </tr> </tbody> </table> <p>The debt service figures for the proposed bond issues above are based upon a general obligation bond issued for 20 years at 5 percent interest. This rate is only used for illustration. County officials, its financial advisors, bond counsel and underwriters would establish the actual terms of any bond issue.</p>	Bond Issue	Debt Service	Tax Req'd	Avg. House	\$10 million	\$802,425	0.1	\$12	\$20 million	\$1,604,852	0.2	\$23	<p>A bond measure requires majority voter approval.</p>	<p>Pro: The county has little debt and a solid bond rating. Pro: Bonds raise substantial amounts of money, enabling the county to make important acquisitions now while land is available. Costs would be spread out over a long time horizon, and therefore costs borne by both current and future beneficiaries. Con: Bond proceeds generally may not be used to fund ongoing expenses, although the county could include additional millage in the bond question.</p>
Bond Issue	Debt Service	Tax Req'd	Avg. House												
\$10 million	\$802,425	0.1	\$12												
\$20 million	\$1,604,852	0.2	\$23												

Appendix A - A1

2006 & 2007 Residential permits and commercial permits in Nassau County

Year	Residential Permits	Commercial	Total
2006	1,061	61	1,122
2007	533	47	580
2008*	137	15	152

*First Quarter activity only, January 1, 2008- May 15, 2008.

For the year of 2006, Nassau County had a total of 1,061 residential permits and 61 commercial permits issued.

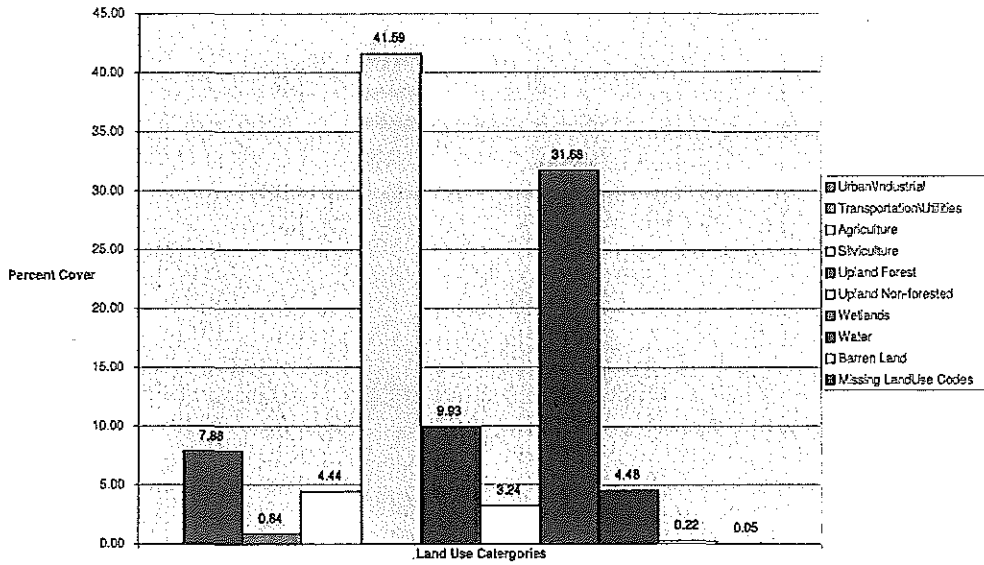
For the year of 2007, Nassau County had a total of 533 residential permits and 47 commercial permits issued.

From January 1, 2008 through May 15, 2008, Nassau County had 137 residential permits issued and 15 commercial permits issued.

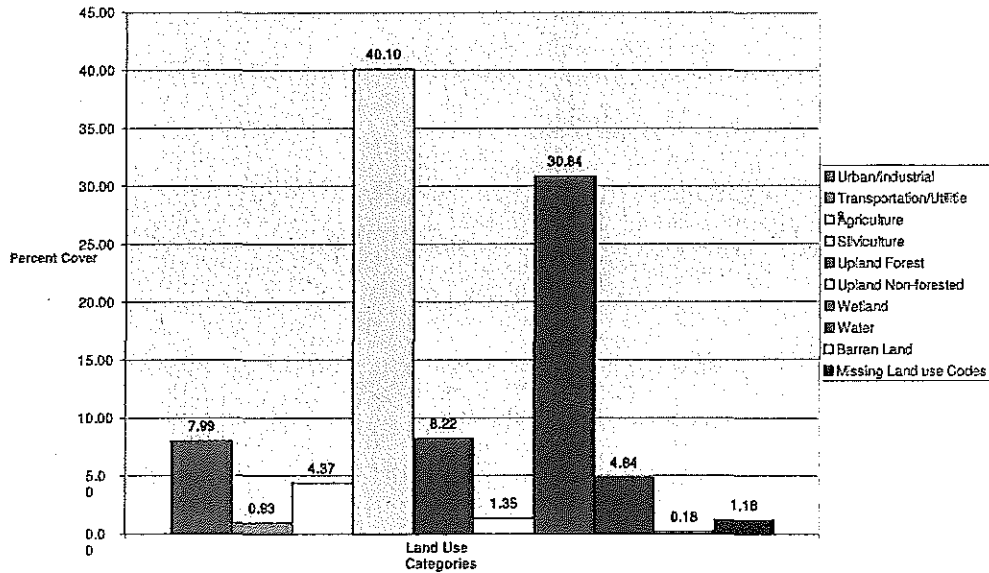
Source: Nassau County Building Department, Personal Communication S. Solomon.

Appendix A - A2

1994 Nassau County Percent Land Use



2004 Nassau County Percent Land Use



These bar charts reflect the percentages of land use categories based on St. Johns River Water Management District's 1994 and 2004 Florida Land Cover and Land Use Classification System for Nassau County, Florida. Subcategories were collapsed into the Main categories depicted in the graph.

Appendix A - A3

Nassau County Local Mitigation Strategy – Guiding Principals

- *New development may be constructed only in those areas where drainage and soils can support septic tanks or where utility services are available.*⁶²
- *Discourage development in the FEMA 100-year flood hazard zone and implement LDR's that minimize adverse impacts from potential flooding.*⁶³
- *To discourage development in the 100-year flood hazard zone, the Town of Callahan shall adopt LDR's which require new construction to meet FEMA regulations pertaining to floor level/floodplain level which reduce allowable densities for residential development and Floor/Area Ratio's for commercial development unless proposed development includes off setting design and development techniques which will minimize adverse impacts from potential flooding.*⁶⁴
- *Conservation Land Use shall be designated for land areas within the 100-year floodplain and wetlands. These new areas which are ecologically significant and so must be protected, but are not always in public ownership.*⁶⁵
- *Identify areas for potential acquisition in areas of existing vulnerable development.*⁶⁶
- *Establish a dune management program which will strictly limit excavation and destruction of native vegetation and other activities which interfere with the normal transport of dune sediments.*⁶⁷
- *Adopt standards for dune stabilization and restoration.*⁶⁸
- *LDR's shall include regulations governing the location, construction and maintenance of development adjacent to the Atlantic shoreline and include design standards which would not adversely affect the contours and topography 1000 feet landward of the Coastal Construction Control Line (CCCL).*⁶⁹
- *Docks and piers shall not obstruct or alter natural water flow or restrict navigation.*⁷⁰
- *Development orders shall be designed to protect the type, nature, and function of floodplains, wetlands, waterways, inlets, estuaries and lakes by limiting encroachment, removal of native vegetation, pollution discharge, dredge and fill, drainage, or other impacts associated with development.*⁷¹
- *Public expenditures that subsidize development in high hazard coastal areas will be limited to those improvements required to ensure public health, welfare, safety and access to recreation areas.*⁷²
- *Criteria shall be included in the LDR to include incentives to preserve/replace the natural (native) vegetation along County waterways to maintain the natural beauty of the area, to control erosion, and retard runoff.*⁷³

Source: Nassau County Local Mitigation Strategy, 2004.

⁶² Town of Callahan Comprehensive Plan Future Land Use Policy A.1.2.1

⁶³ Town of Callahan Comprehensive Plan Future Land Use Policy A.1.2.4

⁶⁴ Town of Callahan Comprehensive Plan, Future Land Use Policy A.1.2.4

⁶⁵ Town of Hilliard Comprehensive Plan Future Land Use Policy A.1.1.3(F)

⁶⁶ Strategic Regional Policy Plan- Emergency Preparedness Element Policies 3.7.1 through 3.7.6

⁶⁷ Fernandina Beach Comprehensive Plan, Dune Preservation Element Policy 5a.02.02

⁶⁸ Fernandina Beach Comprehensive Plan, Dune Preservation Element Policy 5a.02.03

⁶⁹ Fernandina Beach Comprehensive Plan, Dune Preservation Element Policy 5a.02.07

⁷⁰ Fernandina Beach Comprehensive Plan, Dune Preservation Element Policy 5a.05.07

⁷¹ Fernandina Beach Comprehensive Plan, Coastal Conservation Element Policy 5a.05.09

⁷² Fernandina Beach Comprehensive Plan, Capital Improvement Element Objective 8.02

⁷³ Nassau County Comprehensive Plan, Future Land Use Element Policy 1.01.02

Appendix A - A4

Economic Contributions of Agriculture, Natural Resources, Food & Kindred Product Manufacturing, Distribution and Related Services in Northeast Florida Counties in 2006
Compiled by Alan W. Hodges,
University of Florida, April 3, 2008

Industry Group/Sector	Output Impacts (\$Mn)*						Value Added Impacts (\$Mn)*						Employment Impacts (jobs)					
	NASSAU	BAKE	DUVAL	PUTN	ST.	Total	NASSAU	BAKE	DUVA	PUT	ST.	Total	NASSAU	BAK	DUVAL	PUT	ST.	Total
	U	R		AM	JOHN			R	L	NAM	JOHN		U	ER		NAM	JOHN	
Agricultural Inputs & Services	45.7	16.3	816.6	21.8	105.6	1,006.1	22.0	8.2	419.2	10.8	52.6	512.8	734	303	10,507	353	1,537	13,434
Farm machinery and equipment manufacturing	0.0	0.0	0.0	0.0	5.3	5.3	0.0	0.0	0.0	0.0	1.4	1.4	0	0	0	0	15	15
Landscape services	26.4	13.5	511.9	12.6	61.0	625.3	14.0	6.6	284.7	6.6	33.6	345.6	438	261	7,662	221	958	9,541
Paper industry machinery manufacturing	0.0	0.0	14.4	0.0	0.0	14.4	0.0	0.0	5.7	0.0	0.0	5.7	0	0	82	0	0	82
Pest control services	3.8	1.9	73.1	1.8	8.7	89.3	2.0	0.9	40.7	0.9	4.8	49.4	63	37	1,095	32	137	1,363
Pesticide and other agricultural chemical man	0.0	0.0	132.7	0.0	0.0	132.7	0.0	0.0	52.9	0.0	0.0	52.9	0	0	514	0	0	514
Veterinary services	15.6	0.8	84.5	7.4	30.6	139.0	6.0	0.6	35.3	3.3	12.8	57.9	233	4	1,155	101	426	1,919
Crop, Livestock, Forestry & Fisheries Production	301.3	89.3	115.6	130.2	178.7	815.2	135.0	40.2	50.8	71.9	115.2	413.1	1,678	481	1,418	1,013	1,553	6,144
Agriculture and forestry support activities	13.9	0.4	17.2	1.1	8.5	41.1	11.7	0.2	11.4	0.6	5.2	29.1	263	17	353	58	324	1,025
All other crop farming	0.4	0.0	1.1	0.8	0.0	2.2	0.2	0.0	0.6	0.4	0.0	1.2	2	0	9	4	0	15
Animal production- except cattle and poultry	3.9	19.7	0.1	3.4	2.0	29.1	0.9	3.7	-0.6	2.9	1.5	6.4	11	50	8	57	27	153
Cattle ranching and farming	7.2	3.8	16.9	9.3	1.1	38.3	1.5	0.5	3.9	1.8	0.3	8.2	40	22	231	86	9	387
Cotton farming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0
Fishing	2.2	1.3	12.5	0.0	1.3	17.3	0.7	0.3	4.4	0.0	0.3	5.7	64	42	329	0	41	477
Forest nurseries- forest products- and timber	172.4	5.1	33.4	10.0	0.0	220.9	73.2	1.6	12.4	4.1	0.0	91.2	892	33	163	68	0	1,155
Fruit farming	0.6	0.3	1.5	1.3	0.2	4.0	0.3	0.2	0.9	0.7	0.1	2.2	4	3	29	19	2	57
Grain farming	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0	0	3	0	0	3
Greenhouse and nursery production	14.6	12.9	12.5	48.0	24.9	113.8	11.0	9.8	9.2	37.2	18.6	85.7	82	88	144	440	180	934
Logging	43.8	7.1	9.6	31.2	1.4	93.1	14.0	1.7	2.1	9.4	0.4	27.5	168	38	43	121	9	379
Oilseed farming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0
Poultry and egg production	35.5	18.5	1.3	4.2	0.0	59.5	17.2	9.1	0.7	2.0	0.0	29.0	122	68	7	16	0	213
Tobacco farming	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0	2	0	0	0	2
Tree nut farming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0
Vegetable and melon farming	6.7	20.0	9.5	19.9	139.4	195.5	4.3	12.9	6.0	12.8	68.8	124.8	30	118	89	145	962	1,344
Food & Kindred Products Distribution	204.2	35.2	5,697.1	128.5	856.8	6,931.8	113.8	17.7	3,415.5	70.1	498.6	4,115.7	3,214	706	67,676	2,221	12,254	86,071
Building material and garden supply stores	44.0	3.1	589.7	30.3	84.6	751.7	27.0	1.8	375.4	17.9	53.7	475.8	524	47	5,663	418	831	7,484
Food and beverage stores	35.9	9.9	694.6	31.4	137.4	909.1	22.0	5.8	437.7	18.9	84.3	568.8	639	200	10,706	594	2,394	14,533
Food services and drinking places	103.9	18.6	2,117.4	51.4	478.8	2,768.1	51.1	7.8	1,080.0	22.9	247.4	1,409.2	1,929	421	36,053	1,084	8,102	47,620
Wholesale trade, food & kindred products	20.3	3.6	2,295.5	15.5	168.0	2,502.9	13.7	2.4	1,522.4	10.4	113.1	1,661.9	122	38	15,223	124	926	16,434
Food & Kindred Products Manufacturing	6.4	0.2	7,977.4	0.0	71.4	8,055.3	2.3	0.0	3,647.3	0.0	25.2	3,674.9	30	1	36,521	0	286	36,839
All other food manufacturing	0.0	0.0	168.2	0.0	0.0	168.2	0.0	0.0	57.8	0.0	0.0	57.8	0	0	877	0	0	877
Bread and bakery product- except frozen- manu	0.0	0.0	128.0	0.0	0.0	128.0	0.0	0.0	62.7	0.0	0.0	62.7	0	0	794	0	0	794
Breweries	0.0	0.0	1,401.7	0.0	0.0	1,401.7	0.0	0.0	731.1	0.0	0.0	731.1	0	0	6,974	0	0	6,974
Coffee and tea manufacturing	0.0	0.0	346.9	0.0	0.0	346.9	0.0	0.0	125.5	0.0	0.0	125.5	0	0	1,528	0	0	1,528
Confectionery manufacturing from purchased ch	6.1	0.0	14.6	0.0	13.2	33.9	2.3	0.0	5.7	0.0	4.5	12.4	29	0	78	0	65	173
Cookie and cracker manufacturing	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.1	0	0	1	0	0	1
Distilleries	0.0	0.0	577.4	0.0	0.0	577.4	0.0	0.0	370.0	0.0	0.0	370.0	0	0	3,400	0	0	3,400
Fluid milk manufacturing	0.0	0.0	42.4	0.0	0.0	42.4	0.0	0.0	6.0	0.0	0.0	6.0	0	0	69	0	0	69
Mayonnaise- dressing- and sauce manufacturing	0.0	0.0	201.2	0.0	0.0	201.2	0.0	0.0	74.3	0.0	0.0	74.3	0	0	908	0	0	908
Meat processed from carcasses	0.0	0.0	39.5	0.0	0.0	39.5	0.0	0.0	6.4	0.0	0.0	6.4	0	0	103	0	0	103
Other tobacco product manufacturing	0.0	0.0	3,882.5	0.0	0.0	3,882.5	0.0	0.0	1,778.3	0.0	0.0	1,778.3	0	0	16,649	0	0	16,649
Poultry processing	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0	0	1	0	0	1
Seafood product preparation and packaging	0.2	0.2	65.1	0.0	0.2	65.7	0.0	0.0	19.4	0.0	0.0	19.5	1	1	310	0	1	313
Soft drink and ice manufacturing	0.0	0.0	1,101.4	0.0	57.5	1,158.9	0.0	0.0	407.7	0.0	20.7	428.3	0	0	4,810	0	219	5,029
Spice and extract manufacturing	0.0	0.0	7.7	0.0	0.4	8.2	0.0	0.0	2.4	0.0	0.1	2.5	0	0	17	0	1	18

Appendix A - A4 continued																		
Forest Products Manufacturing	471.4	0.0	1,023.3	985.1	13.0	2,492.9	198.7	0.0	449.3	382.6	5.8	1,036.3	1,908	0	5,384	4,299	69	11,660
All other converted paper product manufacturing	0.0	0.0	28.4	0.0	0.0	28.4	0.0	0.0	14.2	0.0	0.0	14.2	0	0	164	0	0	164
Coated and laminated paper and packaging material	0.0	0.0	79.4	0.0	0.0	79.4	0.0	0.0	34.9	0.0	0.0	34.9	0	0	404	0	0	404
Coated and uncoated paper bag manufacturing	0.0	0.0	26.5	0.0	0.0	26.5	0.0	0.0	10.0	0.0	0.0	10.0	0	0	145	0	0	145
Cut stock- resawing lumber- and planing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0
Engineered wood member and truss manufacturing	0.0	0.0	223.6	26.3	8.8	258.9	0.0	0.0	121.8	12.4	4.4	138.6	0	0	1,332	180	49	1,561
Miscellaneous wood product manufacturing	0.0	0.0	1.8	0.0	0.0	1.8	0.0	0.0	0.9	0.0	0.0	0.9	0	0	10	0	0	10
Other millwork- including flooring	0.0	0.0	8.3	0.0	0.0	8.3	0.0	0.0	3.1	0.0	0.0	3.1	0	0	43	0	0	43
Paper and paperboard mills	372.5	0.0	139.4	728.2	0.0	1,241.0	163.4	0.0	63.4	286.3	0.0	513.1	1,434	0	646	2,840	0	4,921
Paperboard container manufacturing	36.9	0.0	398.7	12.3	0.0	447.9	12.8	0.0	156.0	3.8	0.0	172.6	174	0	2,057	58	0	2,289
Pulp mills	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0
Reconstituted wood product manufacturing	0.0	0.0	17.4	0.0	0.0	17.4	0.0	0.0	9.6	0.0	0.0	9.6	0	0	37	0	0	37
Sanitary paper product manufacturing	0.0	0.0	0.0	5.7	0.0	5.7	0.0	0.0	0.0	3.0	0.0	3.0	0	0	0	49	0	49
Sawmills	62.0	0.0	51.6	104.1	0.9	218.6	22.5	0.0	16.7	37.2	0.3	76.8	300	0	196	508	3	1,008
Surface-coated paperboard manufacturing	0.0	0.0	0.0	0.0	3.3	3.3	0.0	0.0	0.0	0.0	1.0	1.0	0	0	0	0	16	16
Veneer and plywood manufacturing	0.0	0.0	0.0	107.5	0.0	107.5	0.0	0.0	0.0	39.8	0.0	39.8	0	0	0	662	0	662
Wood container and pallet manufacturing	0.0	0.0	37.7	0.0	0.0	37.7	0.0	0.0	15.7	0.0	0.0	15.7	0	0	314	0	0	314
Wood preservation	0.0	0.0	9.4	0.0	0.0	9.4	0.0	0.0	2.5	0.0	0.0	2.5	0	0	32	0	0	32
Wood windows and door manufacturing	0.0	0.0	0.9	0.1	0.0	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0	0	4	1	0	5
Mining	0.0	0.0	15.2	17.6	8.2	40.9	0.0	0.0	9.7	10.9	4.4	25.0	0	0	106	141	63	310
Oil and gas extraction	0.0	0.0	0.0	0.0	1.3	1.3	0.0	0.0	0.0	0.0	0.3	0.3	0	0	0	0	4	4
Other nonmetallic mineral mining	0.0	0.0	9.7	0.5	0.0	10.2	0.0	0.0	5.6	0.3	0.0	5.9	0	0	60	3	0	63
Sand- gravel- clay- and refractory mining	0.0	0.0	0.0	17.0	6.3	23.4	0.0	0.0	0.0	10.6	3.8	14.4	0	0	0	138	54	192
Support activities for oil and gas operations	0.0	0.0	4.6	0.0	0.0	4.6	0.0	0.0	3.5	0.0	0.0	3.5	0	0	39	0	0	39
Support activities for other mining	0.0	0.0	1.0	0.0	0.5	1.5	0.0	0.0	0.5	0.0	0.3	0.8	0	0	8	0	4	12
Nature-based Recreation	12.9	0.0	57.1	15.8	45.3	131.2	8.0	0.0	33.8	3.4	27.6	72.8	113	1	702	169	533	1,518
Golf courses	9.3	0.0	40.0	0.5	34.0	83.8	5.9	0.0	24.0	0.3	20.7	50.9	82	1	506	8	400	997
Hunting and trapping	0.5	0.0	3.8	15.1	0.0	19.5	0.2	0.0	1.8	3.0	0.0	5.0	3	0	27	158	0	189
Recreational fishing	3.1	0.0	13.3	0.2	11.3	27.9	2.0	0.0	8.0	0.1	6.9	17.0	27	0	169	3	133	332
Grand Total	1,041.8	141.0	15,702.5	1,289.1	1,289.0	19,473.4	479.8	66.1	8,025.6	549.7	729.4	9,850.7	7,677	1,491	122,316	8,197	16,295	155,975

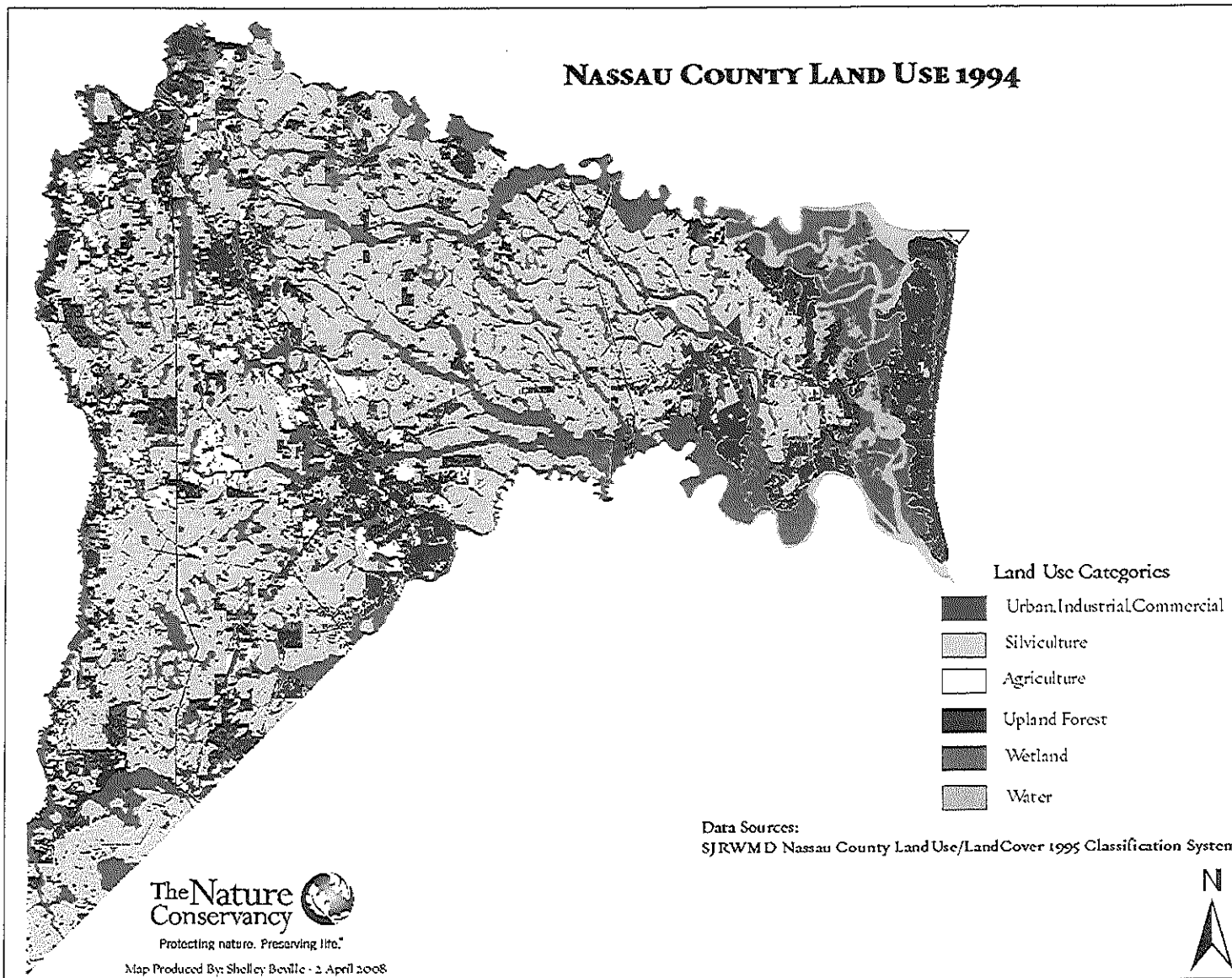
Spreadsheet Notes:

*Deflated Values (2007 dollars) using GDP Implicit Price Deflator (U.S. Commerce Dept.)

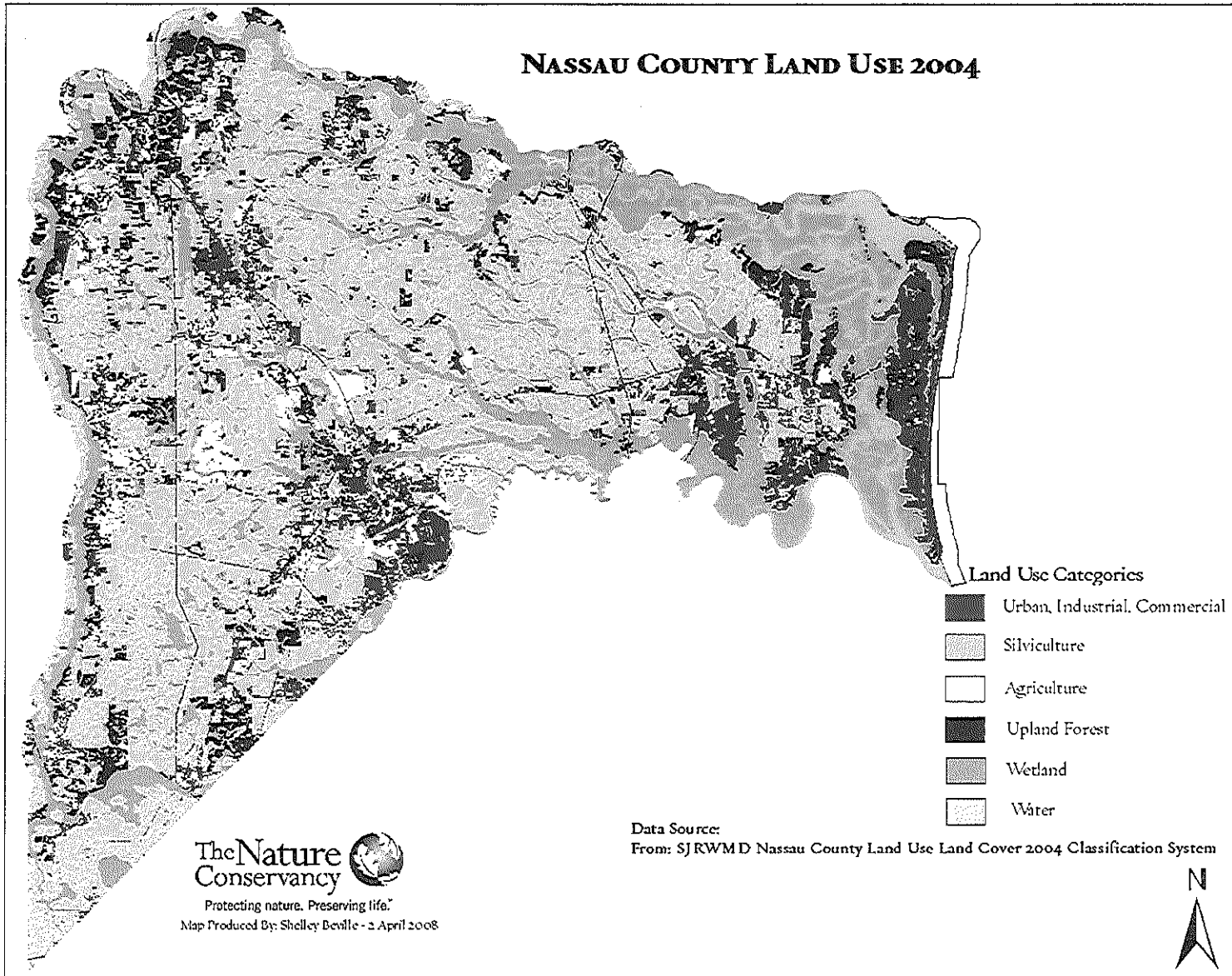
Data source: Implan Professional, Florida state data package (MIG, Inc. 2007)

For more detailed information on the methods of this economic analysis, please refer to UF IFAS School of Natural Resources Publication # EDIS FE702, "Economic Contributions of Florida Agriculture, Natural Resources, Food and Kindred Product Manufacturing and Distribution, and Service Industries in 2006". <http://edis.ifas.ufl.edu>.

Appendix B – Maps (see separate document for all Appendix B materials)

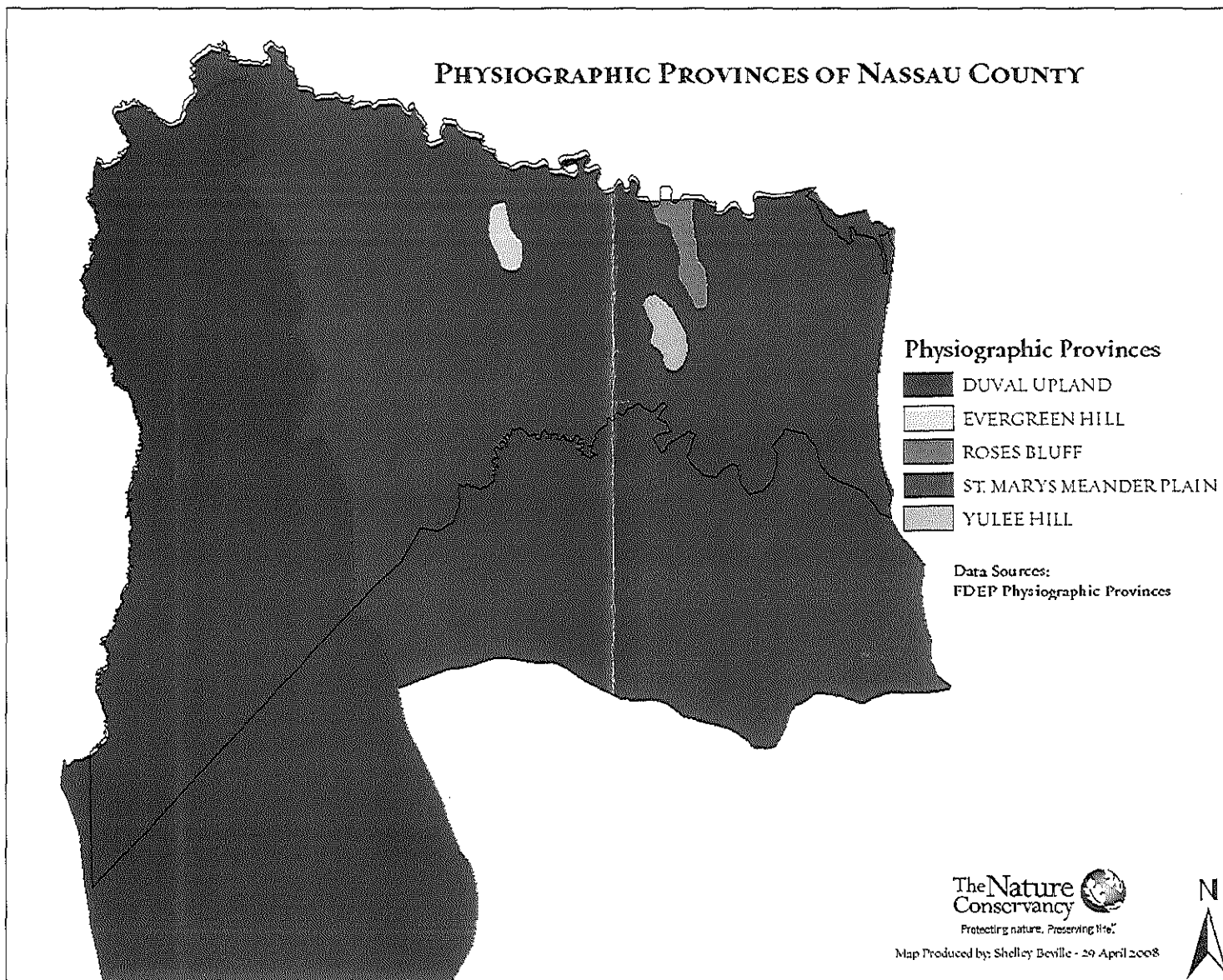


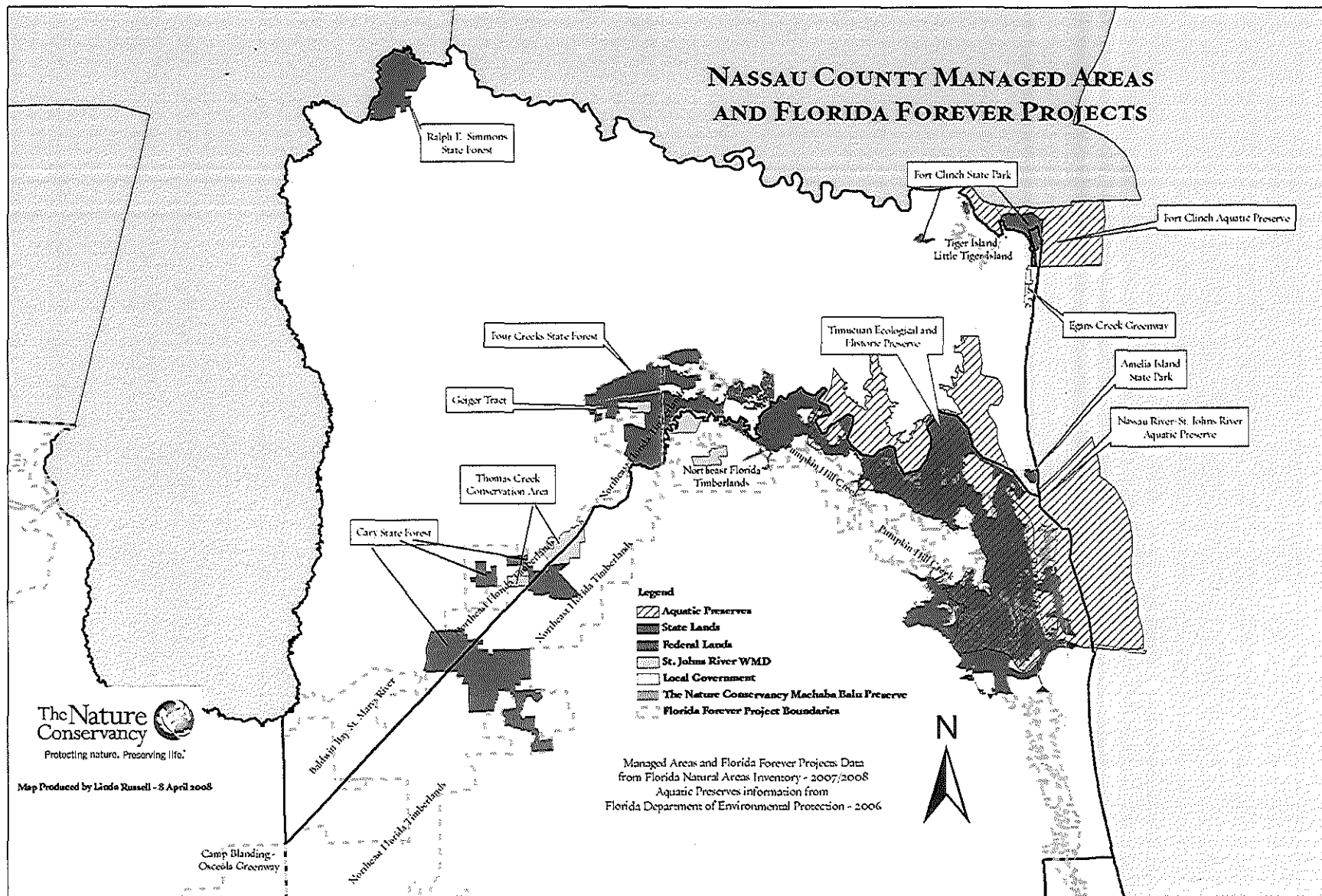
NASSAU COUNTY LAND USE 2004

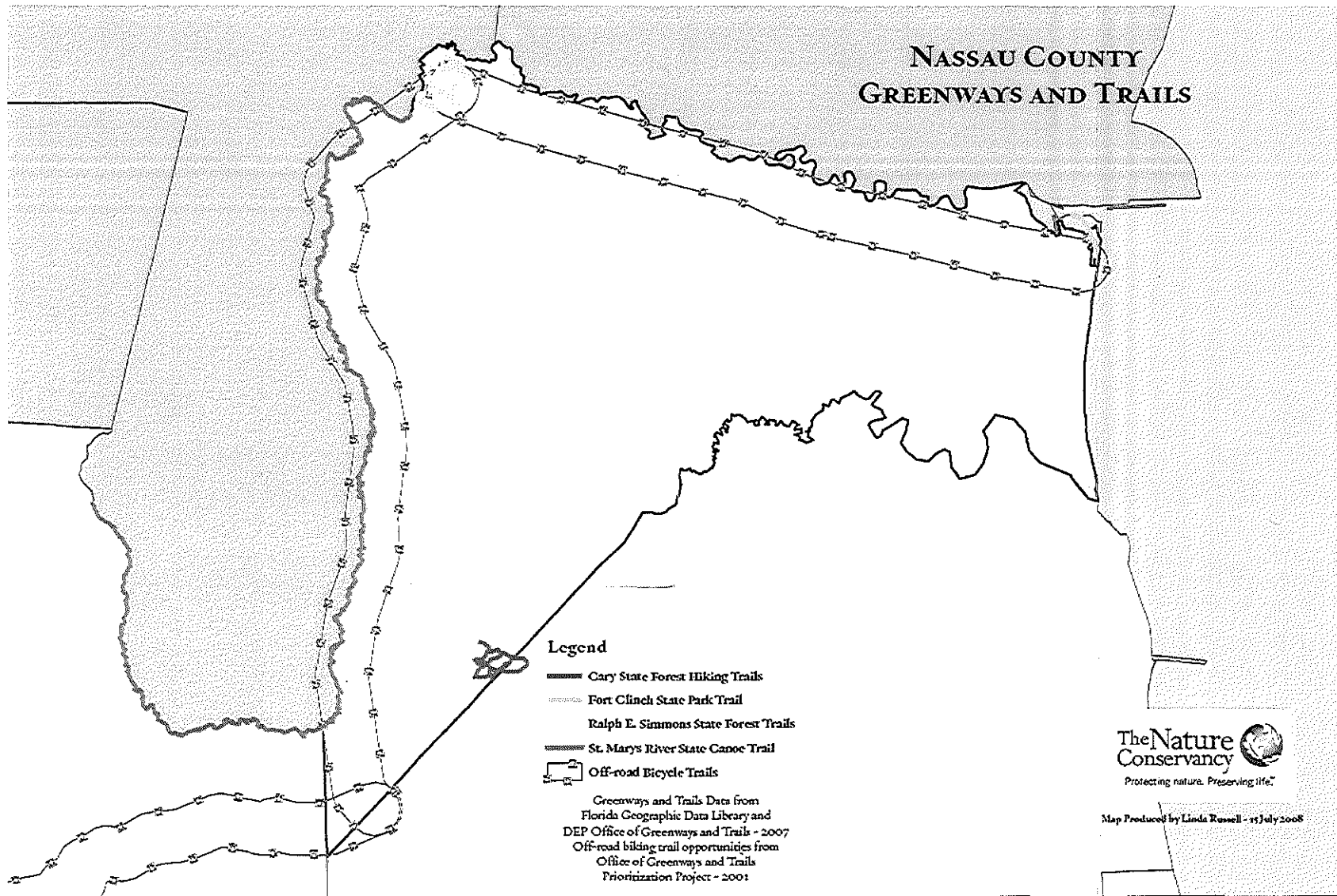


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Map Produced By: Shelley Beville - 2 April 2008









NASSAU COUNTY FNAI ELEMENT OCCURRENCES

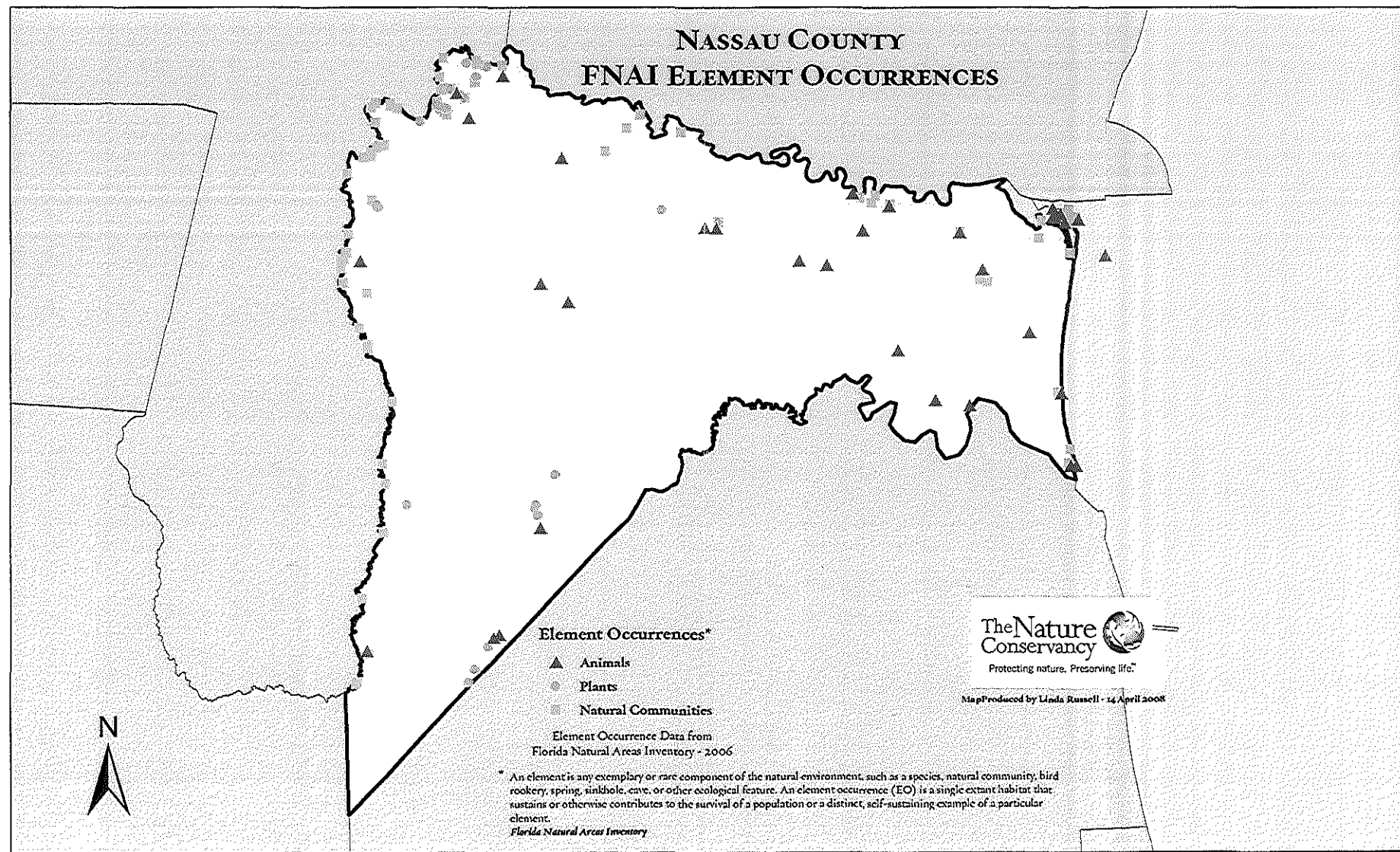
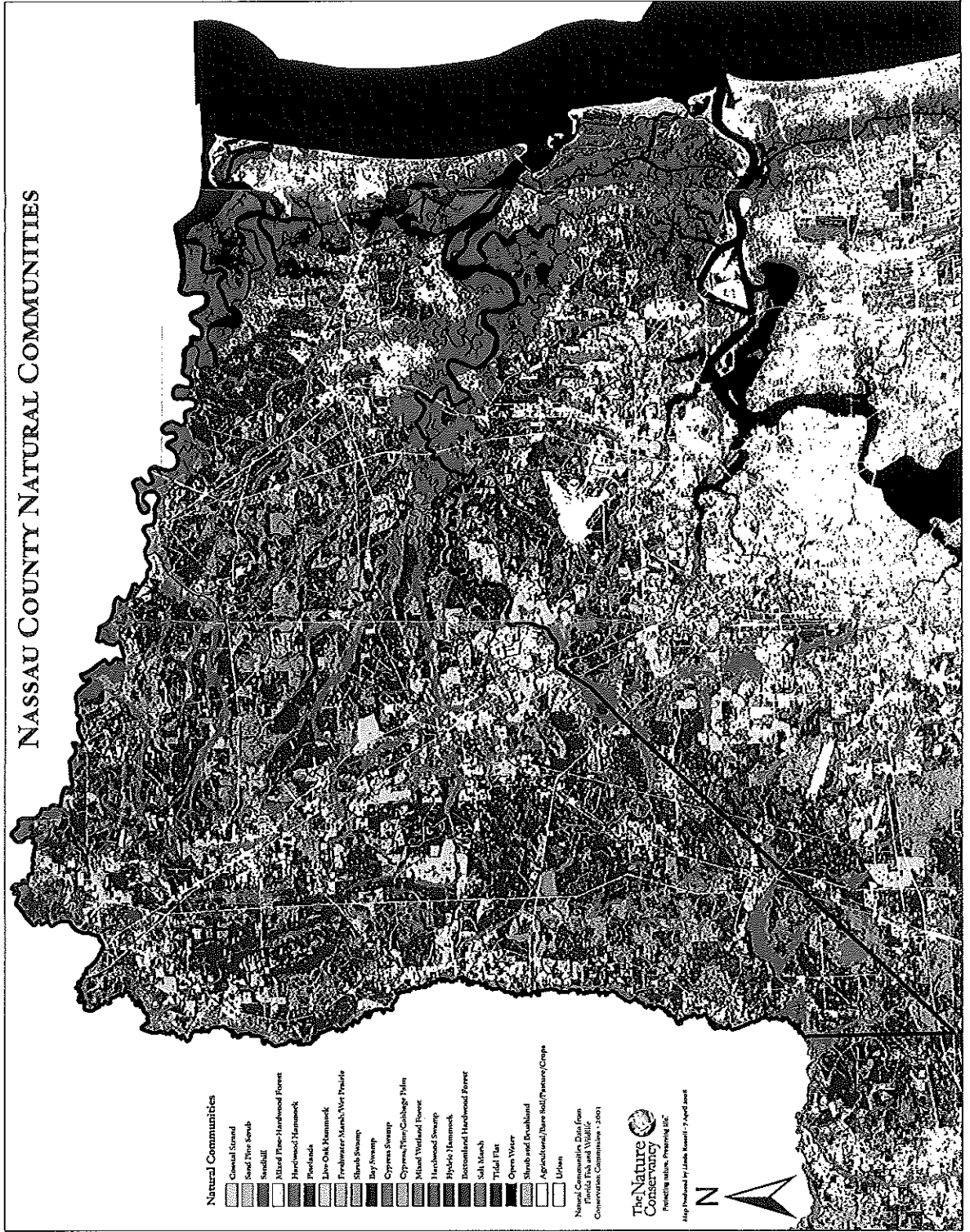


Table B7

Florida Natural Areas Inventory – Elemental Occurrences in Nassau County

<u>Common Name</u>	<u>No. of Occurrences on Map</u>	<u>Element Type</u>
Bachman's Sparrow	2	Animal
American Alligator	1	Animal
Great Egret	2	Animal
Loggerhead	1	Animal
Wilson's Plover	1	Animal
Timber Rattlesnake	1	Animal
Eastern Indigo Snake	7	Animal
Little Blue Heron	1	Animal
Snowy Egret	1	Animal
Gopher Tortoise	7	Animal
American Oystercatcher	1	Animal
Southeastern Weasel	2	Animal
Wood Stork	2	Animal
Black-crowned Night-heron	1	Animal
Red-cockaded Woodpecker	3	Animal
Sherman's Fox Squirrel	2	Animal
Many-lined Salamander	1	Animal
Least Tern	2	Animal
Southern Milkweed	1	Plant
Purple Honeycomb-head	3	Plant
Ciliate-leaf Tickseed	3	Plant
Florida toothache-grass	5	Plant
Hartwrightia	8	Plant
Heartleaf	1	Plant
Yellow sunnybell	1	Plant
Silver Buckthorn	1	Plant
Florida Merrybells	1	Plant
Beach dune	3	Natural Community
Blackwater stream	1	Natural Community
Bottomland forest	1	Natural Community
Coastal grassland	2	Natural Community
Coastal interdunal swale	2	Natural Community
Coastal strand	1	Natural Community
Depression marsh	1	Natural Community
Estuarine tidal marsh	2	Natural Community
Floodplain forest	3	Natural Community
Floodplain swamp	2	Natural Community
Freshwater tidal swamp	2	Natural Community
Geological feature	2	Natural Community
Mannatee aggregation site	1	Natural Community
Maritime hammock	7	Natural Community
Mesic flatwoods	2	Natural Community
River floodplain lake	24	Natural Community
Sandhill	3	Natural Community
Seepage slope	8	Natural Community
Slope forest	7	Natural Community

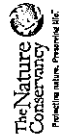
NASSAU COUNTY NATURAL COMMUNITIES



Natural Communities

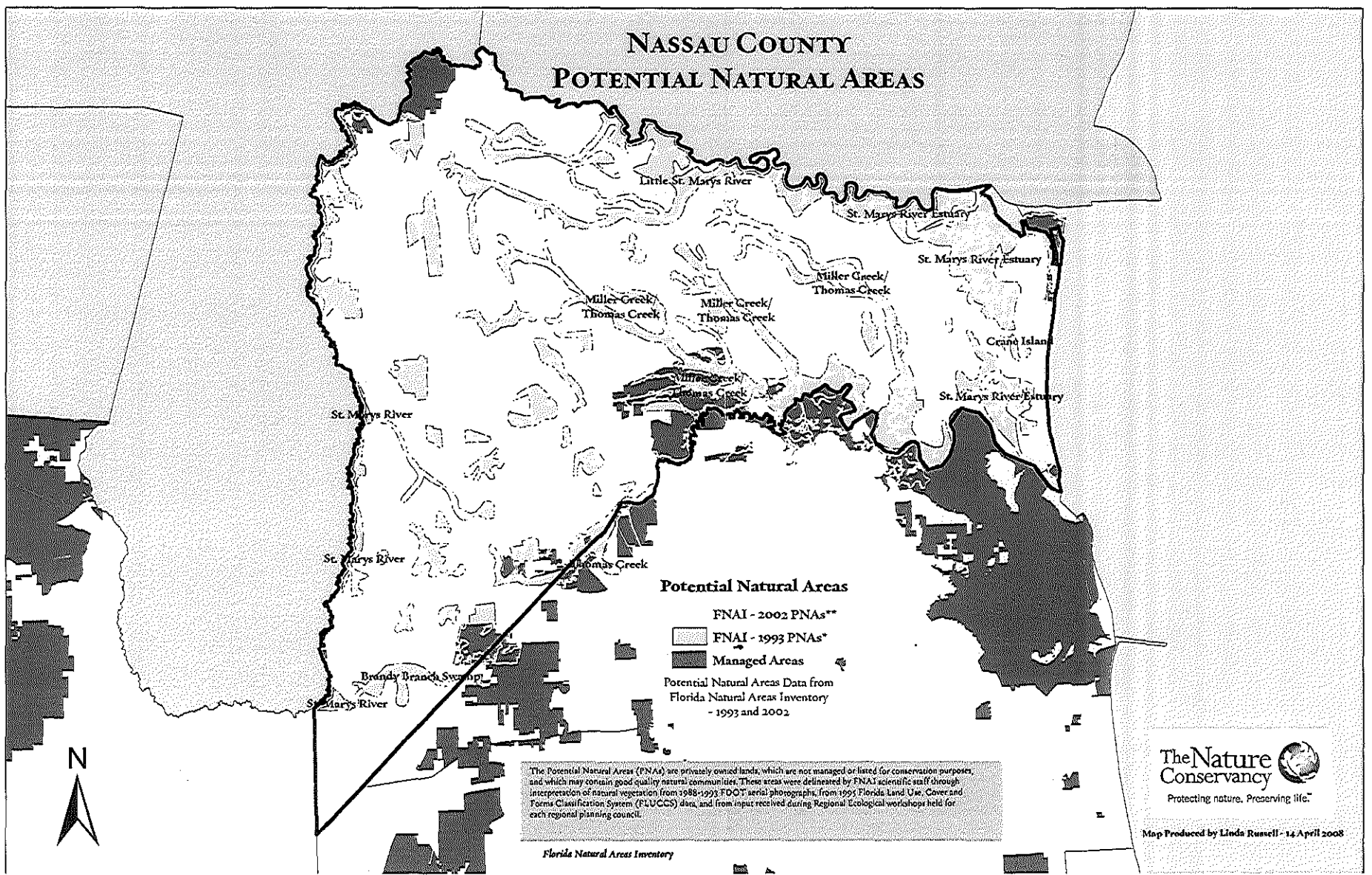
- Coastal Strand
- Sand Pine Scrub
- Sandhill
- Mixed Pine-Hardwood Forest
- Hardwood Hammock
- Pinelands
- Live-Oak Hammock
- Freshwater Marsh/Vet Thicket
- Shrub Swamp
- Bay Swamp
- Cypress Swamp
- Cypress/Pine/Cabbage Palm
- Mixed Wetland Forest
- Hardwood Swamp
- Physalis Hammock
- Bottomland Hardwood Forest
- Salt Marsh
- Tidal Flat
- Open Water
- Shrub and Ecotone
- Agriculture/Bare Soil/Pasture/Crope
- Urban

Natural Communities Data from
 Florida Natural Heritage Inventory
 Conservation Communities v. 2001



Map Produced by Linda Russell 12 April 2002

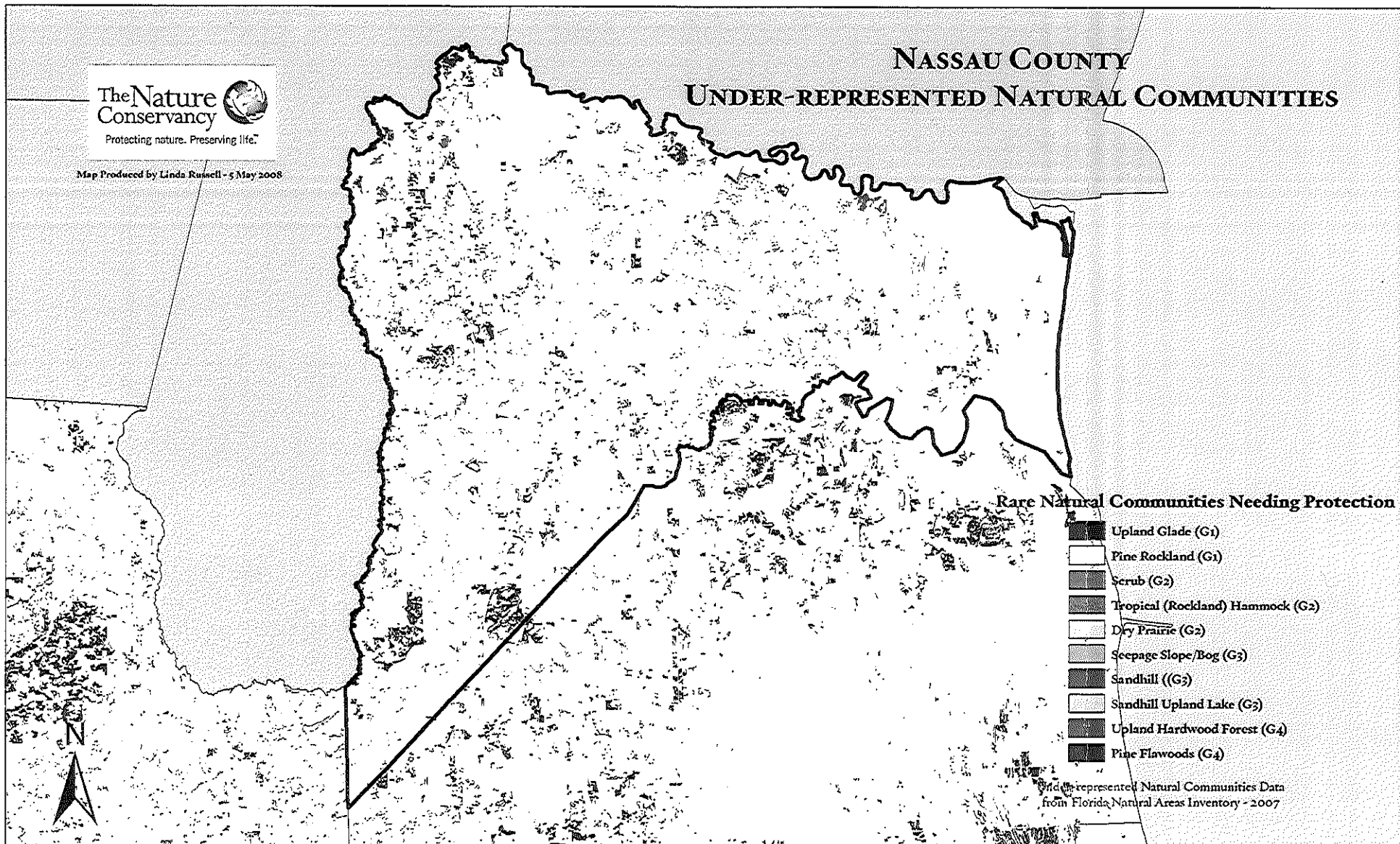
NASSAU COUNTY POTENTIAL NATURAL AREAS





Map Produced by Linda Russell - 5 May 2008

NASSAU COUNTY UNDER-REPRESENTED NATURAL COMMUNITIES



Rare Natural Communities Needing Protection

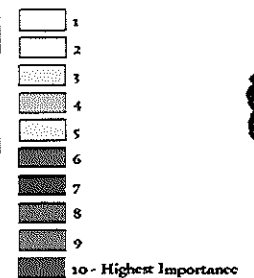
- Upland Glade (G1)
- Pine Rockland (G1)
- Scrub (G2)
- Tropical (Rockland) Hammock (G2)
- Dry Prairie (G2)
- Seepage Slope/Bog (G3)
- Sandhill ((G3)
- Sandhill Upland Lake (G3)
- Upland Hardwood Forest (G4)
- Pine Flawoods (G4)

Under-represented Natural Communities Data
from Florida Natural Areas Inventory - 2007



NASSAU COUNTY WILDLIFE HABITAT RANKING

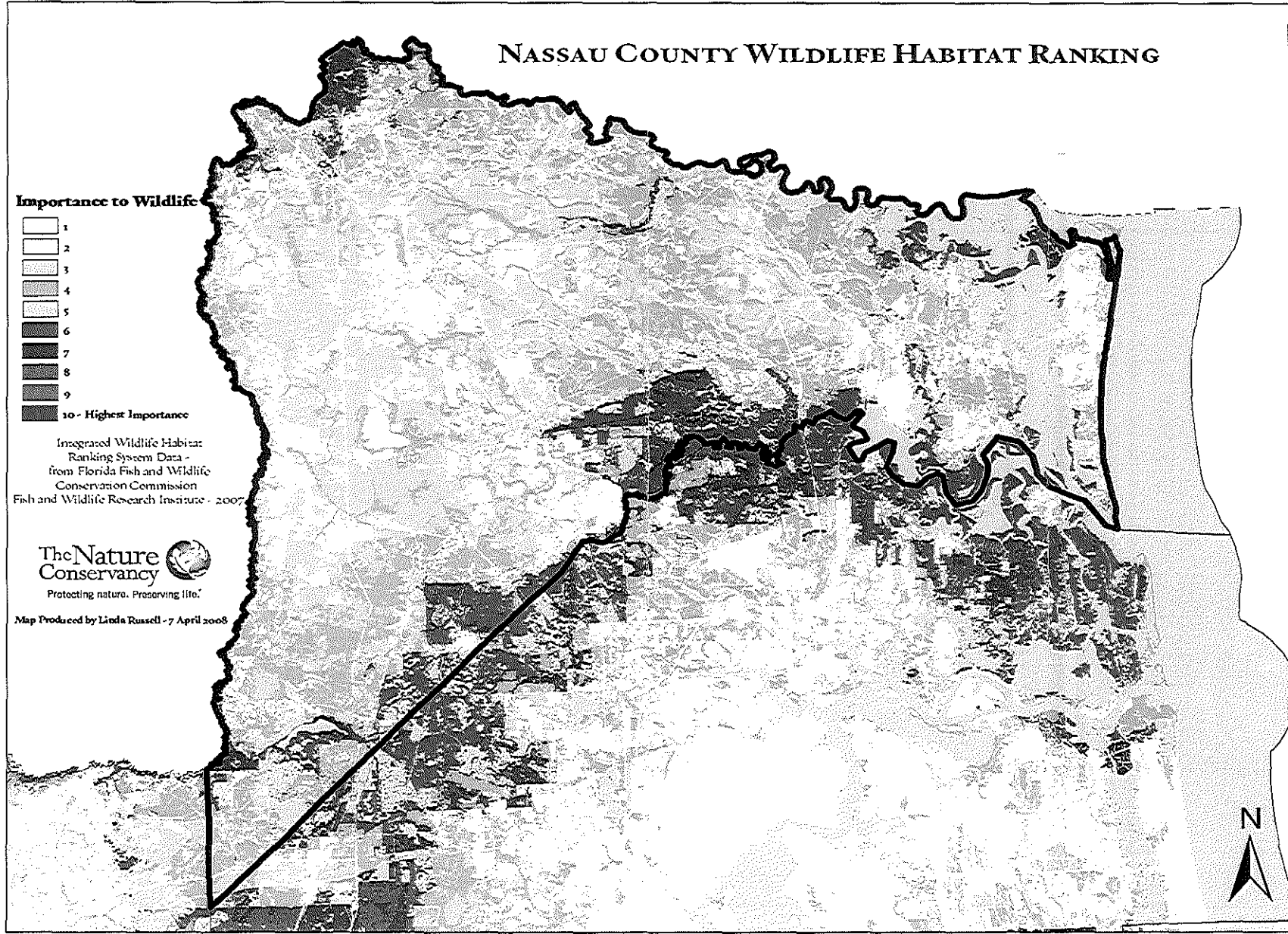
Importance to Wildlife



Integrated Wildlife Habitat
Ranking System Data -
from Florida Fish and Wildlife
Conservation Commission
Fish and Wildlife Research Institute - 2007



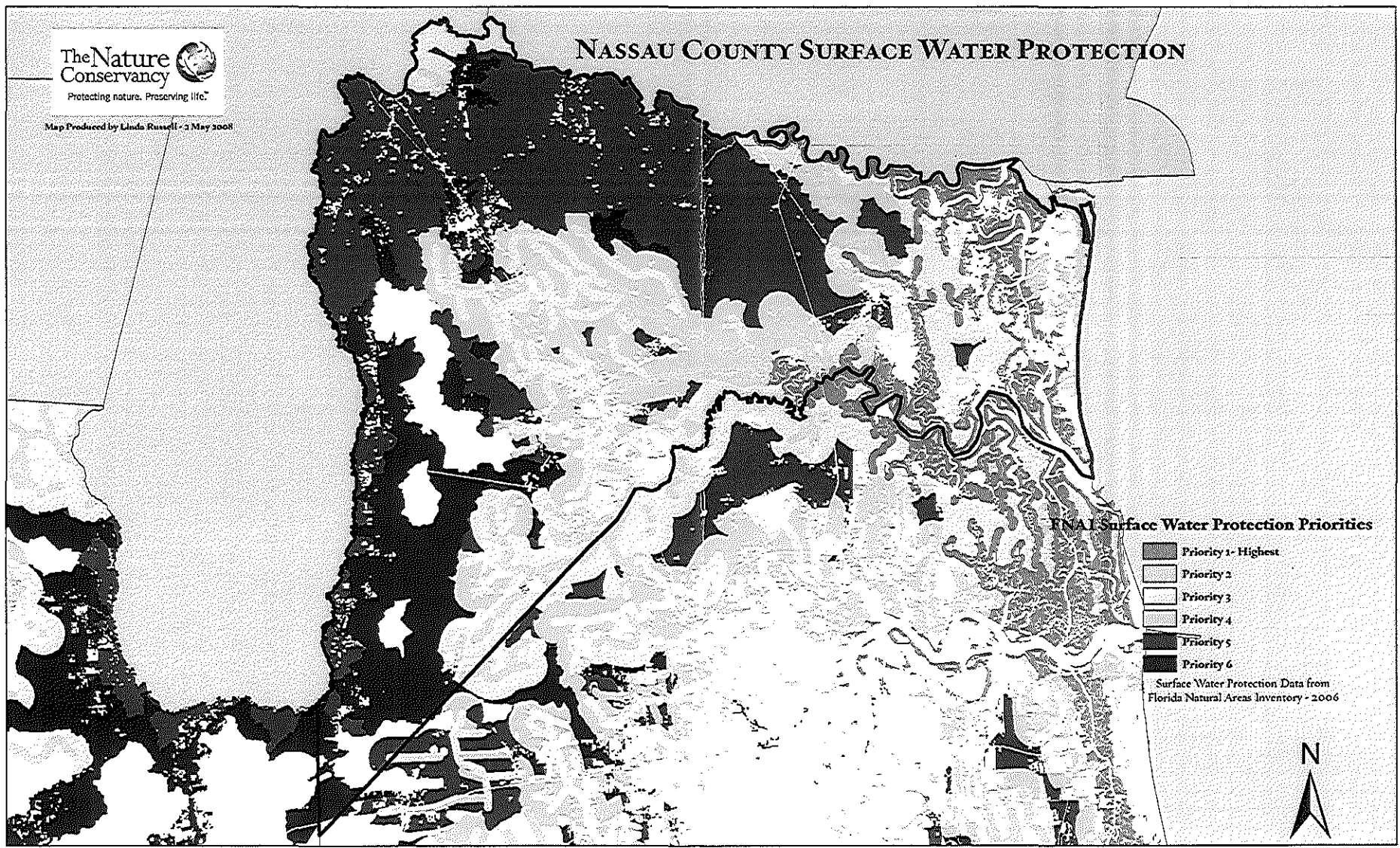
Map Produced by Linda Russell - 7 April 2008

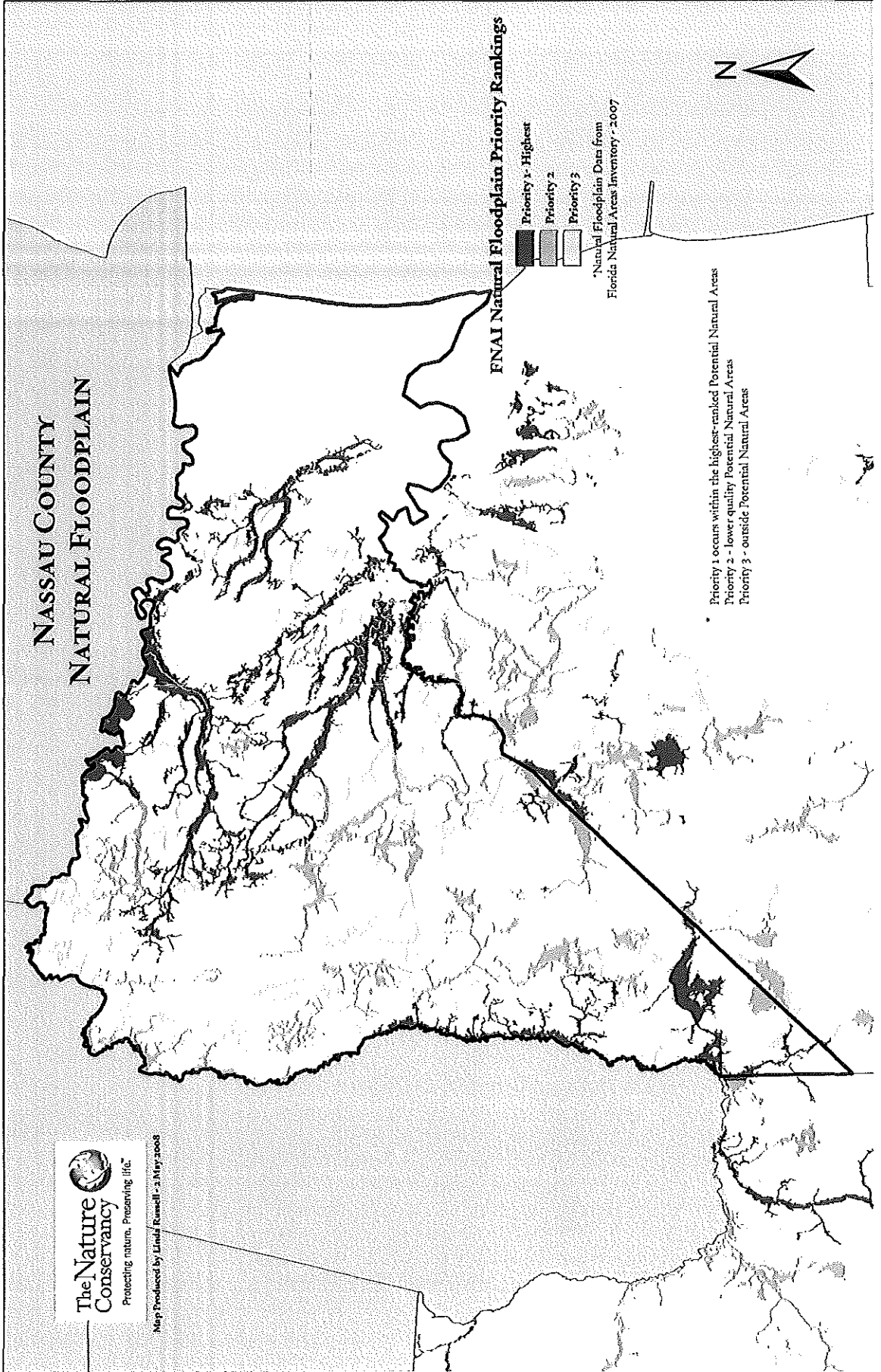




Map Produced by Linda Russell - 2 May 2008

NASSAU COUNTY SURFACE WATER PROTECTION



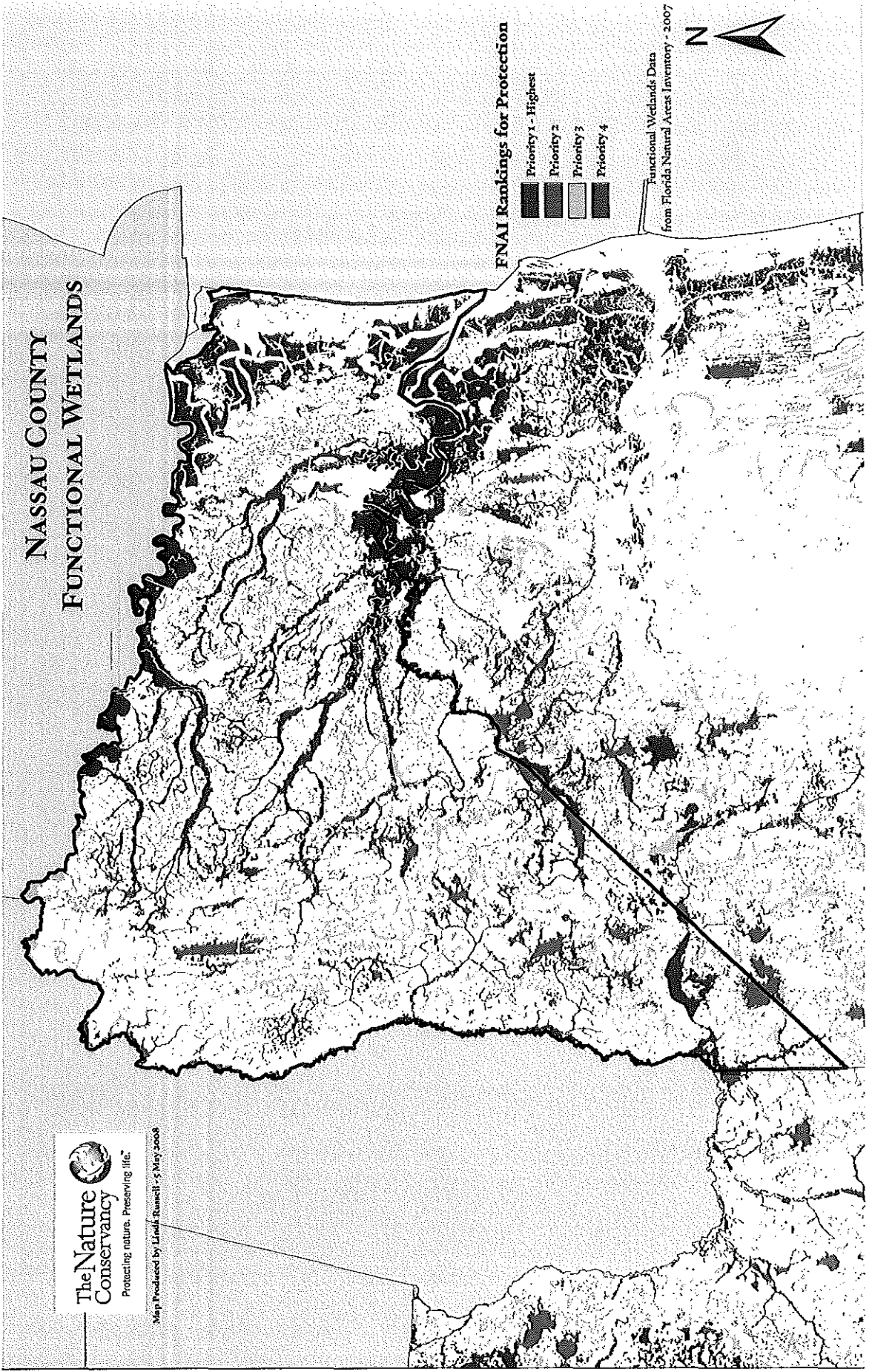


Map Produced by Linda Russell - 2 May 2008

NASSAU COUNTY FUNCTIONAL WETLANDS



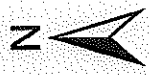
Map Produced by Linda Runnett - May 2008

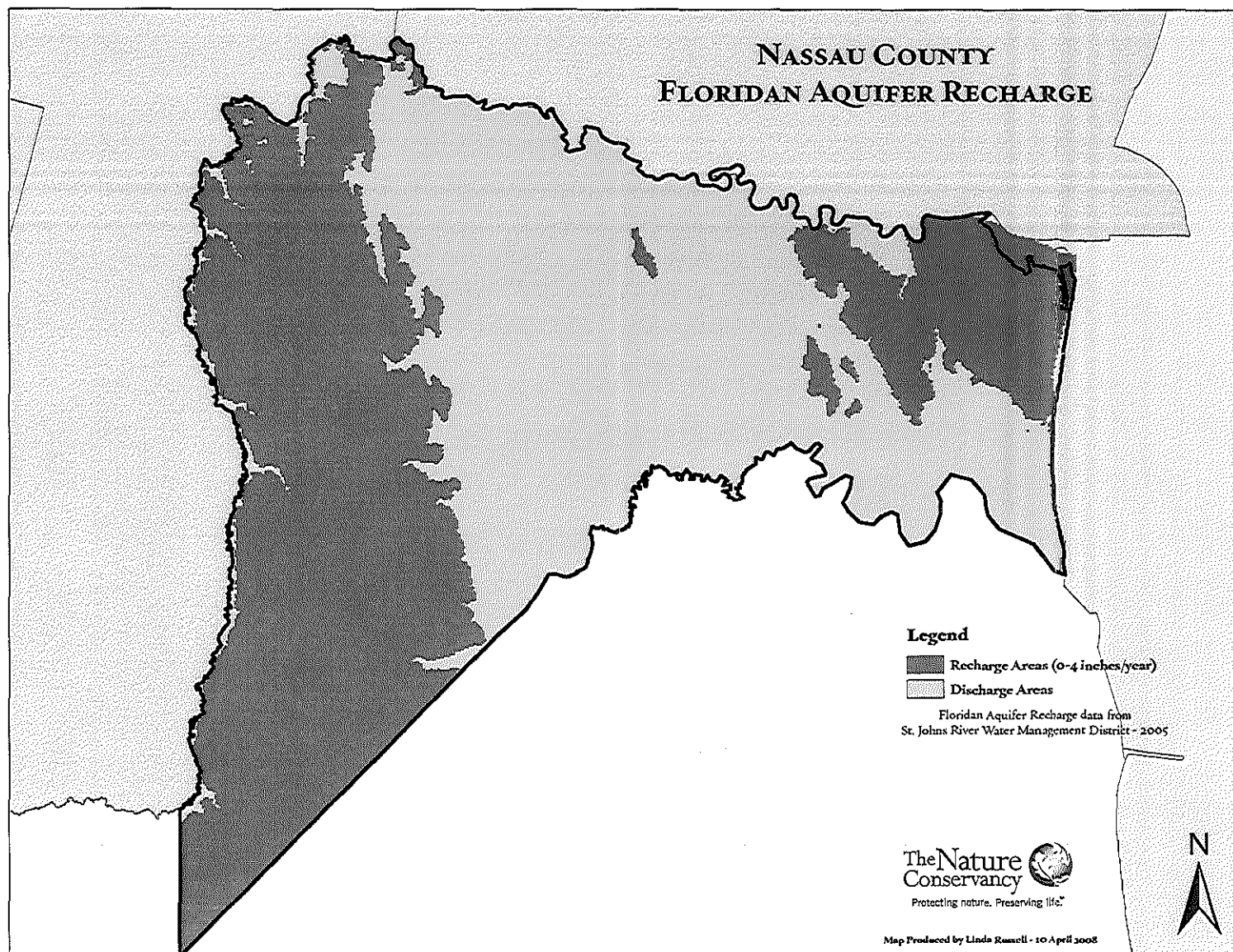


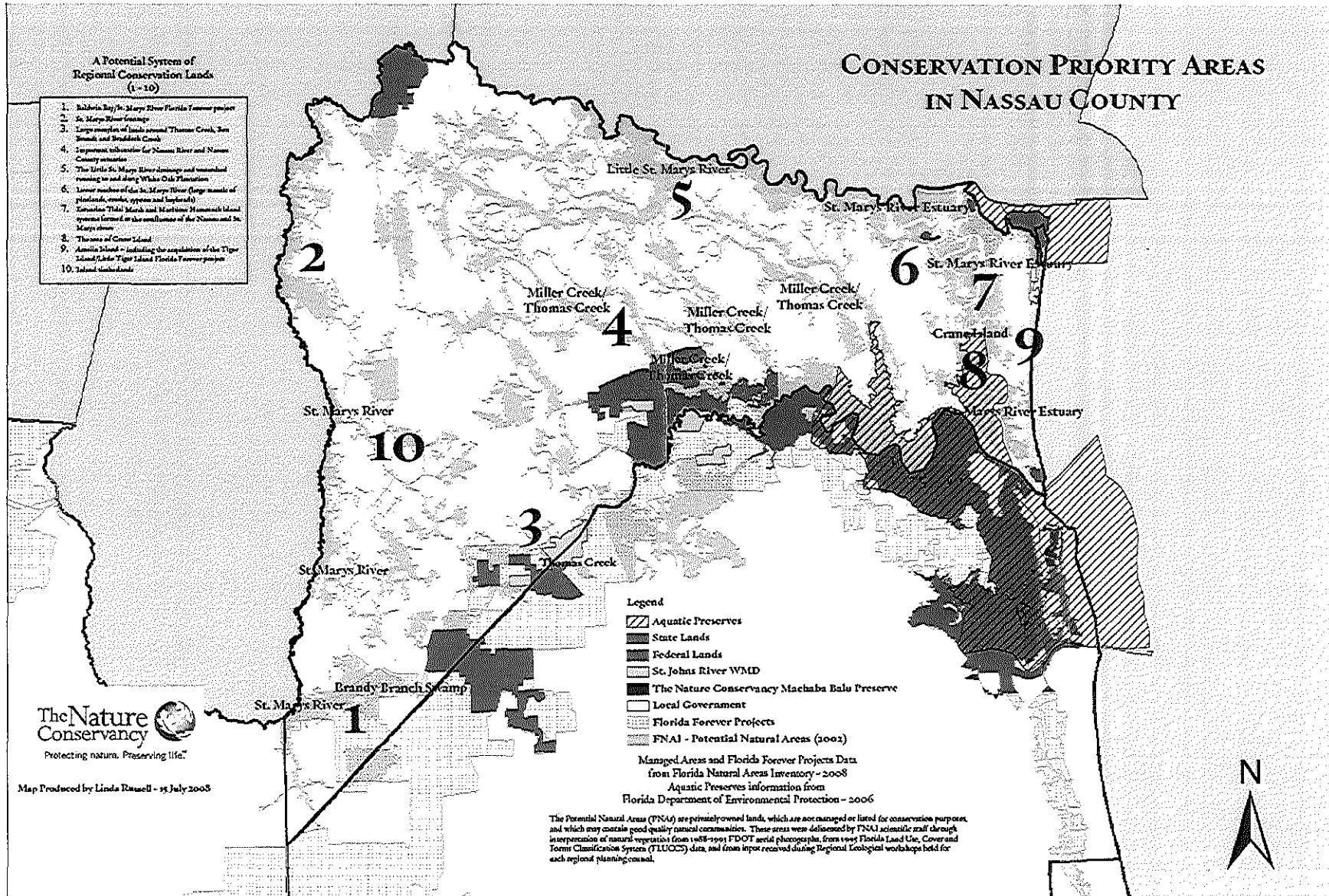
FNAI Rankings for Protection

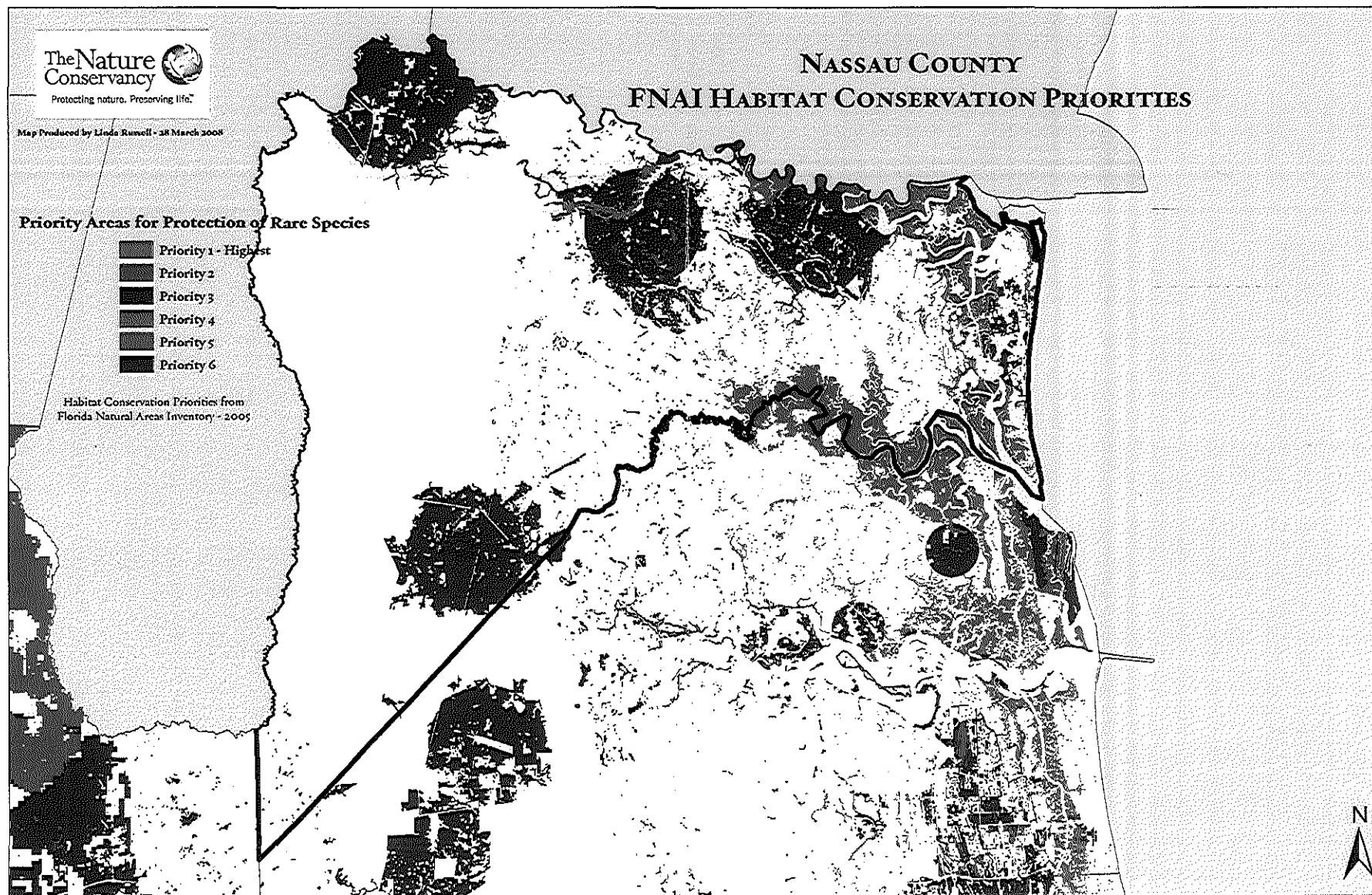
- Priority 1 - Highest
- Priority 2
- Priority 3
- Priority 4

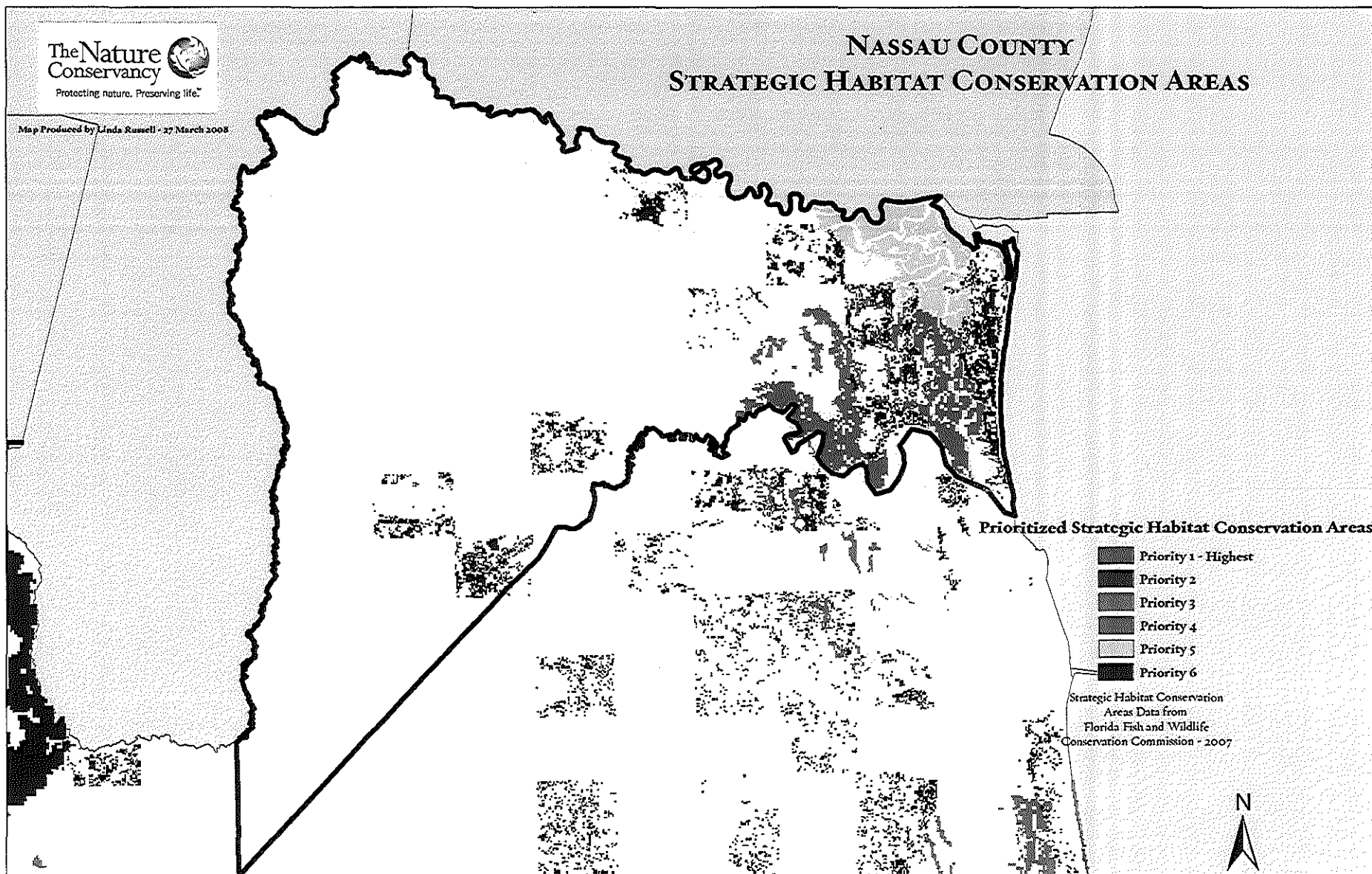
Functional Wetlands Data
from Florida Natural Areas Inventory - 2007















Map Produced by Linda Russell - 2 May 2008

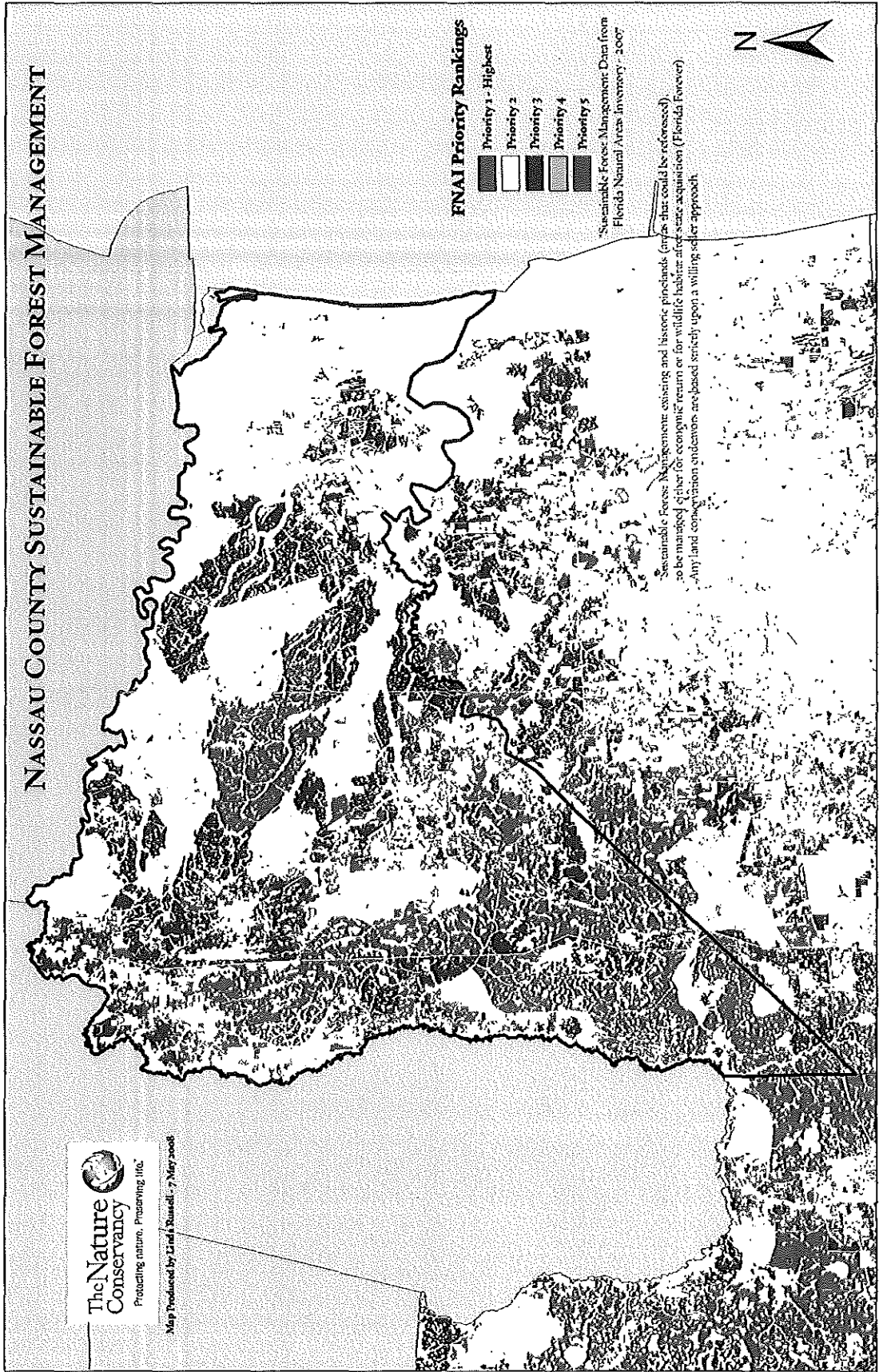
NASSAU COUNTY FRAGILE COASTAL RESOURCES

Fragile Coastal Resources

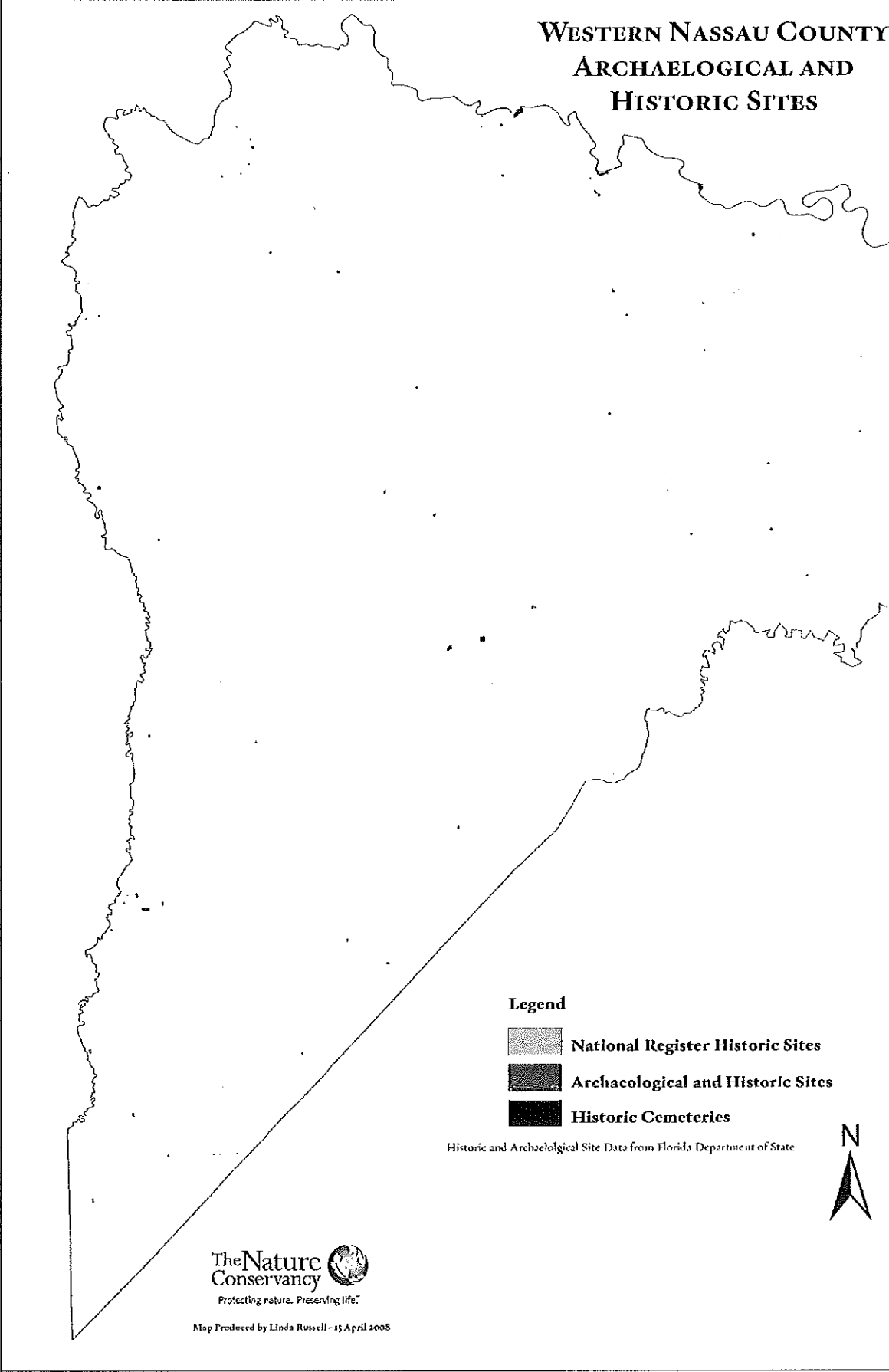
-  Coastal Uplands
-  Coastal Wetlands

Fragile Coastal Resources Data
from Florida Natural Areas Inventory - 2007








**WESTERN NASSAU COUNTY
ARCHAEOLOGICAL AND
HISTORIC SITES**



Legend

-  **National Register Historic Sites**
-  **Archaeological and Historic Sites**
-  **Historic Cemeteries**

Historic and Archaeological Site Data from Florida Department of State






Map Produced by Linda Russell - 15 April 2005

MAP B21a

CENTRAL NASSAU COUNTY ARCHAEOLOGICAL AND HISTORIC SITES



Legend

-  National Register Historic Sites
-  Archaeological and Historic Sites
-  Historic Cemeteries

Historic and Archaeological Site Data from Florida Department of State

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MAP B21b

EASTERN NASSAU COUNTY ARCHAEOLOGICAL AND HISTORIC SITES



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Legend



National Register Historic Sites



Archaeological and Historic Sites



Historic Cemeteries

Historic and Archaeological Site Data from Florida Department of State

Table B21c

Florida Department of State – Historical and Archeological Sites in Nassau County

Table B22

National Register of Historic Sites		
Hippard House	American Beach	
American Beach Historic District	American Beach	
Ervin's Rest	American Beach	
Tabby House	Fernandina Beach	
Bailey House	Fernandina Beach	
Fairbanks House	Fernandina Beach	
Fernandina Beach Historic District	Fernandina Beach	
Palmer House	Fernandina Beach	
Merrick-Simmons House	Fernandina Beach	
Amelia Island Lighthouse	Fernandina Beach	
Original Town of Fernandina Historic Site	Fernandina Beach	
Mount Olive Missionary Baptist Church	Nassauville	

Cities with Historic Cemeteries	Number	Years
Amelia City	2	1822-1885
American Beach	1	1860
Boulogne	1	1889
Bryceville	5	1897-1930
Callahan	3	1893-1945
Crawford	1	1901
Evergreen	4	1862-1932
Fernandina Beach	2	1868-1883
Franklinton	1	1912
Gross	1	1951
Hilliard	7	1872-1944
Italia	3	1863-1901
Kings Ferry	4	1876-1929
Nassau County	3	1860-1885
Nassauville	1	1930s
O'Neill	8	1881 - 1940
Verdie	1	1885
	5	1877-1946

Summary of Archaeological and Historic Sites		
<i>Archaeological Sites - Culture*</i>		
Archaic, 8500 B.C.-1000 B.C.	4 sites	
Deptford, 700 B.C.-300 B.C.	6 sites	
Late Archaic, 700 B.C. - A.D. 1500	6 sites	
Orange, St. Johns and St. Johns II, 700 B.C. - A.D. 1500	27 sites	
Other Prehistoric, 700 B.C. - A.D. 1500	4 sites	
Other Prehistoric, date not indicated	56 sites	
Alachua A.D., 1250-A.D. 1600	2 sites	
St. Augustine prehistoric middens	3 sites	

**Summary of Culture1 descriptions. Many sites have Culture2 (earlier) classifications, also.*

Historic Sites		
British, 1763-1783	3 sites	
Nineteenth century American, 1821-1899	32 sites	
American, 1821-present	4 sites	
Twentieth century American, 1900-present	17 sites	