

Case Study

Introduction

Nassau County is part of the Northeast Florida Region that includes Clay, Duval, Nassau, Baker, and St. Johns counties. Nassau County is located along the Atlantic Ocean in northeast Florida. It covers a total of 726 square miles, of which approximately 652 square miles are land and 74 square miles are water. There are three incorporated municipalities within Nassau County: the Towns of Callahan and Hilliard and the City of Fernandina Beach. Nassau and the other surrounding counties are growing relatively faster than Jacksonville (i.e., Duval) the regions' population center. Population growth in Clay, St. Johns and Nassau Counties is predicted to outpace the traditional regional center of Jacksonville between 2010 and 2030.¹

The county is characterized by mostly urban development along the coast, an urban-rural mix east of I-95, and largely rural west of I-95. While opportunities for infill development in Fernandina Beach and the unincorporated areas of Amelia Island still exist, the island's land development patterns are now predominantly settled. Yulee has outpaced Amelia Island as the hub of new growth in unincorporated Nassau County. This area, roughly defined as the eastern portion of the County between the Amelia River and I-95, is where most new development has occurred during the past seven years. New developments planned within the County and in the surrounding jurisdictions of Jacksonville, Baker County and Camden County, Georgia indicate that certain areas in the western part of the county will be increasingly subject to urban development pressures in the near future.

As much of county has yet to be developed, opportunities exist within county to develop with greater resilience to coastal hazards. Both development and potential post-disaster redevelopment will require a higher level of intergovernmental coordination to meeting existing and future challenges. Intergovernmental coordination activities require qualified staff, support systems and processes for successful implementation.

A Post Disaster Redevelopment Plan (PDRP) was created to establish a strategy for Nassau County to leverage coordination amongst county departments, municipalities, businesses, non-governmental organization and regional organization to redevelop after a catastrophic disaster in a proactive and effective manner. The PDRP positions Nassau County and its jurisdictions to be in a better position to recover more expeditiously from a disaster to utilize redevelopment as an opportunity to build a more sustainable community and maintain or enhance the "quality of life", which is often cited by residents as a benefit of living in Nassau County.

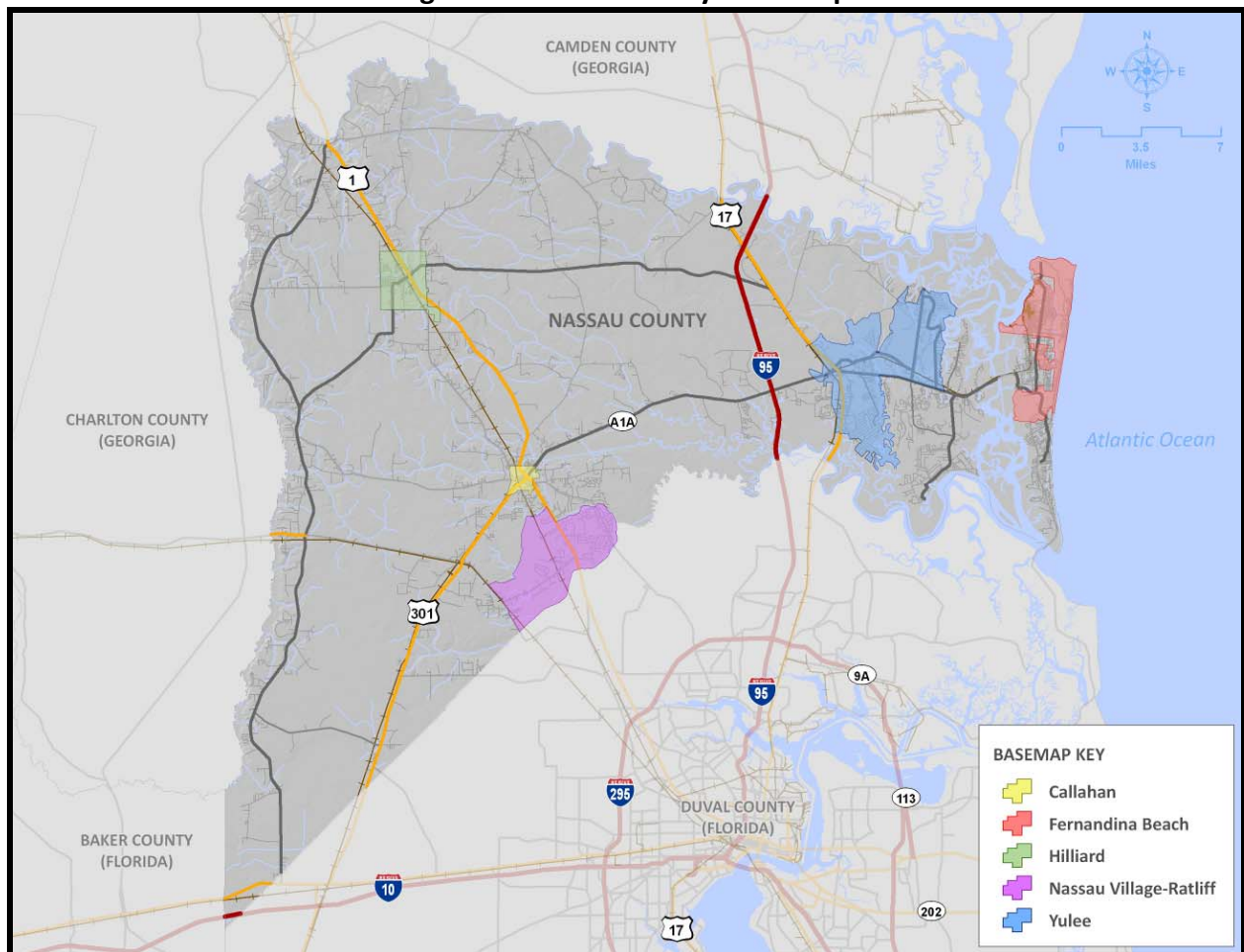
Hazards Vulnerability

The vulnerability assessment was prepared using the best available data and technology. Data was obtained from the Nassau County GIS and Emergency Management Departments, as available. The vulnerability assessment includes a quantitative summary of exposure and loss estimates to hazards that would most likely trigger the implementation of the PDRP. For the most part, mapping and GIS analysis was conducted for Nassau County and the incorporated jurisdictions of Callahan, Hilliard, and Fernandina Beach. However, in some cases, mapping, analyses or references were made to Amelia

¹ Fufidio, W. and McDowell D. 2010 *Comprehensive Plan Evaluation and Appraisal Report*. Nassau County Growth Management Department. Adopted July 14, 2008.

Island, Bryceville and Yulee, which are not incorporated. **Figure 1** shows the base map that was used for Nassau County.

Figure 1: Nassau County Base Map



Nassau County is vulnerable to various hazards, as it is a coastal community located on the Atlantic Ocean with many rivers, streams, creeks, and marshes spanning from the coast to the inland areas. The highest risk hazards for Nassau County that would likely result in a redevelopment effort include tropical cyclone-generated storm surge and high wind, flooding and wildfire. Since 1898, nearly 40 tropical cyclones, floods or wildfires have impacted Nassau County.

Located along the Atlantic coastline, areas of unincorporated Nassau County and the City of Fernandina Beach are susceptible to tropical cyclone-generated storm surge and wind. Despite that the incorporated jurisdictions of Callahan and Hilliard are located further inland, the various tributaries located in these two towns pose vulnerability from flood and surge as well. Nassau County's coastal proximity predisposes it to major wind and water damage for any category of tropical cyclone event. During January 1978 to August 2008, there were 410 losses for flood-related claims that were paid by the National Flood Insurance Program in the amount of \$2.3 million throughout Nassau County. As of August 2008, 14 repetitive loss properties have had flood losses totaling \$777,273. In August 2008, Tropical Storm Fay caused significant flood damage, with an estimated 60 homes flooded.

Although the entire county can be affected by high winds, there are certain areas where winds would be higher due to their geography and/or higher elevations, such as the shoreline, areas adjacent to the Intercoastal Waterway, developed areas and areas in around the City of Fernandina Beach and Amelia Island.

Vulnerability (i.e., exposure and loss) to improved property was determined using geographic information system (GIS) analyses, utilizing probabilistic and deterministic HAZUS-MH MR3 scenarios for tropical cyclone and parcel level data for storm surge, flood and wildfire. To perform the assessment, digital data was collected from the Nassau County GIS Department and regional, state and national sources as needed. ESRI® ArcGIS™ 9.2 was used to assess vulnerability utilizing digital data including local tax records for individual parcels, georeferenced point locations for critical facilities and historic properties, as well as georeferenced polygons for land use classifications and environmentally sensitive areas. Using these data layers, risk was assessed by estimating the assessed building value associated with parcels determined to be located in identified hazard areas with delineable geographic boundaries. Vulnerability was assessed by identifying the number of critical facilities and historic properties, and the acreage of future land use and environmentally sensitive areas in these hazard areas too.

According to the April 1, 2008, population estimate by the University of Florida's Bureau of Economic and Business Research, nearly 70,000 people reside in Nassau County. Nassau County's population is projected to grow steadily and reach an estimated 104,800 by the year 2030, increasing the average population density of 107 to 161 persons per square mile. In terms of population segments that may potentially be at higher risk in the event of a disaster, in general, 5.7% of the total population (66,506) is under the age of five (a total of 3,771 persons) and 15% is age 65 years and over (a total of 9,957 persons). Approximately 17% of households have incomes of \$25,000 or less (4,427 households), and 19.7% (12,223 persons age five and up) hold disability status. There are 2,768 female householders with no husband present, of which 1,866 have children under the age of 18.

Based on the HAZUS-MH probabilistic scenario, nearly 20 percent of the buildings are estimated to be damaged resulting from a 100-year event, nearly 30 percent for a 200-year event, and over 50 percent for a 500-year event. 100-year return period corresponds to a 1 percent chance per year of equaling or exceeding the estimated loss of a 100-year event.² According the HAZUS-MH scenario, based on what would occur if the October 2, 1898³ Category 4 hurricane were to occur today, about 19,515 or 80 percent of the county's buildings would be at least moderately damaged and 6,821 buildings would be completely destroyed.

There are a total of 47,480 parcels in Nassau County, 30,712 of which have building values associated with them. **Tables 1** provides the number, percent and values of parcels at risk to flood or storm surge

² FEMA. 2008. HAZUS-MH MR3 User Manual. Department of Homeland Security, Federal Emergency Management Agency, Mitigation Division. Washington, D.C.

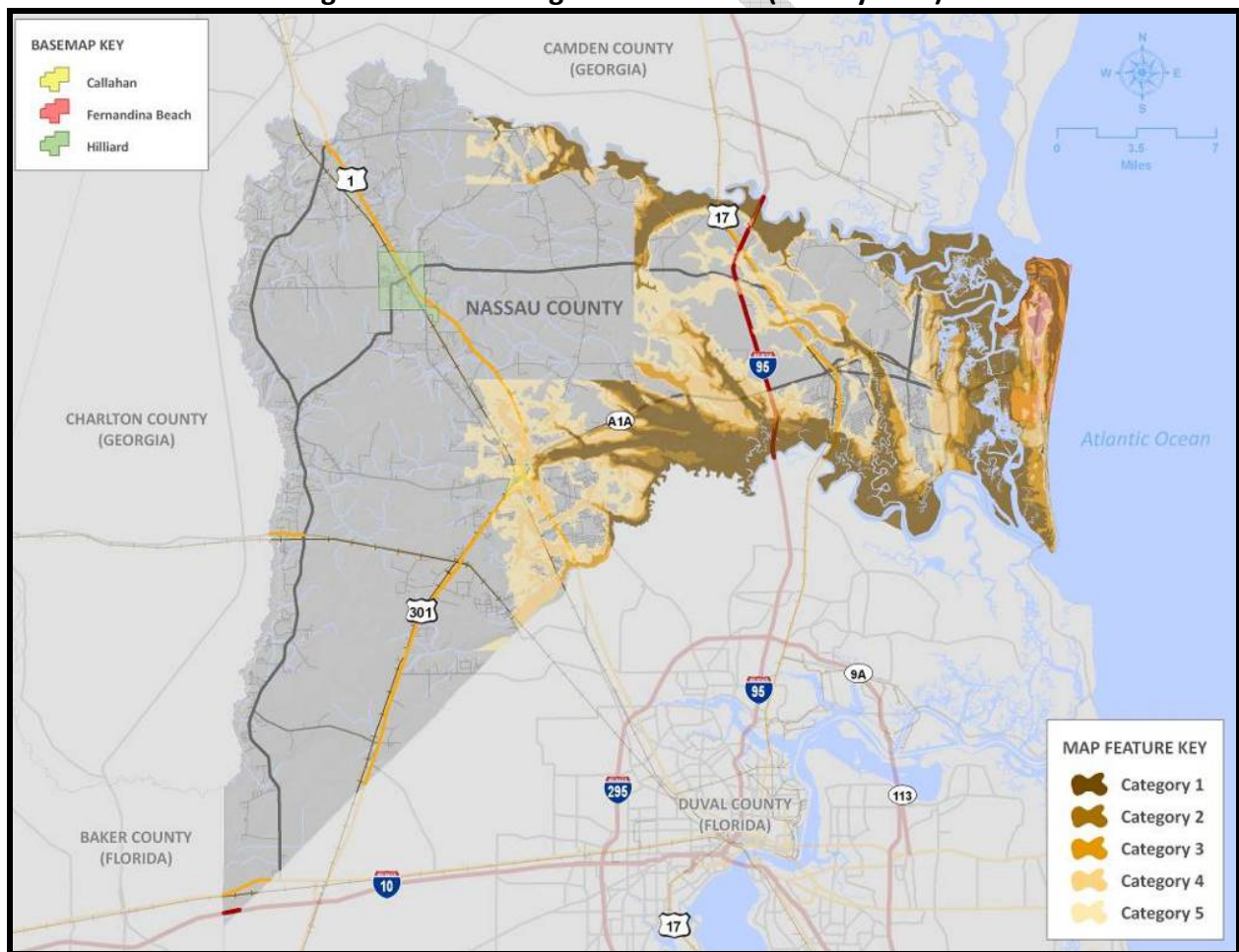
³ Although the hurricane made a direct landfall 12 miles north of the Nassau County border, the county still experienced \$2.5 million in loss.

Table 1: Flood Hazard Vulnerability of Improved Parcels in Nassau County				
Hazard Zone	Percent At-Risk for Each Flood Hazard Zone	Total Assessed Building Value of At-Risk Parcels	Cumulative Percent of Improved Parcels at Risk to Storm Surge	Cumulative Assessed Building Value of Parcels At-Risk to Storm Surge
1 Percent Annual Chance Flood	25%	\$1,444,095,084		
0.2 Percent Annual Chance Flood	16%	\$934,243,901	41%	\$2,378,338,985
Coastal V/VE Zone	3%	\$427,863,244	44%	\$2,806,202,229
Category 1 Storm Surge	10%	\$818,985,301		
Category 2 Storm Surge	6%	\$272,904,564	16%	\$1,091,889,865
Category 3 Storm Surge	26%	\$2,042,655,811	42%	\$3,134,545,676
Category 4 Storm Surge	23%	\$1,606,506,126	65%	\$4,741,051,802
Category 5 Storm Surge	19%	\$1,129,604,620	84%	\$5,870,656,422

Source: GIS analysis

Figure 2 illustrates the storm surge vulnerable areas in Nassau County, as of June 2009.

Figure 2: Storm Surge Hazard Areas (Countywide)



A wildfire analysis was conducted using a risk index of “low,” “medium,” or “high” based on fire-spreading potential during a climatologically “dry” year. There are a total of 9,544 parcels countywide potentially at high risk of being impacted by a wildfire, with a combined total of \$1,638,359,284 in assessed building values. There are a total of 16,735 parcels countywide potentially at medium risk of

The economy plays a significant role in recovery and redevelopment activities, as it provides employment, revenue, and resources after a disaster. These factors contribute to returning the sense of community, stability, and quality of life. Nassau County has a diverse economy, ranging from agricultural and silvicultural activity in the west and central areas (predominantly tree farms), to a variety of economic sectors in the eastern portion of county such as commercial, industrial, manufacturing and tourism. Rayonier, a major employer in the area, owns most of the land used for tree farming and a large pulp mill in Fernandina Beach. Historically, tree farming, trucking and paper production has accounted for a large part of the economy. However, that is changing due to growth in the county. Fernandina Beach has mostly industries such as real estate, legal services, medical care and tourism. Amelia Island has beautiful white sand beaches, small-town convivial flair, meeting and convention spaces, world-class golfing, fine dining and other tourism activities.⁴ Amelia Island has over 2,000 rental homes and condo units.

Tourism plays a major role in Nassau County’s economy, spawning employment growth, personal income, tax revenue and gross regional product. The tourism industry is Nassau County's largest employer, and would very likely be adversely affected by a major or catastrophic disaster. The Amelia Island Plantation and Ritz-Carlton Hotel and, the second and third largest employers respectively, are two upscale resorts located on Amelia Island. Both resorts are susceptible to hurricane wind and storm surge. Each of these establishments has a disaster recovery plan.

Critical facilities play a vital role in delivering services after a disaster. There are no critical facilities in the 100-year floodplain. However, there are 12 critical facilities located that are vulnerable to storm surge and that are vulnerable to 18 wildfire.

Vulnerability was analyzed for properties of cultural significance, such as historic properties and religious buildings. There are 197 historic properties that are at risk to either 100- or 500-year flood, and 41 properties that are vulnerable to Category 1 to 3 storm surge inundation areas. There are 12 potentially at risk religious buildings that are located in 100- or 500-year flood or storm surge inundation areas.

Disasters not only affect buildings and infrastructure, but also impact the natural environment. Surge and flood exacerbate erosion of beaches and rivers, and can also cause secondary hazards such as pollution infiltration of water bodies and other sensitive environmental areas. Flood and surge can transport debris, sewage, chemicals and animal carcasses into these areas. Additionally, extensive development related fragmentation of natural environments has decreased ecosystem resiliency, as storm impacts can have greater, more expensive and long-lasting impacts on coastal resources.⁵

Nassau County has a widespread network of waterways, wetlands and unique natural features. There are several wetland areas, which are environmentally sensitive, primarily in the low land areas near the

⁴ Neal, Melissa and Pooley, Phyllis K., 2008. *The Economic Impact of Amelia Island Tourism on Nassau County Florida*. University of West Florida Haas Center for Business Research and Economic Development. Pensacola, Florida.

⁵ H. John Heinz III Center for Science, Economics and the Environment, 2000. *The Hidden Costs of Coastal Hazards*. Island Press. Washington, D.C.

lakes and rivers. These areas accommodate a variety of residential, commercial, industrial and recreational uses. Protection of these unique natural features is important for maintaining the vitality and unique character of the county, and to simultaneously reduce potential damage from natural hazards such as flooding and storm surge.

Incorporating disaster resilient and sustainable development practices that include environmental amenities, saves money and lives and enhances the quality of life in the community.⁶ Wetlands and riparian areas assist with the absorption of floodwater and prevent erosion. Open space, greenways and parks provide habitat for wildlife, protect streams from pollutants, help maintain water temperatures and protect high risk areas from development. Trees can also reduce the costs of stormwater management, as tree canopy reduces stormwater.

GIS analyses were performed to identify location and number of acres for the following environmentally sensitive areas in Nassau County that are susceptible to flood and surge, and secondary hazards such as hazardous materials:

- Tidally influenced areas that contain hazardous materials facilities
- Wetlands
- Aquatic preserves and essential fish habitats
- Conservation and wildlife management areas
- Conservation Areas For Plants
- Conservation areas for vertebrates

These areas could be targeted for identifying natural areas that could be impacted by flood and surge hazards, to prioritize redevelopment priorities such as mitigating hazards impacts through conservation.

As Nassau County grows, additional pressure will be placed upon vacant and undeveloped lands, some of which are in hazard vulnerability areas. A GIS analyses was performed to identify the developed and vacant acreage by future land use classifications in flood, surge and wildfire hazard areas for the unincorporated areas of Nassau County. Of the 417,280 developed and vacant square acres in Nassau County, more than 42,900 acres (10%) are susceptible to Category 1 storm surge, over 126,000 acres (30%) are susceptible to 100-year flood, and over 332,000 acres (80%) are susceptible to wildfire.

Nassau County Uniquities

Nassau County is one of the lesser populated counties in Florida and relies on fewer staff than a larger community would have. As such, there were not a lot of members to participate on the various Working Groups without having too many meetings from a practical standpoint. An Executive Technical Committee (ETC) was formed to steer the development of the PDRP. To ensure participation, the ETC decided that it was more realistic to meet as the ETC instead of breaking up into Working Groups for each topical area. This process was productive, as ETC members possessed an interdisciplinary

⁶ Natural Hazards Center, 2005. Holistic Disaster Recovery: Ideas for Building Local Sustainability After a Natural Disaster (482 UCB). University of Colorado. Boulder Colorado.

knowledge of the community recovery issues, policies and interdepartmental working relationships that created a synergistic understanding of the often times interrelatedness of PDRP issues and actions within the various topical areas.

Members of the ETC include various county and municipal staff (building, GIS, public works, emergency management, growth management, law enforcement, fire/rescue, EOC Policy Group, health department, and zoning board), non-profits (American Red Cross and faith based organizations), Economic Development Board, Chambers of Commerce, NE Florida Builders Association, Northeast Florida Regional Council, local businesses (Rayonier, Baptist Medical), local utilities (municipal and FPL), and the Fernandina Beach Historic Board.

ETC Meeting attendance ranged from 12 to 20 members. Group dynamics and dialogue were productive, focused and supported the PDRP development process. ETC meetings were held from 10:00 a.m. to 4:00 p.m., with nearly all of the attendees staying to the end of or after the meetings, as needed to finish group activities. Working Group meetings were attended by about a dozen members and were held in two-hour durations.

The PDRP supports existing plans such as the Comprehensive Emergency Management Plan, Evacuation Plan, Local Mitigation Strategy, Temporary Housing Plan and Debris Management Plans. The PDRP Vulnerability Assessment has been developed in coordination with the County Emergency Management, GIS and Growth Management Departments; the National Weather Service; and the Northeast Regional Council. The PDRP results will be shared with the County to include in their 2008-2009 LMS Update, and methodology for land use analysis was coordinated with Growth Management for the 2030 Local Comprehensive Plan update.

Several unique components were developed for the Nassau County PDRP. The PDRP was viewed as a hybrid between an emergency operations plan and a comprehensive planning policy document, and strategic in nature. The term "Capability Assessment" was preferred by the county, instead of Capacity Assessment, as this is the term that has been used in other emergency management plans. The county also deemed it appropriate to develop the PDRP as a National Incident Management System (NIMS) compliant plan. As such, a NIMS checklist was developed based on the State of Florida's Emergency Operations Plan NIMS checklist.

The ETC unanimously voted to recommend that the Nassau County Board of County Commissioners (BOCC) officially adopt the PDRP by reference to the Nassau County Comprehensive Plan Coastal Management Element. The Nassau BOCC is scheduled to consider adoption of the PDRP in August 2009.

Based on the evaluations that were submitted by Nassau County and interviews with the ETC members, there was an overall high level of satisfaction with the PDRP planning process. The ETC members believed that using the ETC meetings to develop the PDRP helped to streamline the process and simplified the communication process between stakeholders, in lieu of having to share information from various Working Group meetings with all of the ETC members. However, the ETC did deem it to be exigent to conduct Working Group meetings for Land Use and Economic Resumption topics, as they required highly specialized knowledge from specific community stakeholders.