

## **Multiple Plan Analysis for New Smyrna Beach and Volusia County**

Claire Connolly Knox, Ph.D.  
Associate Professor  
Emergency Management & Homeland Security Program Director  
School of Public Administration  
University of Central Florida

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## Plan Analysis

### Introduction

This report summarizes the methods and results of a comprehensive plan review for the City of New Smyrna Beach and Volusia County. The primary analysis was the city and county comprehensive master plans (CMP) with a secondary analysis of the county's emergency management plans. Resilience is a community's "ability to prepare and plan for, absorb, respond, recover from, and more successfully adapt to adverse events".<sup>i</sup> Measuring a community's resilience is challenging but essential. Various measures exist and for this analysis, 85 indicators of resilience were obtained from multiple sources including the planning literature<sup>ii</sup>, disaster resilience literature<sup>iii</sup>, and best practices<sup>iv</sup>.

In this analysis, the City of New Smyrna Beach's CMP scored well for resiliency (38.9 out of 50). Of the 85 indicators, 54% (n=46) were discussed throughout the plan in great detail, 33% (n=28) were discussed in the plan but not in depth, and 13% (n=11) were rarely or not discussed in plan. The majority of these indicators were in the Policies, Tools, and Strategies component, which also scored the lowest in the analysis. This section of the full report details the literature, methods, results, and recommendations of the full analysis completed for this grant.

### Resilience Literature

Contemporary discussions of resilience can be traced back to the ecological literature, in which Dr. C. S. Holling defined it as "a measure of an ecological system's 'ability to absorb changes of state variables, driving variables, and parameters, and still exist'".<sup>v</sup> Since then, it has been applied to multiple disciplines including urban and regional planning, emergency and disaster management, public administration, and policy. This analysis uses the National Academies of Science's definition stated in the introduction above. Specifically, a community's resilience needs to align with its goals and vision, which planning scholars argue are detailed in a city or county's comprehensive master plan.<sup>vi</sup> For this analysis, we reviewed the extensive planning literature<sup>vii</sup>, disaster resilience literature<sup>viii</sup>, and best practices<sup>ix</sup> to create 85 indicators of resilience. (The full code book is included in Appendix A of this report.) Prior to our analysis, these indicators were reviewed by staff with the City of New Smyrna Beach and East Central Florida Regional Planning Council.

### Methods

Dr. Claire Connolly Knox, Associate Professor and Director of the Master of Emergency and Crisis Management Program in the School of Public Administration at the University of Central Florida, trained two graduate students (Master of Science in Urban and Regional Planning, Master of Public Administration) in coding methodology. The research team coded independently and held weekly phone calls to discuss conflicting codes. Once the coding was completed, Dr. Knox conducted an intercoder reliability test (Krippendorff's Alpha), in which all the coding scored at or above 0.87 (minimum required is 0.80). The research team coded three plans for this grant project: NSB's CMP, Volusia County's CMP (Results of the county's CMP analysis are in Appendix B), and Volusia County's Comprehensive Emergency Management Plan (Results of this plan analysis are in Appendix C).

Plan Evaluation and Quality

Analysis of the CMPs included an assessment process developed by Dr. Samuel Brody at Texas A&M University and used by other scholars.<sup>ii</sup> The assessment is comprised of five core components: Factual Basis; Goals and Objectives; Policies, Tools and Strategies; Inter-organizational Coordination; and Implementation and Monitoring (see Table 1 for description).

Table 1: Description of Core Components<sup>x</sup>

Component	Description
Factual Basis	Quality is dependent upon maps, videos, tables, checklists, and detailed plans and is critical in setting the direction for well-informed goals and policies.
Goals and Objectives	Specify ways to create a vision and evaluate its components in terms of thoroughness, clarity, long-term mindset, consistency, implementation strategies, and adoption protocols. Must value population safety, property, and the environment.
Policies, Tools and Strategies	Incorporates the actual means to realizing the goals and objectives. May include development regulations, land and property acquisition, information dissemination, and building standards.
Inter-organizational Coordination	Incorporate steps to ensure cooperation among specified levels of government, neighboring jurisdictions, and applicable agencies and organizations.
Implementation and Monitoring	Indicators include clarity of schedule, allocation of resources, and frameworks for program and process evaluation.

For the coding portion of the analysis, the two trained coders applied a three-point coding system generated from previous planning evaluation research to measure depth and breadth of the 85 resiliency indicators across the 5 components (See Table 2).<sup>xi</sup>

Table 2: Indicator Measurement<sup>vi</sup>

Types	Score of 0	Score of 1	Score of 2
Factual-related indicators (described/classified/visualized)	Not described	Vague description	Full identification
	Not classified	No specific description	Clear statement
	Not visualized/mapped	Vague classification	Classification/catalog
Goal-related indicators	Not identified	Vague identification	Clear identification
		No specific objectives	Measurable objectives
Policy coordination/ implementation indicators	Not identified/adopted	Non-mandatory words: may/prefer/encourage/suggest/ should/intend/consider to adopt	Mandatory words: mandate/must/will/shall/ already adopted

Once the team completed the coding, the principal investigator further analyzed the data utilizing IBM SPSS software to measure the depth and breadth of the data. More specifically, the plan components and total plan quality were calculated with these equations:

$$PC_j = \frac{10}{2m} \sum_{i=1}^{mj} I_i$$

$$TPQ = 5 \sum_{j=1}^5 PC_j$$

Whereas  $PC_j$  is the quality of the  $j$ th plan component (with a range of 1-10);  $m_j$  is the number of indicators within the  $j$ th plan component; and the  $I_i$  is the  $i$ th plan indicator score (with a range of 0-2); and  $TPQ$  is the total score of the plan (with a range of 0-50).<sup>vi</sup>

### Results for NSB CMP

#### Plan Quality

With a maximum score of 50, NSB’s CMP scored a 38.9 indicating a sufficiently good job overall. Of the 5 components, implementation and monitoring received the highest score of 8.75 (on a 0-10 scale) meaning NSB demonstrates a very good job of goals and objectives in its comprehensive master plan. Compared to land use plan analysis in the U.S., this is an above average score and stronger than most other plans. The second highest score of 8.33 is implementation and monitoring indicating a moderately good effort. Coming in a close third and fourth are Factual Basis at 7.86 and Interorganizational Coordination at 7.71. The weakest category is Policy, Tools, and Strategies at 6.25. While scoring above the mean, this result is not surprising as this category tends to be the weakest one in comprehensive land use plan analysis across the U.S.<sup>xii</sup> When looking for areas to increase the city’s resiliency, this category would be the first to consider as it would have the greatest long-term impact on community resilience.

Table 3: New Smyrna Beach’s CMP Component and Total Plan Scores

	Score	Out of
Factual Basis	7.86	10
Goals and Objectives	8.75	10
Policies, Tools, and Strategies	6.25	10
Interorganizational Coordination	7.71	10
Implementation and Monitoring	8.33	10
Total Plan Quality	38.9	50

Indicator Depth

**Indicators Discussed Thoroughly and in Great Detail**

Of the 85 resiliency indicators, 54% (n=46) are those discussed throughout the city’s plan and in great detail. These indicators included full identification, clear statements, measurable objectives, and/or concrete language, such as “mandate” and “adopted”.

Table 4: Indicators Discussed Thoroughly and in Great Detail

<b>Category</b>	<b>Indicator</b>
<b><i>Factual Basis</i></b>	Major coastal zone management laws and regulations
	Significant natural resources, environmentally sensitive lands
	Scenic/historic areas, recreational resources, open spaces
	Disaster vulnerable areas
	Coastal water and water quality
	Critical infrastructure
	Transportation, roads, and coastal access points
	Economic development, population growth, recreation needs
	Coastal environmental issues and potential conflicts
<b><i>Goals and Objectives</i></b>	Protect and restore significant coastal resources
	Prevent, reduce polluted runoff to coastal waters
	Promote sustainable growth in coastal communities
	Provide for priority water-dependent uses
	Improve public shoreline access
	Improve government coordination and decision-making
<b><i>Policies, Tools, and Strategies</i></b>	Residential subdivision ordinances
	Planned unit development
	Special overlay districts
	Agricultural or open space zoning
	Storm water retention requirements
	Environmental impact assessment requirements
	Restrictions on shoreline armoring
	Dune protection regulations
	Wetlands protection regulations
	Requirements for habitat protection/restoration

	Special local hazard retrofit standards for existing infrastructure
	Acquisition of development rights or easements
	Relocating existing buildings
	Transfer of development rights
	Clustered development
	Public education
	Citizen involvement
	Formal education/training of staff
	Impact fees
	Land trusts
<b><i>Interorganizational Coordination and Collaboration</i></b>	Coordination with other plans
	Coordination with related emergency management plans
	Internal local government collaboration
	External local government collaboration
	Coordination with surrounding and regional organizations
	Coordination with federal agencies
	Volunteer collaboration
<b><i>Implementation and Monitoring</i></b>	Designation of responsibility
	Clear timetable for implementation
	Reliable financial support
	Amendment procedures

Below are a few details from this list of indicators.

- Three of the Policies, Tools, and Strategy category indicators - “Restrictions on shoreline armoring”, “Dune protection regulations”, and “Wetlands protection regulations” – were very detailed in the Coastal Management Element of the CMP and used strong, mandatory words. For example, “prohibit removal/destruction of sand dunes.”
- The majority of the indicators in the Interorganizational Coordination and Collaboration category, as well as “Improve government coordination and decision-making” from the Goals and Objectives category, were addressed extensively in the Intergovernmental Coordination element of the CMP.
- “Public Education” from the Policies, Tools, and Strategy category included detailed information about schools, school boards, education programs for sustainability initiatives, recycling, and proper solid waste management, etc. This indicator could be strengthened by adding details from the public education of the CMP itself. There is a good possibility the education process is occurring during the public participation workshops and hearings detailed on page I-2. However, providing additional details would strengthen the indicator.

- The Implementation and Monitoring category scored the highest with 67% (n=4) of the indicators thoroughly discussed and in great detail. The two remaining indicators, “Regular monitoring, review and updating” and “Necessary Technical Assistance,” should be strengthened by replacing non-mandatory words with mandatory words.
- The CMP discussed infrastructure in great detail and included maps; however, it should be noted that this infrastructure is only referred to once as “critical” in relation to transportation facilities for hurricane evacuation (III-4). Instead, this word is used most in discussing habitats (referred to as “critical” eight times) in the CMP. This indicator and “critical facilities and services” in Table 5 should be expanded in the CMP to include all critical infrastructure, facilities, and services in the city.

**Indicators Discussed, But Not in Great Detail**

Table 5 includes the 33% (n=28) of indicators discussed in the comprehensive master plan, but not in depth. The majority are in the policies, tools, and strategies component, which is consistent with analysis of other county master plans. These indicators would be considered the easiest to improve upon as they are discussed in the plan; however, each one needs to be more detailed, include measurable objectives, and include mandatory words (e.g., mandate, must, will, shall, adopt/ed).

Table 5: Indicators Discussed, But Not in Great Detail

<b>Category</b>	<b>Indicator</b>
<b><i>Factual Basis</i></b>	Coastal zone boundary and maps
	Identification of vulnerable populations
	Critical facilities and services
	Global warming, climate change, sea level rise
	Coastal Construction Control Line
<b><i>Goals and Objectives</i></b>	Protect life and property in hazardous areas
	Build disaster-resistant, healthy, safe community
<b><i>Policies, Tools, and Strategies</i></b>	Affordable housing
	Performance zoning
	Hazard setback ordinances
	Limitation of shoreline development
	Restrictions on dredging/filling
	Coastal vegetation protection regulations
	Land acquisition
	Density bonuses
	Requirements for locating public facilities and infrastructure
	Using urban service areas to limit development

	Lower tax rates for preservation
	Special tax assessment districts
	Public-private partnerships
	Suitable building sites in hazard prone areas
	Special building techniques for hazard prone areas
	Identify stakeholders and their interests
<b><i>Interorganizational Coordination and Collaboration</i></b>	Coordination with state agencies
	Coordination with private organizations
	Coordination with non-profit organizations
<b><i>Implementation and Monitoring</i></b>	Necessary technical assistance
	Regular monitoring, review and updating

Below are a few details from this list of indicators.

- The “Coastal Zone Boundary and Maps” in the Factual Basis category scored a 1 as there was brief mentions of a coastal zone; however, it was unclear what the discussion was in reference to and there were no discussion of a defined boundary or inclusion of a map. The city’s plan did include Coastal High Hazard Areas (Map VIII-1) and Flood Prone Areas (Map II-2) maps, which are related to this indicator.
- The “Identification of Vulnerable Populations” in the Factual Basis category scored a 1 because these populations were only included in reference to populations located in the Hurricane Vulnerability Zones. In fact, while “vulnerability” is mentioned throughout the plan’s section discussing the Hazard Vulnerability Zone, “vulnerable” is only included twice in the entire plan. However, as research highlights, our communities have different types of vulnerable populations that comprehensive master plans should consider. For example, one vulnerable population group is individuals living below the poverty levels, which aligns with “Affordable Housing” which also scored a 1 because the plan’s language did not include mandatory or committal words; the plan states “encourages” in the Future Land Use Element. It also aligns with “Coordination with non-profit organizations” and “Coordination with faith-based organizations” which were rarely or not mentioned in the CMP at all. Research highlights that most vulnerable populations trust and rely on nonprofit and faith-based organizations in their personal networks (ties into their social capital). These networks can reduce a populations’ vulnerability and increase a community’s resilience.
- “Limitation of shoreline development” in the Policies, Tools, and Strategies category was discussed in the Coastal Management Element of the CM; however, the language does not necessarily place limitations on development. “Limit development” was briefly mentioned twice; first in relation to schools (Public Schools Facilities Element) and second to avoid building in floodplains (Conservation Element).

***Indicators Rarely or Not Discussed Thoroughly***

Finally, Table 6 includes the 13% (n=11) of indicators not discussed or are rarely discussed in NSB’s plan. We recommend adding these indicators to the master plan. In our analysis, the emergency management related information was thoroughly discussed in great details in Volusia

County’s Comprehensive Emergency Management Plan and Local Mitigation Strategy. However, similar to other U.S. communities, the plans are not linked together, which is an opportunity to increase NSB’s resilience.

Table 6: Indicators Rarely or Not Discussed Thoroughly

<b>Category</b>	<b>Indicator</b>
<b><i>Factual Basis</i></b>	Previous disaster experience
<b><i>Policies, Tools, and Strategies</i></b>	Special local standards for hazard resistance in new buildings
	Special local hazard retrofit standards for existing buildings
	Special local utility codes
	Fee simple purchase of undeveloped lands
	Seminars for developers and builders
	Hazard disclosure requirements in real estate transactions
	Hazard zone signs
	Requirements for locating critical private facilities
	Tax abatement for mitigation methods for new development
<b><i>Interorganizational Coordination and Collaboration</i></b>	Coordination with faith-based organizations

Including hazard related elements in a comprehensive master plan is a critical element of resiliency as hazard plans do not have legal standing as master plans do. As seen in the 2016 Louisiana Floods and Hurricane Harvey in 2017, allowing development in flood prone areas, especially floodplains, increase residents’ vulnerability and decreases a community’s resiliency. Research studies conclude that communities that include hazard reduction related information in their comprehensive master plans experience less damage from a disaster and rebound more quickly; essentially the definition of resilience.<sup>xiii</sup>

Additionally, for every \$1 spent on flood mitigation, saves a community \$6 post disaster.<sup>xiv</sup> This National Institute of Buildings 2017 report specifically mentions adapting building codes in hazard prone areas. The majority of the resilience indicators in Table 6 above coincide with this recommendation. Specifically, three factors in the Policies, Tools, and Strategies category – “Special local standards for hazard resistance in new buildings”, “Special local hazard retrofit standards for existing buildings”, and “Tax abatement for mitigation methods for new development” – are directly related to the recommendations from this report and we recommend strengthening them.

While the CMP encouraged developers and builders to comply with best practices, there were no specific mention of hosting “Seminars for developers and builders” in the plan. The plan includes seminars for community and homeowners, but not for builders and developers.

Discussion

Comparison of NSB and Volusia County CMPs

Overall, the county’s CMP analysis results were 4.87 points stronger than the city’s results (43.77 versus 38.9 respectively) (see Table 7). (Full analysis is included in Appendix B).

Table 7: Volusia County CMP Component and Total Plan Scores

	Score	Out of
Factual Basis	8.75	10
Goals and Objectives	9.38	10
Policies, Tools, and Strategies	7.73	10
Inter-organizational Coordination	8.75	10
Implementation and Monitoring	9.17	10
Total Plan Quality	43.77	50

Common indicators rarely or not discussed in both the city and county CMPs are listed in Table 8.

Table 8: Indicators Rarely or Not Discussed Thoroughly in Either Plan

Category	Indicator
<b><i>Factual Basis</i></b>	Previous disaster experience
<b><i>Policies, Tools, and Strategies</i></b>	Special local hazard retrofit standards for existing buildings
	Seminars for developers and builders
	Hazard disclosure requirements in real estate transactions
	Hazard zone signs
	Requirements for locating critical private facilities
	Tax abatement for mitigation methods for new development
<b><i>Interorganizational Coordination and Collaboration</i></b>	Coordination with faith-based organizations

Specifically, coordination with faith-based organizations indicator was never discussed in the City’s or County’s CMP; however, it was included in the county’s Comprehensive Emergency Management Plan. Including the whole community is essential in community resilience. We recommend either engaging with this sector of the community, or if this is already occurring, include it using mandatory words.

Three indicators in the Policies, Tools, and Strategies category are included in the county’s plan, but are missing from the city’s CMP (see Table 9). It should be noted that the first indicator, “Special local standards for hazard resistance in new buildings,” does not include language about local standards in the county’s plan. It states: “All development in the Hurricane Vulnerability Zone shall be consistent with the federal flood hazard requirements” (p. 286); missing are special local standards.

Table 9: Indicators in Volusia County’s Plan and not in NSB’s Plan

Category	Indicator
<b><i>Policies, Tools, and Strategies</i></b>	Special local standards for hazard resistance in new buildings
	Fee simple purchase of undeveloped lands
	Requirements for locating critical private facilities

### Conclusion

This analysis empirically tested indicator breadth and depth along with the total plan quality for the City of New Smyrna Beach and Volusia County’s Comprehensive Master Plans. While the county’s plan scored higher across the five components and for the total plan quality, the city’s scores were above the average of previous studies.<sup>iv</sup> The weakness for both plans lies in the Policies, Tools, and Strategies component which is consistent with the planning literature.<sup>iv</sup>

Results highlight a strength among 54% (n=46) of the 85 resiliency indicators used in the analysis of the City of New Smyrna Beach’s comprehensive master plan. Of the remaining indicators 33% (n=28) are included but not thoroughly or in great detail. These are the factors we recommend the city focus on to build resiliency as they are included in the current comprehensive master plan but are lacking details and/or mandatory words. Finally, 13% (n=11) of the indicators are rarely or not discussed in the city’s plan. While many of them are included in Volusia County’s Comprehensive Emergency Management Plan, we recommend increasing the city’s resiliency by incorporating these factors into the comprehensive master plan.

### Recommendations

Below are specific recommendations based on this analysis, which are also discussed throughout this report:

- Some of these indicators are linked, so improving one can improve others (as seen in the vulnerable population discussion above).
- Include a list of “critical infrastructure” and “critical facilities and services” in the city’s CMP that aligns with the list in the County’s CEMP. The city’s plan primarily focuses on “critical habitat”. We recommend expanding the plan to include details of all critical infrastructure, facilities, and services in the city.

- Include mandatory words for affordable housing, which also was not included in Volusia County’s CEMP. After hurricanes Irma and Maria in 2017, transitioning individuals from short-term to long-term housing was an issue with the lack of affordable housing in Central Florida.
- Many of the hazard-related indicators need to be more detailed in the CMP to increase the disaster resilience of the city.
- One indicator, “Formal education/training of staff” from the Policies, Tools, and Strategies category, is included in the city’s CMP but is missing from the county’s plan. This is an important element of internal organizational resilience for the city and we recommend the county add it to its plan as well.
- “Public Education” from the Policies, Tools, and Strategy category could be strengthened by adding details from the public education of the CMP itself.
- Include specific details regarding the defined coastal zone boundary and include of a map within the CMP.
- Review the indicators in Table 6, which were either rarely or not discussed in the city’s CMP.
- Include information about collaboration efforts with faith-based organizations, which was never mentioned in the city’s CMP, and add mandatory language to ensure these efforts continue.
- Overall, change as many of the “should” words to “shall” to strengthen the resiliency of New Smyrna Beach.

## Appendix A

### Resiliency Planning Coding Indicators for New Smyrna Beach and Volusia County Comprehensive Master Plans

#### I. Factual Basis

- Major coastal zone management laws and regulations
- Coastal zone boundary and maps (Location-based disaster risk information, i.e., GIS maps)
- Significant natural resources and environmentally sensitive lands
- Scenic and historic areas, recreational resources, and open spaces
- Disaster vulnerable areas (Risk or hazard information/details specific to their county pre and post disaster)
- Identification of vulnerable populations (elderly, unregistered/undocumented individuals, low socio-economic status, medically assisted individuals, prisoners, etc.)
- Previous disaster experience: lessons learned/actions taken because of a previous disaster
- Coastal water and water quality
- Critical facilities and services (hospitals, fire stations, city hall/government buildings, police stations, EOC, etc.)
- Critical infrastructure (wastewater treatment system, power grid, water purification system, roads, levees, dikes, seawalls, 911 system, communications system, etc.)
- Transportation, roads, and coastal access points
- Economic development, population growth, recreation needs
- Coastal environmental issues and potential conflicts
- Global warming, climate change, and sea level rise
- Coastal Construction Control Line

#### II. Goals and Objectives

- Protect and restore significant coastal resources
- Prevent, reduce polluted runoff to coastal waters
- Protect life and property in hazardous areas
- Build disaster-resistant, healthy, safe community
- Promote sustainable growth in coastal communities
- Provide for priority water-dependent uses
- Improve public shoreline access
- Improve government coordination and decision-making

### III. Policies, Tools, and Strategies

- Residential subdivision ordinances
- Planned unit development
- Affordable housing
- Special overlay districts
- Agricultural or open space zoning
- Performance zoning
- Hazard setback ordinances
- Storm water retention requirements
- Environmental impact assessment requirements
- Limitation of shoreline development
- Restrictions on shoreline armoring
- Restrictions on dredging/filling
- Dune protection regulations
- Wetlands protection regulations
- Coastal vegetation protection regulations
- Requirements for habitat protection/restoration
- Special local standards for hazard resistance in new buildings
- Special local hazard retrofit standards for existing buildings
- Special local utility codes
- Fee simple purchase of undeveloped lands
- Acquisition of development rights or easements
- Land acquisition
- Relocating existing buildings
- Transfer of development rights
- Density bonuses
- Clustered development
- Public education
- Citizen involvement
- Formal education/training of staff
- Seminars for developers and builders
- Hazard disclosure requirements in real estate transactions
- Hazard zone signs
- Requirements for locating public facilities and infrastructure

- Requirements for locating critical private facilities
- Using urban service areas to limit development
- Lower tax rates for preservation
- Special tax assessment districts
- Tax abatement for mitigation methods for new development
- Impact fees
- Land trusts
- Public–private partnerships
- Suitable building sites in hazard prone areas
- Special building techniques for hazard prone areas

#### IV. Inter-organizational Coordination and Collaboration

- Identify stakeholders and their interests
- Coordination with other plans
- Coordination with related emergency management plans (Comprehensive Emergency Management Plan, Hazard Mitigation Plan, etc.)
- Internal local government collaboration (local government agencies within the county)
- External local government collaboration (local government agencies outside the county)
- Coordination with surrounding and regional organizations
- Coordination with state agencies
- Coordination with federal agencies
- Coordination with private organizations
- Coordination with non-profit organizations (NGOs)
- Coordination with faith-based organizations
- Volunteer collaboration

#### V. Implementation and Monitoring

- Designation of responsibility
- Clear timetable for implementation
- Necessary technical assistance
- Reliable financial support
- Regular monitoring, review and updating (evaluation)
- Amendment procedures

## Appendix B

### Results of the Volusia County Comprehensive Master Plan Analysis

Similar to the analysis completed for NSB’s Comprehensive Master Plan, below are the results of the analysis on the county’s Comprehensive Master Plan.

#### **Indicators Discussed Thoroughly and in Great Detail**

Of the 85 resiliency indicators, 78% (n=66) are those discussed throughout the city’s plan and in great detail. These indicators included full identification, clear statements, measurable objectives, and/or concrete language, such as “mandate” and “adopted”.

Table 10: Indicators Discussed Thoroughly and in Great Detail

<b>Category</b>	<b>Indicator</b>	
<b><i>Factual Basis</i></b>	Major coastal zone management laws and regulations	
	Coastal zone boundary and maps	
	Significant natural resources, environmentally sensitive lands	
	Scenic/historic areas, recreational resources, open spaces	
	Disaster vulnerable areas	
	Coastal water and water quality	
	Critical facilities and services	
	Critical infrastructure	
	Transportation, roads, and coastal access points	
	Economic development, population growth, recreation needs	
	Coastal environmental issues and potential conflicts	
	<b><i>Goals and Objectives</i></b>	Protect and restore significant coastal resources
		Prevent, reduce polluted runoff to coastal waters
Protect life and property in hazardous areas		
Build disaster-resistant, healthy, safe community		
Promote sustainable growth in coastal communities		
Provide for priority water-dependent uses		
Improve public shoreline access		
<b><i>Policies, Tools, and Strategies</i></b>	Residential subdivision ordinances	
	Planned unit development	
	Affordable housing	

	Special overlay districts
	Agricultural or open space zoning
	Storm water retention requirements
	Environmental impact assessment requirements
	Limitation of shoreline development
	Restrictions on shoreline armoring
	Restrictions on dredging/filling
	Dune protection regulations
	Wetlands protection regulations
	Coastal vegetation protection regulations
	Requirements for habitat protection/restoration
	Special local hazard retrofit standards for existing infrastructure
	Special local utility codes
	Fee simple purchase of undeveloped lands
	Acquisition of development rights or easements
	Land acquisition
	Relocating existing buildings
	Transfer of development rights
	Density bonuses
	Clustered development
	Public education
	Citizen involvement
	Requirements for locating public facilities and infrastructure
	Requirements for locating critical private facilities
	Using urban service areas to limit development
	Special tax assessment districts
	Impact fees
	Land trusts
	Public-private partnerships
	Special building techniques for hazard prone areas
<b><i>Interorganizational Coordination and Collaboration</i></b>	Identify stakeholders and their interests
	Coordination with other plans

	Coordination with related emergency management plans
	Internal local government collaboration
	External local government collaboration
	Coordination with surrounding and regional organizations
	Coordination with state agencies
	Coordination with federal agencies
	Coordination with private organizations
	Coordination with non-profit organizations
<b>Implementation and Monitoring</b>	Designation of responsibility
	Necessary technical assistance
	Reliable financial support
	Regular monitoring, review and updating
	Amendment procedures

**Indicators Discussed, But Not in Great Detail**

Table 11 includes the 9% (n=8) of indicators discussed in the comprehensive master plan, but not in depth. The majority are in the policies, tools, and strategies component, which is consistent with analysis of other county master plans. These indicators would be considered the easiest to improve upon as they are discussed in the plan; however, each one needs to be more detailed, include measurable objectives, and include mandatory words (e.g., mandate, must, will, shall, adopt/ed).

Table 11: Indicators Discussed, But Not in Great Detail

<b>Category</b>	<b>Indicator</b>
<b>Factual Basis</b>	Identification of vulnerable populations
	Global warming, climate change, sea level rise
	Coastal Construction Control Line
<b>Goals and Objectives</b>	Improve government coordination and decision-making
<b>Policies, Tools, and Strategies</b>	Special local standards for hazard resistance in new buildings
	Lower tax rates for preservation
<b>Interorganizational Coordination and Collaboration</b>	Volunteer collaboration
<b>Implementation and Monitoring</b>	Clear timetable for implementation

**Indicators Rarely or Not Discussed Thoroughly**

Finally, Table 12 includes the 13% (n=11) of indicators not discussed or are rarely discussed in NSB’s plan. We recommend adding these indicators to the master plan. In our analysis, the emergency management related information was thoroughly discussed in great details in Volusia County’s Comprehensive Emergency Management Plan. However, similar to other U.S. communities, the plans are not linked together, which is an opportunity to increase county’s resilience.

Table 12: Indicators Rarely or Not Discussed Thoroughly

<b>Category</b>	<b>Indicator</b>
<b><i>Factual Basis</i></b>	Previous disaster experience
<b><i>Policies, Tools, and Strategies</i></b>	Performance zoning
	Hazard setback ordinances
	Special local hazard retrofit standards for existing buildings
	Formal education/training of staff
	Seminars for developers and builders
	Hazard disclosure requirements in real estate transactions
	Hazard zone signs
	Tax abatement for mitigation methods for new development
	Suitable building sites in hazard prone areas
<b><i>Interorganizational Coordination and Collaboration</i></b>	Coordination with faith-based organizations

## Appendix C

### Results of the Volusia County Comprehensive Emergency Management Plan Analysis

Similar to the analysis completed for NSB’s and Volusia County’s Comprehensive Master Plans, below are the results of the analysis on the county’s Comprehensive Emergency Management Plans.

Table 13: Volusia County Comprehensive Emergency Management Plan Component and Total Plan Quality

	Score	Out of
Factual Basis	6.67	10
Goals and Objectives	4.38	10
Policies, Tools, and Strategies	3.75	10
Inter-organizational Coordination	8.46	10
Implementation and Monitoring	6.67	10
Total Plan Quality	29.92	50

#### **Indicators Discussed Thoroughly and in Great Detail**

Of the 63 resiliency indicators, 46% (n=29) are those discussed throughout the county’s plan and in great detail. These indicators included full identification, clear statements, measurable objectives, and/or concrete language, such as “mandate” and “adopted”.

Table 14: Indicators Discussed Thoroughly and in Great Detail

Category	Indicator
<b>Factual Basis</b>	Significant natural resources, environmentally sensitive lands
	Disaster vulnerable areas
	Identification of vulnerable populations
	Previous disaster experience
	Critical facilities and services
	Critical infrastructure
	Economic development, population growth, recreation needs
	Risk/hazard information/details specific to county
<b>Goals and Objectives</b>	Protect life and property in hazardous areas
	Build disaster-resistant, healthy, safe community
	Provide for priority water-dependent uses

<b><i>Policies, Tools, and Strategies</i></b>	Shelter capacity
	Special needs shelters
	Temporary housing
	Public education
<b><i>Interorganizational Coordination and Collaboration</i></b>	Coordination with other plans
	Coordination with related emergency management plans
	Reference to mutual aid agreements/compacts
	Coordination with surrounding and regional organizations
	Coordination with state agencies
	Coordination with federal agencies
	Coordination with private organizations
	Coordination with non-profit organizations
	Coordination with faith-based organizations
Volunteer collaboration	
<b><i>Implementation and Monitoring</i></b>	Designation of responsibility
	Necessary technical assistance
	Reliable financial support
	Regular monitoring, review and updating

***Indicators Discussed, But Not in Great Detail***

Table 15 includes the 25% (n=16) of indicators discussed in the comprehensive master plan, but not in depth. The majority are in the policies, tools, and strategies component, which is consistent with analysis of other county master plans. These indicators would be considered the easiest to improve upon as they are discussed in the plan; however, each one needs to be more detailed, include measurable objectives, and include mandatory words (e.g., mandate, must, will, shall, adopt/ed).

Table 15: Indicators Discussed, But Not in Great Detail

<b>Category</b>	<b>Indicator</b>
<b><i>Factual Basis</i></b>	Scenic/historic areas, recreational resources, open spaces
	Coastal water and water quality
	Transportation, roads, and coastal access points
	GIS disaster risk information
<b><i>Goals and Objectives</i></b>	Improve government coordination and decision-making
<b><i>Policies, Tools, and Strategies</i></b>	Short-term relocation of vulnerable populations

	Local code enforcement
	Special local hazard retrofit standards for existing buildings
	Land acquisition
	Citizen involvement
	Communication/language capacity
	Health/well being of internal employees
	Formal education/training of staff
	Public-private partnerships
<b>Interorganizational Coordination and Collaboration</b>	Identify stakeholders and their interests
	Internal local government collaboration

**Indicators Rarely or Not Discussed Thoroughly**

Finally, Table 16 includes the 29% (n=18) of indicators not discussed or are rarely discussed in the county’s CEMP. We recommend adding these indicators to the plan.

Table 16: Indicators Rarely or Not Discussed Thoroughly

<b>Category</b>	<b>Indicator</b>
<b>Factual Basis</b>	Major coastal zone management laws and regulations
	Coastal zone boundary and maps
	Global warming, climate change, sea level rise
<b>Goals and Objectives</b>	Protect and restore significant coastal resources
	Prevent, reduce polluted runoff to coastal waters
	Provide for priority water-dependent uses
<b>Policies, Tools, and Strategies</b>	Affordable housing
	Long-term relocation of vulnerable populations
	Special local standards for hazard resistance in new buildings
	Relocating existing buildings
	Hazard zone signs
	Requirements for locating public facilities and infrastructure
	Requirements for locating critical private facilities
	Tax abatement for mitigation methods for new development
	Suitable building sites in hazard prone areas
	Special building techniques for hazard prone areas

<b><i>Interorganizational Coordination and Collaboration</i></b>	External local government collaboration
<b><i>Implementation and Monitoring</i></b>	Clear timetable for implementation

<sup>i</sup> National Research Council. (2012). *Disaster resilience: A national imperative*. Washington, DC: National Academies Press. ¶1

<sup>ii</sup> Brody, S.D. (2003). Implementing the principles of ecosystem management through local land use planning. *Population and Environment*, 24(6), 511-540; Knox, C.C. (2017). A Football Field Lost Every 45 Minutes: Evaluating Local Capacity to Implement Louisiana's Coastal Master Plan. *Coastal Management Journal*, 45(3), 233-252; Tang, Z., Lindell, M.K., Prater, C.S., & Brody, S.D. (2008). Measuring tsunami planning capacity on US Pacific coast. *Natural Hazards Review*, 9(2), 91-100; Tang, Z., Lindell, M.K., Prater, C., Wei, T., & Hussey, C.M. (2011). Examining local coastal zone management capacity in US Pacific coastal counties. *Coastal Management*, 39(2), 105-132; Woodruff, S. C., Meerow, S., Stults, M., & Wilkins, C. (2018). Adaptation to Resilience Planning: Alternative Pathways to Prepare for Climate Change. *Journal of Planning Education and Research*, 0739456X18801057.

<sup>iii</sup> Cutter, S.L., Ash, K.D., & Emrich, C.T. (2014). The geographies of community disaster resilience. *Global environmental change*, 29, 65-77; Cutter, S. L., Burton, C. G., & Emrich, C. T. (2010). Disaster resilience indicators for benchmarking baseline conditions. *Journal of Homeland Security and Emergency Management*, 7(1).

<sup>iv</sup> The Rockefeller Foundation. 100 Resilient Cities. Retrieved from: <https://www.rockefellerfoundation.org/our-work/initiatives/100-resilient-cities/>;

<sup>v</sup> Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual review of ecology and systematics*, 4(1), 1-23. p. 17

<sup>vi</sup> Cutter, S.L., Ash, K.D., & Emrich, C.T. (2014). The geographies of community disaster resilience. *Global environmental change*, 29, 65-77; Brody, S.D. (2003). Implementing the principles of ecosystem management through local land use planning. *Population and Environment*, 24(6), 511-540; Berke, P.R., & Godschalk, D. (2009). Searching for the good plan: A meta-analysis of plan quality studies. *Journal of Planning Literature*, 23(3), 227-240; Guyadeen, D., & Seasons, M. (2016). Plan evaluation: Challenges and directions for future research. *Planning Practice and Research*, 31(2), 215-228.

<sup>vii</sup> Brody, S.D. (2003). Implementing the principles of ecosystem management through local land use planning. *Population and Environment*, 24(6), 511-540; Knox, C.C. (2017). A Football Field Lost Every 45 Minutes: Evaluating Local Capacity to Implement Louisiana's Coastal Master Plan. *Coastal Management Journal*, 45(3), 233-252; Tang, Z., Lindell, M.K., Prater, C.S., & Brody, S.D. (2008). Measuring tsunami planning capacity on US Pacific coast. *Natural Hazards Review*, 9(2), 91-100; Tang, Z., Lindell, M.K., Prater, C., Wei, T., & Hussey, C.M. (2011). Examining local coastal zone management capacity in US Pacific coastal counties. *Coastal Management*, 39(2), 105-132; Woodruff, S. C., Meerow, S., Stults, M., & Wilkins, C. (2018). Adaptation to Resilience Planning: Alternative Pathways to Prepare for Climate Change. *Journal of Planning Education and Research*, 0739456X18801057.

<sup>viii</sup> Cutter, S.L., Ash, K.D., & Emrich, C.T. (2014). The geographies of community disaster resilience. *Global environmental change*, 29, 65-77; Cutter, S. L., Burton, C. G., & Emrich, C. T. (2010). Disaster resilience indicators for benchmarking baseline conditions. *Journal of Homeland Security and Emergency Management*, 7(1).

<sup>ix</sup> The Rockefeller Foundation. 100 Resilient Cities. Retrieved from: <https://www.rockefellerfoundation.org/our-work/initiatives/100-resilient-cities/>;

<sup>x</sup> Brody, S.D. (2003). Implementing the principles of ecosystem management through local land use planning. *Population and Environment*, 24(6), 511-540.

<sup>xi</sup> Tang, Z., Lindell, M.K., Prater, C.S., & Brody, S.D. (2008). Measuring tsunami planning capacity on US Pacific coast. *Natural Hazards Review*, 9(2), 91-100.

<sup>xii</sup> Knox, C.C. (2017). A Football Field Lost Every 45 Minutes: Evaluating Local Capacity to Implement Louisiana's Coastal Master Plan. *Coastal Management Journal*, 45(3), 233-252; Tang, Z., Lindell, M.K., Prater, C.S., & Brody, S.D. (2008). Measuring tsunami planning capacity on US Pacific coast. *Natural Hazards Review*, 9(2), 91-100.

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