Integrating Sea Level Rise Adaptation in Local Mitigation Strategies

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Fall 2014

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1.0 Introduction

Florida has a legacy of leadership within the field of hazard mitigation planning and emergency preparedness. Both the state and its many local partners have in place strong policy frameworks that proactively improve public safety, increase community-wide resiliency, and minimize hazard related impacts. As a living system, Florida's state-wide hazard mitigation efforts are regularly updated to reflect emerging trends and changes in our understanding of both the drivers and impacts of hazard events. Recognizing the potential of sea level rise to influence community risk, this guidebook seeks to enhance local understanding of sea level rise and its possible connection to natural hazard events. It continues the tradition of hazard leadership in Florida by detailing a process for local governments considering integrating sea level rise adaptation into the established framework of hazard mitigation planning, including steps toward assessing local vulnerability, identifying hazard specific impacts that may be exacerbated by sea level rise, and mitigating potential future risk through adaptation strategies.

1.1 Background

Since 1953, Florida has experienced 67 major disaster declarations, responding to and recovering from a wide range of events, including hurricanes, flooding, tropical storms, and wildfires (FEMA, 2014). As a result, Florida has recognized that preparing and planning for hazard events is essential to maintaining quality of life and community operation statewide. Florida's Division of Emergency Management (DEM) maintains the State Hazard Mitigation Plan (SHMP) and county emergency management offices also prepare and adopt a Local Mitigation Strategy plan tailored to the unique risks, capacities, and resources of the jurisdiction. Florida's SHMP is required by federal law under Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act as enacted under the Disaster Mitigation Act of 2000. These plans must be in place in order to receive disbursements of federal hazard mitigation grants and certain post-disaster recovery relief funds. Local and regional communities are also required to establish a mitigation plan in order to remain eligible for this same federal funding. Beyond mere funding, proactive hazard mitigation planning has proven an effective way to understand local risks, align other local planning mechanisms with hazard mitigation goals, and effectively coordinate disaster response—all of which save money and lives over the long-term.

1.2 Emerging Emphasis on Future Vulnerability

Recognizing Florida's exposure to hazardous events and potential future vulnerability, agencies and organizations at all scales have launched a variety of adaptation initiatives. Many of these initiatives aim to maximize potential for implementation and complement current processes by integrating adaptation into existing planning and policy frameworks. For example, the Department of Economic Opportunity (DEO) has been actively involved in adaptation planning, as evidenced by the launch of the Community Resiliency initiative. DEO's Community Resilience Initiative is a five-year project to integrate adaptation to potential sea level rise into current planning mechanisms, including local comprehensive, hazard

mitigation, and post-disaster redevelopment plans. The effort is steered by a Focus Group of statewide experts on planning for sea level rise adaptation as well as stakeholders in coastal areas.

State Agencies are not the only organizations involved in sea level rise adaptation planning. A number of Florida local governments have also recently engaged in planning for the potential impacts of sea level rise. Some notable efforts include the Southeast Florida Regional Climate Compact's Unified Sea Level Rise Projection, Broward County's adoption of amendments to their comprehensive plan as well as incorporation of sea level rise into their Local Mitigation Strategy, and municipal level efforts to address adaptation in both the City of Punta Gorda and the City of Satellite Beach. However, this list is by no means exhaustive. Many communities across the state have recognized the potential impacts of sea level rise and have begun to consider its potential impacts in both short range and long range planning efforts.

Hazard mitigation planning represents a key piece of the puzzle in adapting to the potential impacts of sea level rise because it includes risk assessments and recommends mitigation actions. Many adaptation projects fit well within the criteria to be included within a Local Mitigation Strategy as recommended strategies and actions and are eligible for mitigation funding programs. Additionally, many of the vulnerabilities already surveyed in existing Local Mitigation Strategies may be influenced by sea level rise. Thus, because it includes risk assessments and recommends mitigation actions, the Local Mitigation Strategy is a fitting planning process for facilitating sea level rise adaptation at the local level.

1.3 Purpose of Guidebook

This guidebook is a tool for local governments to use in updating their local hazard mitigation plan to include risk analyses and adaptation strategies related to sea level rise. It describes the process by which a local government could choose to integrate sea level rise into their hazard vulnerability assessment and provides an array of strategies and useful tools for sea level rise adaptation into the Local Mitigation Strategy update cycle. As a tool for local action, this guidebook is intended to serve staff and officials involved in guiding updates to Local Mitigation Strategies. Varying by location and government need, relevant users may include county level staff, contracted consultants, regional planning councils, and any sea level rise adaptation workgroups or committees involved in local level adaptation planning. At each step of the way we attempt to deliver useful guidance and helpful examples for communities to use when making decisions about planning for the future.

1.4 How to use this Guidebook

This guidebook includes four sections:

1. The Introduction section explains the purpose of the guidebook while also providing key contextual and background information.
2. The Integration Process section is of greatest importance to local planners engaged in updating the Local Mitigation Strategy. The integration process section follows the general outline of the

requirements for a Local Mitigation Strategy as defined by the Code of Federal Regulations from 44 CFR §201.6(a)(4) to 44 CFR §201.6(c)(4). Throughout this second section, readers will find details of how integrating sea level rise into the Local Mitigation Strategy fits in with each of the requirements of the Code of Federal Regulations. When possible, examples from three different Florida counties will be provided to describe their integration of sea level rise into their Local Mitigation Strategies. The examples are derived from Broward County's Local Mitigation Strategy (2012), and the proposed amendments to Brevard County (2014) and Palm Beach County's Local Mitigation Strategies (2014). It is worth nothing that while references to Broward County are in reference to their most recent plan update that has already undergone approval, the references made to Brevard and Palm Beach County are referring to proposed language for the plan updates they are currently developing and therefore these plans may be subject to change prior to adoption.

3. Conclusion
4. Works Cited

1.5 Foundational Concepts

1.5.1 Hazard Mitigation

The Florida State Hazard Mitigation Plan defines hazard mitigation as "any action taken to reduce or eliminate long-term risk to human life and property from man-made or natural hazards" (2013). Hazard mitigation is not an impediment to the growth of a community; it is simply the process by which communities ensure their present and future growth takes a sustainable form. Incorporating proactive hazard mitigation planning into development practices and regulatory regimes results in the creation of safer and more sustainable communities. According to Florida's State Hazard Mitigation Plan (2013), hazard mitigation has the following benefits:

- Saving lives and protecting public health;
- Preventing or minimizing property damage;
- Minimizing social dislocation and stress;
- Reducing economic losses;
- Protecting and preserving infrastructure;
- Reducing legal liability of government and public officials;
- Less expenditures on response and recovery efforts.

1.5.2 Mitigation Planning

FEMA explains the purpose of mitigation planning as identifying local policies and actions that can be implemented over the long term to reduce risk and future losses from hazards. Mitigation planning is most effective when it is based on a comprehensive, long-term plan developed prior to a disaster. Through the mitigation planning process, the policies and actions identified are generally based on an assessment of hazards, vulnerabilities, and risks conducted by a wide range of stakeholders with public participation throughout the process. (FEMA, 2013)

1.5.3 Local Mitigation Strategy (LMS)

A Local Mitigation Strategy is “a plan developed by the county to reduce and or eliminate the risks associated with natural and man-made hazards” (Florida Division of Emergency Management, 2014). The Local Mitigation Strategy serves as a connection between the local government comprehensive plan, the county emergency management plan, the capital improvements plan, land development regulations, building codes, and key ordinances such as those for floodplain management. Local Mitigation Strategies are coordinated through appropriate state, local, and regional agencies, as well as non-governmental interest groups.

1.5.4 Resiliency

Resiliency is the capacity of social-ecological systems to absorb recurrent disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change (Adger et al., 2005; IPCC, 2007). Resiliency demands not only understanding the risks and potential events that may cause disruption of local processes, but also the development of local capacity to meet challenges faced in the future.

1.5.5 Adaptation

Adaptation to sea level rise is the steps a community takes to become more resilient to the potential impacts of sea level rise over a given period of time. The actions a community may take to mitigate vulnerability to flooding hazards are similar to those a community may take to adapt to sea level rise. The main difference is that adaptation to sea level rise considers a longer timeframe for impact and therefore a longer timeframe for potential increased vulnerability and implementation. Adaptation to sea level rise may also assume an increase in vulnerability of areas subject to hazards such as coastal flooding and therefore proposed adaptation projects take into account increased long-term vulnerability.

The three main strategies a community may use to adapt to sea level rise are:

1. Protection - Protection strategies involve "hard" and "soft" structurally defensive measures to mitigate the impacts of rising seas, such as shoreline armoring or beach renourishment, in order to decrease vulnerability yet allow structures and infrastructure in the area to remain unaltered.

Protection strategies may be targeted for areas of a community that are location-dependent and cannot be significantly changed structurally (i.e., downtown centers, areas of historical significance, water-dependent uses, etc.).

2. Accommodation - Accommodation strategies do not act as a barrier, but rather alter the design through measures such as structural elevation of buildings or stormwater improvements, to allow structures or infrastructure systems to stay in place. Adaptation measures do not prevent flooding or inundation of the property but do protect the structure from flood forces and water damage. Accommodation strategies may be suitable for location-dependent structures that could be altered to accommodate water, without compromising the use (i.e., bridge elevation, residential home elevation, downtown stormwater improvements, etc.).

3. Retreat - Retreat strategies involve the relocation of development from areas of high risk to areas of lower risk and the potential prevention of future development in these high risk areas. Retreat options usually involve the acquisition of vulnerable land for public ownership, but may also include other strategies such as transfer of development rights, purchase of development rights, rolling easements, conservation easements, etc.

2.0 Integration Process

2.1 Formation of the Planning Team

One of the first tasks during the planning process is the formation of the planning team. According to FEMA's Local Mitigation Planning Handbook, members of the planning team should have the expertise to develop the plan, and their organizations should have the authority to implement the mitigation strategy developed through the planning process. The planning team is "the core group of people responsible for developing and reviewing drafts of the plan, creating the mitigation strategy, and submitting the final plan for local adoption (2013, pp. 2-1). FEMA's Local Mitigation Planning Handbook provides advice on general formation of the planning team and recommends that identifying team members should begin with reconvening the team from past Local Mitigation Strategy updates. The general planning team should likely consist of relevant staff decision leaders, a handful of scientific and/or academic members with technical expertise, representatives from interested community groups or environmental organizations, and elected official support, if possible. The process of integrating sea level rise into the Local Mitigation Strategy may require additional members, not part of the past planning team, to join the team in order to provide expertise. Some of the planning team members you may wish to include may come from specific groups, task forces, organizations, or others who are actively involved in sea level rise adaptation.

In addition to choosing team members with expertise in sea level rise vulnerability analysis and adaptation, the integration of the team members within the planning team structure will need to be determined. This can be done in a variety of ways and each community may decide a different method that works best with their existing team structure. One example of a method of team organization is creating a sea level rise technical team, task force, revisions committee, or other identified subgroup dedicated to incorporating sea level rise research and adaptation strategies in the plan. This subgroup can be charged with leading the inclusion of sea level rise considerations to future vulnerability and potential adaptation strategies. As an example, in the latest Local Mitigation Strategy update (2013-2014), Palm Beach County established a revisions committee that looked at data from sources that discussed sea level rise in order to incorporate this information into the Local Mitigation Strategy (Kelvin Bledsoe, personal communication, August 26, 2014).

Creating a specific sea level rise subgroup is not the only way to accomplish the integration of sea level rise into a Local Mitigation Strategy, although it is certainly one method of doing so. For example, even though Palm Beach County established a revisions committee to look at sea level rise data, they did not establish a technical team (Bledsoe, 2014). Instead, they hosted specific meetings with the entire planning team to incorporate sea level rise issues in addition to sending one planning team member to a meeting of the Southeast Florida Regional Climate Compact to gather additional data (Bledsoe, 2014).

Overall, how the decision to integrate potential future vulnerability to sea level rise into the Local Mitigation Strategy will impact the formation of the planning team will largely depend on who is already

on the planning team (and what their expertise may be regarding sea level rise) and how the team is already organized. Generally it will be important to identify who is responsible for collecting data and information on sea level rise at the beginning of the planning process in addition to establishing how these identified team members will work together and with others throughout the process.

2.1.1. Considerations for Multi-jurisdictional Plans (44 CFR § 201.6(a)(4))

> *44 CFR § 201.6(a)(4)*
> *Multi-jurisdictional plans (e.g. watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.*

In forming the planning team, it is important to consider the each of the jurisdiction within the county so that respective local representatives can be actively involved in the planning process. The planning team must make sure to reach out to all local governments within the county to invite them to participate in the process. At the end of the planning process, it will also be important to continue to work with each jurisdiction to assure that they officially adopt the plan following the strategies laid out in 44 CFR §201.6(c)(5).

2.2 Planning Process (44 CFR § 201.6(b))

The Code of Federal Regulations 44 CFR §201.6 (b) stresses the importance of an open public involvement process for the development of an effective plan. This part of the code provides the requirements for the planning process that are part of a comprehensive approach to reducing the effects of natural disasters including the requirements for public comment, the requirement to provide a variety of stakeholders the ability to be involved in the planning process, and the requirement to review and incorporate information from existing documents. Integrating sea level rise into the Local Mitigation Strategy may benefit from considering these requirements from the Code of Federal Regulations.

2.2.1 Public Involvement - Public Comment Period (44 CFR § 201.6(b)(1))

> *44 CFR § 201.6(b)*
> *The planning process shall include:*
> *(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*

Outside of designated task force members, it is important to consider that members of the public may be able to make valuable contributions for integrating future vulnerability and adaptation. 44 CFR § 201.6(b)(1) states that the planning process shall include "[a]n opportunity for the public to comment on the plan during the drafting stage and prior to plan approval." As this requirement has been in existence for a while, previous Local Mitigation Strategy updates likely established a methodology for accepting public comments during the planning process. The planning team may opt to utilize this same methodology or improve upon it with this Local Mitigation Strategy update. For example, with the current Palm Beach County Local Mitigation Strategy update, the county opted to use the same methodology to collect public comments as the 2009 plan update. However, with this plan update they took advantage of the advancement of social media, which allowed Palm Beach County to provide the public with quicker access to the plan from new sources such as Twitter and Facebook (Bledsoe, 2014).

The integration of sea level rise into the Local Mitigation Strategy may or may not change how the team decides to take public comment. The team may decide that due to this integration, additional time is necessary for public comment or they may decide that the methodology of collecting public comment may not need to change at all.

2.2.2 Involvement by Local, State and Regional Stakeholders (44 CFR § 201.6(b)(2))

> *44 CFR § 201.6(b)*
> *The planning process shall include:*
> *(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process;*

By law, it is required that the planning process provides an opportunity for a variety of agencies, organizations, businesses, and people to participate in the planning process. This requirement may be

extended to encourage the involvement of parties interested in sea level rise to participate in the planning process. When incorporating sea level rise into the Local Mitigation Strategy, it can be beneficial to reach out to discover who in and around the county is actively engaged in adaptation activities. In some cases, task forces or groups may already exist within the community that work on assessing sea level rise vulnerability and/or proposing adaptation policies to address these potential vulnerabilities. When these groups exist, they can be an excellent resources for information to incorporate into the Local Mitigation Strategy. Working with these groups can help to enhance the cohesion of planning for sea level rise in the county as well as promote consistency across planning documents.

As an example of how Florida Counties have engaged with local groups to incorporate sea level rise considerations into their local mitigation plans, one can look at both Broward County and Palm Beach County. Both of these counties are part of the Southeast Florida Regional Climate Compact, a group which works to foster community resilience. In addition to reviewing Compact documents, Palm Beach County actively engaged with members of the compact during the Local Mitigation Strategy planning process. Palm Beach County sent one of their Local Mitigation Strategy steering committee members to a Southeast Florida Regional Climate Compact workshop/meeting to bring back the latest data from the Compact to incorporate into their proposed language for their update to their Local Mitigation Strategy (Bledsoe, 2014). Broward County is actively engaged in trying to reduce their risk to potential sea level rise and, as such, has created multiple groups, task forces, and plans. One example of how Broward County engaged with these groups is their inclusion of representatives from these pre-established groups during the plan review process. For instance, the Broward County Climate Change Task Force reviewed the Local Mitigation Strategy vulnerability assessment for flood risks based on sea level rise and also provided comment on listed mitigation actions to assure consistency with task force efforts (Broward County, 2012).

2.2.3 Review and Incorporation of Existing Resources (44 CFR § 201.6(b)(3))

> *44 CFR § 201.6(b)*
> *The planning process shall include:*
> *(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

2.2.3.1 Existing Plans, Studies, and Reports

While involving outside partners and stakeholders is vital in the planning process, it is also important to identify existing plans, studies, reports, and technical information that may be of assistance in developing the Local Mitigation Strategy. Incorporating sea level rise into the Local Mitigation Strategy

requires identifying existing data on the vulnerability of the region to sea level rise and identifying any existing plans and policies that address adaptation to sea level rise. In choosing what documents may be beneficial to review, the planning team may consider documents that address differing spatial scales. For instance, your planning team may find benefit in reviewing documents that contain more generalized information on sea level rise science and resulting potential vulnerability such as the 2014 National Climate Assessment's chapter on sea level rise. Although documents that are larger scale in nature may not address the county's vulnerability specifically, they do have the ability to provide valuable information, especially in regards to general descriptions of how sea level rise may impact various hazards.

Aside from documents with information on a larger spatial scale, the planning team should consider reviewing local and regional plans, studies, and reports addressing sea level rise especially those that have been formally adopted by the county and/or jurisdictions within the county. In reviewing local documents, counties should look for data that can assist with the risk assessment portion of the Local Mitigation Strategy along with goals, actions, and policies that have been adopted or suggested by planning documents, reports, statutes, and studies. Reviewing other local plans is very important as it allows for consistency across the different planning mechanisms and will also assist in integrating mitigation strategies from the Local Mitigation Strategy into other plans upon completion of the update.

Broward, Brevard, and Palm Beach Counties all reviewed local and regional plans and documents in order to accumulate information on sea level rise for their Local Mitigation Strategy updates. Broward County consulted local and regional documents to find information for the risk assessment portions of their mitigation strategy. Some of these documents reviewed by Broward County for incorporation into their Enhanced Local Mitigation Strategy included: Broward County's Climate Action Plan (2010), the Southeast Florida Regional Compact Climate Change Plan (2012), and the South Florida Water Management District external report on the projected Climate and Sea Level Trends (2011) along with other documents (Broward County, 2014). Brevard County reviewed documents from the Environmental Protection Agency, Brevard County property appraiser documents, and the City of Satellite Beach's study on sea level rise (Deborah Coles, personal communication, August 26, 2014). The Satellite Beach study is directly referenced in the text of the proposed language and the results of the study are discussed with potential implications for the rest of the county (Brevard County, 2014). Finally, Palm Beach County used a variety of local and regional documents to access their vulnerability within their proposed Local Mitigation Strategy update. Some of the documents include Palm Beach County's *Overview Analysis of the Vulnerability of Southeast Florida to Sea Level Rise, South Florida Regional Climate Change Compact Inundation, Mapping and Vulnerability Assessment Work Group, April 2011* and the results of an a DEO Statewide Post-Disaster Redevelopment Planning initiative (Phase V) which worked to analyze sea level rise integration utilizing Palm Beach County as a pilot study (Palm Beach County, 2014).

2.2.3.2 Existing Tools and Other Resources

Identifying tools that help to assess vulnerability can be helpful in integrating considerations of sea level rise into the risk assessment. There are a wide variety of tools in existence meant to assist in the climate-adaptation process that include features which address potential future vulnerability to sea level rise. There are two different resources that provide descriptions of some of the different tools available: a guidebook and a matrix. The 2013 guidebook entitled *Tools for Coastal Climate Adaptation Planning- a Guide for Selecting Tools to Assist with Ecosystem-Based Climate Planning* was released by The Ecosystem-Based Management Tools Network coordinated by NatureServe. This guidebook includes descriptions of software and web-based application tools for visualization, modeling, and decision support. The guidebook provides a description of each tool, a description of applicable sector usage, examples of past uses of each tool, and the link to each tool. Tools described in the guidebook include the following:

- CanVis, Digital Coast: Sea Level Rise and Coastal Flooding Impacts Viewer;
- The Social Vulnerability Index (SoVI);
- HAZUS-MH;
- Open-Source Nonpoint Source Pollution and Erosion Comparison Tool (OpenNSPECT);
- Sea Level Affecting Marshes Model (SLAMM);
- Integrated Valuation of Environmental Services and Tradeoffs (INVEST);
- NatureServe Climate Change Vulnerability Index (CCVI);
- CommunityViz; and,
- NatureServe Vista.

Another resource for discovering tools is the matrix *Tools for Climate Change Adaptation Planning* published by the U.S. Fish and Wildlife Service National Conservation Training Center. This matrix describes tools, compares their complexity and their prices, describes additional software needed, and provides a link to each tool. Some of the tools described that may be helpful for adaptation planning in Florida include tools listed in the before mentioned 2013 guidebook (NOAA Digital Coast, HAZUS-MH, SLAMM, CommunityViz, CanVis, SoVI, and NatureServe Vista) in addition to:

- Adaptation Database for Planning Tool (ADAPT);
- Community-based Risk Screening Tool (CRiSTAL);
- Climate Wizard (by the Nature Conservancy);
- Land Use Portfolio Model (by U.S.G.S.);
- SimCLIM;
- SLAMM Viewer;
- Google Mashups; and,
- CAKE (Climate Adaptation Knowledge Exchange).

In looking at the descriptions provided by the matrix and guidebook resources, the planning team can compare some of the various tools available and decide which ones best serve the goals and capacities of the team. It is also important to note that these two resources are not a comprehensive list of all tools available and that not all tools listed are for sea level rise adaptation specifically. For instance, neither resource includes the Surging Seas tool by Climate Central or the Coastal Adaptation to Sea Level Rise Tool (COAST), both of which may also be helpful in assessing risk to sea level rise.

2.3 Plan Content (44 CFR § 201.6(c))

> 44 CFR § 201.6(c) *Plan content.*
> The plan shall include the following:
> (1) Documentation of the *planning process* used to develop the plan, including how it was prepared, who was involved in the process, and how the public was

2.3.1 Documentation (44 CFR § 201.6(c)(1))

Documentation of the planning process is essential for meeting the requirements set by the Code of Federal Regulations. The Local Mitigation Strategy Working Group, or whoever is in charge of the planning process, likely already has a methodology for assuring the documentation of the planning process. The changes made throughout the planning process as a result of efforts to integrate considerations of potential future vulnerability due to sea level rise into the Local Mitigation Strategy, whether they be the creation of a new subgroup, the involvement of new organizations, or additional public meetings and comment periods, may be able to be recorded as part of this previously established methodology. In the documentation that is included in the Local Mitigation Strategy, a community may choose to integrate a description of sea level rise adaptation planning throughout the entire chapter or dedicate a subsection to describe the planning process as it related to sea level rise considerations. How to incorporate adaptation into the plan will largely depend on the planning process itself and whether it was almost its own standalone process or if it was heavily integrated within the normal structured Local Mitigation Strategy planning process.

2.3.2 Risk Assessment (44 CFR § 201.6(c)(2))

The risk assessment is a large part of a Local Mitigation Strategy and is performed to determine the potential impacts of hazards to the people, economy, and built and natural environments of a community (FEMA, 2013). The risk assessment is used as a basis for the planning of hazard mitigation strategies which focus on reducing risk to the identified hazards in the risk assessment. Incorporating sea level rise into the risk assessment requires systematically determining how sea level rise may impact the vulnerability to hazards already identified in the Local Mitigation Strategy in addition to identifying and profiling sea level

rise as its own hazard. There are three requirements of a risk assessment identified by the Code of Federal Regulations; however, some jurisdictions may opt to include more information than the requirements. The requirements and the integration of sea level rise into these requirements are described in subsections 2.3.2.1 through 2.3.2.3 below.

2.3.2.1 Description of Hazards (44 CFR § 201.6(c)(2)(i))

> *44 CFR § 201.6(c)*
> *(2)…The risk assessment shall include:*
> *(i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.*

The first step in integrating sea level rise into the hazard profiles is to decide how sea level rise will be profiled within the risk assessment section. Sea level rise is both its own hazard and it also has the potential to alter other hazards such as flooding, hurricanes (storm surge), coastal erosion, and potentially others. When integrating sea level rise into the Local Mitigation Strategy, the team must consider whether sea level rise will simply be profiled as its own hazard or whether they also wish to include amendments to other hazards' profiles on how sea level rise will alter future vulnerability to those hazards. When integrating sea level rise considerations into other hazards' risk assessment profiles, some communities may approach this in different ways. Some communities may opt to include language throughout the entire hazard profile on sea level rise while others may want to include it under a subsection on future vulnerability. Other communities opt to create an entirely new subsection under the hazard profile to include all discussions on sea level rise. Where and how sea level rise is integrated into the Local Mitigation Strategy's risk assessment will depend much upon what is discussed during the planning process and how the risk assessment update is formatted.

When providing the description of hazards (type, location, and extent), Broward County, Palm Beach County, and Brevard County all choose to create an individual hazard profile for sea level rise. When an individual profile for sea level rise is created, it is likely best to try to follow nearly the same format as all other hazard profiles. Both Brevard County and Palm Beach County profiled sea level rise as its own hazard in the risk assessment utilizing limited subsections and a lot of information and references containing the results of existing studies. Brevard County first describes what sea level rise is, provides information from an Environmental Protection Agency report on the expected extent of sea level rise at a national level, and then describes the potential local extent of sea level rise by describing the City of Satellite Beach's study findings. Following this description of the hazard, Brevard County provided a vulnerability assessment within the hazard profile which is described in section 2.3.2.2 (see below; Description of Vulnerability).

Palm Beach County used a similar format to Brevard County by limiting the number of subsections in the hazard profile and providing a lot of details on the local risk associated with sea level rise. Within this profile, Palm Beach County characterizes their vulnerability to coastal and beach erosion as moderate then provides the results of the county's vulnerability assessment "Overview Analysis of the Vulnerability of Southeast Florida to Sea Level Rise, South Florida Regional Climate Change Compact Inundation, Mapping and Vulnerability Assessment Work Group, April 2011." Following this description, Palm Beach County further describes the extent of the hazard through providing a description of how sea level rise will impact other hazards within the plan with references to those hazards' sections. (Brevard County, 2014; Palm Beach County, 2014).

Broward County took a different approach to integrating sea level rise into the risk assessment of their Local Mitigation Strategy by both profiling sea level rise as its own hazard and by integrating it into the hazard profiles of other hazards listed in the risk assessment including hurricane wind, storm surge, coastal erosion, and flooding. Broward County's hazard profiles include the following subsections:

- Background,
- Location and Spatial Extent
- Historical Occurrences
- Probability and Extent of Future Occurrences
- Vulnerability Assessment

All of these subsections under each hazard profile, sans the vulnerability assessment subsection, work together to meet the requirements of 44 CFR §201.6(c)(2)(i). In the hazard profile "Sea Level Rise/ Climate Change", Broward County utilized the same subsections as other hazard profiles to maintain consistency. The 'Background' subsection includes general information on the hazard and localized information with references to the results of local studies, articles, and reports. The 'Location and Spatial Extent' subsection details the work of the Southeast Florida Regional Climate Compact with Broward County's Climate Change Task Force and the South Florida Water Management District (SFWMD). It provides sea level rise projections for 1, 2, and 3 foot rises for the county and references maps found in the vulnerability assessment. 'Historical Occurrences', like the other subsections, references an external report by the SFWMD explaining their conclusion that 5.5 inches of sea level rise has occurred between 1950 and 2010. Finally, the 'Probability and Extent of Future Occurrences' subsection categorizes the probability of future sea level rise events in Broward County as "likely" and references external reports to back up this conclusion. Additionally, it discusses the uncertainties of how much sea level rise may be anticipated in the coming years. (Broward County, 2012)

In regards to how Broward County incorporated the potential increases in vulnerability due to sea level rise in other hazard profiles, they choose to create a new subsection in each of these hazard profiles. The subsection is titled "Future Risk Conditions Influencing {insert hazard name}" which includes the

influences of potential sea level rise on each hazard. As an example, the language from "Future Risk Conditions Influencing Flood" is provided below.

> *Future Risk Conditions Influencing Flood*
>
> *The impacts of climate change and the attendant sea level rise will have considerable impact on future flood conditions. While the impacts of sea level rise are discussed in greater detail in a subsection dedicated to this subject in Section 4, the following results … sea level rise, as documented by the 2011 SFWMD report, will impact flooding in Broward County:*
>
> - *Inundation of coastal properties by higher sea level;*
> - *Higher storm surge levels;*
> - *Higher sea levels limit the ability of coastal drainage systems to outfall inland stormwater runoff into marine systems thus exacerbating flooding and reducing the effectiveness of the larger drainage system*
>
> *In conclusion, the impacts of climate change, global warming, and sea level rise will likely exacerbate the severity and duration of floods, both ones caused by tropical cyclones and ones not caused by these storms. For more information about climate change, refer to the "Sea Level Rise/Climate Change part of this section (starting p.138) and the Economic Hot Spot Profiles of Chapter 5." (Broward County, 2012, p.119-120)*

2.3.2.2 Description of Vulnerability (44 CFR § 201.6(c)(2)(ii))

> *44 CFR § 201.6(c)*
> *The risk assessment shall include:*
> *(ii) A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:*
> *(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;*
> *(B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate;*
> *(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*

The description of vulnerability often takes the form of a vulnerability or risk analysis. A vulnerability analysis involves identifying assets, describing potential impacts, and estimating the losses for each identified hazard (FEMA, 2013, p. 5-13). The purpose of describing the vulnerability of the county (and the jurisdictions within the county) is to help the community understand what hazards pose the greatest risks to the county. The description of vulnerability to hazards is usually included in the hazard profiles of the risk assessment following or combined within the description of the hazard's type, location, and extent. Some counties may also opt to include parts of this vulnerability assessment in other chapters of the Local Mitigation Plan in addition to within the risk assessment chapter itself.

The analysis of risk to sea level rise necessitates identification of community assets that may be vulnerable to sea level rise and to hazards influenced by sea level rise. The identification of community assets is detailed in FEMA's Local Mitigation Planning Handbook (2013) and describes how communities might identify community assets such as people, economic assets, built environment assets (including existing structures, infrastructure, critical facilities, cultural resources, and future development), and natural environment assets. The analysis of the risk of these assets to sea level rise, and to hazards potentially influenced by sea level rise, can be presented in the Local Mitigation Strategy quantitatively and/or qualitatively. According to FEMA's handbook, "Qualitative evaluations describe the types of

impacts that might occur during a hazard event. The planning team, subject matter experts, stakeholders, and community members can conduct qualitative evaluations by brainstorming and discussing potential impacts. Quantitative evaluations assign values and measure the potential losses to the assets at risk" (2013, p. 59).

Palm Beach and Brevard Counties followed a similar methodology of including a lot of qualitative discussion on the vulnerability of the county to the potential impacts of rising sea levels. This discussion was integrated with the hazard description of location and extent. Both counties also included other methodologies of describing vulnerability. Palm Beach County opted to reference a map which shows Palm Beach County's vulnerability to two feet of sea level rise. Within the risk assessment's description of vulnerability, Palm Beach County opted to interpret the map and what it means for the vulnerability of different areas of the county. Brevard County also included a thematic map titled "Sea Level Rise Zones," which includes a display of "sea level rise risk" categorized by the following zones: Protection reasonably likely, protection almost certain, protection unlikely, no protection, wetlands/submerged. In addition to the map, Brevard County also included three tables with quantitative data based upon analysis of the map, which contains a parcel detail summary, a financial exposure summary, and a future land use summary. The parcel detail summary describes the number of parcels in each 'sea level rise zone' of the map, whether they are built-out or vacant, and the age of existing primary structures. The financial exposure summary looks at the parcels in these zones and assesses the amount of land value, building value, assessed value, taxable value, and property value per acre in each of the map zones. The future land use summary analyzes the number of parcels of each land use type in each of the sea level rise zones.

Broward County integrated assessments of vulnerability within their risk assessment and in other chapters of their plan using both qualitative and quantitative methods. Similar to Brevard County, the vulnerability assessment of Broward County included qualitative discussion, maps, and tables. The vulnerability assessment of Broward County focuses on the results from Southeast Florida Regional Compact Climate Change's "Analysis of the Vulnerability of Southeast Florida to Sea Level Rise" draft document from April 2011. The discussion focuses on how different scenarios of potential sea level rise impact the vulnerability of the county. The scenarios used are 1, 2, and 3 feet of rise. There are three thematic maps corresponding to each of these scenarios which show where inundation is "possible" and "more likely" for each scenario in the county. The quantitative data shown in the four tables includes a loss estimation table (representative of losses for all three scenarios) and three separate tables for impacts on different types of land use under the three different scenarios. Tables 4.32, the Loss Estimation of Broward Commercial Properties, and table 4.33, the Impact of Sea Level Rise on Different Types of Land use at a 1 foot scenario, are found below.

In addition to the vulnerability assessment included under the hazard profile "Sea Level Rise/ Climate Change," Broward County also included considerations of future vulnerability to sea level rise in their chapter on economic vulnerability which is separate from their risk assessment. This section details how

storm surge and sea level rise of 1 foot (identified by the county as the most probable and most immediate of all scenarios) impact identified economic hot spots within the county. (Broward County, 2012)

Table 4.32: Loss Estimation of Broward Commercial Properties for 3 Sea Level Rise Scenarios

Level of Inundation	Range of Taxable Value for Vulnerable Properties	Approximate Level of Damages*
1 Foot	$403,069,831 - $828,221,856	$52,865,347
2 Foot	$1,751,104,870 - $3,779,685,458	$187,431,683
3 Foot	$6,900,509,868 - $12,109,037,156	$595,936,634

Source: Broward Chapter of Final Regional Compact Vulnerability Report April 2011

Table 4.33: Impact of Sea Level Rise on different types of land use at 1 foot scenario

Land Use	More Likely (acres)	Possible (acres)	Total Inundation (acres)	Total Coverage (acres)	Percent Inundation of that Land Use
Conservation Land/ Open Space & Recreation*	1,172.78	285.86	1,458.64	20,703.96	7.0 %
Commercial/Industrial**	329.12	185.99	515.11	49,010.83	1.1 %
Residential***	689.02	461.21	1150.23	140,441.55	0.8%
Utilities / Transportation****	318.76	225.04	543.80	58,968.14	0.9%
Agricultural / Rural*****	9.07	55.57	64.64	44,382.94	0.1%

Source: Broward Chapter of Final Regional Compact Vulnerability Report April 2011

(Broward County, 2012, pg. 144)

2.3.2.3 Multi-Jurisdictional Plan Considerations for Risk Assessments (44 CFR § 201.6(c)(2)(iii))

> *44 CFR § 201.6(c)(2)(iii)*
>
> *For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.*

As every Local Mitigation Strategy in Florida is a multi-jurisdictional plan, it is important to consider how different jurisdiction's risks may vary from those facing the entire planning area. In regards to sea level rise, jurisdictions along the coast may have an increased level of risk compared to many inland communities. As such, it is important to note this potential increased risk throughout the risk assessment section. This can be done qualitatively and integrated throughout the risk assessment, through a map that shows sea level rise scenarios and jurisdictions, through tables of quantitative data broken down by jurisdiction, or your planning team may opt to include a separate section identifying each jurisdiction most at risk.

Palm Beach County opted to describe the varying risk of different jurisdictions within their risk assessment through a qualitative description. For instance, part of their proposed language states "The map illustrates isolated area below sea level and areas inundated with 2 feet sea level rise. Areas within [Palm Beach County] that may be most problematic consist of those already below sea level. Cities in the northern portions of the County that are most inundated include Juno Beach, and the coastal areas of North Palm Beach and Palm Beach" (working language) (Palm Beach County, 2014). As another example, in their Enhanced Local Mitigation Strategy, Broward County showed more specifics on the potential impacts of sea level rise through their analysis of economic hot spots as these included maps of areas of concern at a larger spatial scale (i.e., more detailed) than the county and analyzed the risk of these areas using maps and quantitative output tables (Broward County, 2012).

2.3.2.4 Summary of Risk Assessment

In looking at how Broward County incorporated sea level rise considerations into their Enhanced Local Mitigation Strategy and some of the proposed amendments to the Local Mitigation Strategies of Brevard and Palm Beach Counties, it is evident that there are many different methodologies for incorporating sea level rise into local plans. It is important to note how sea level rise can be profiled as its own hazard and as an occurrence that increases a county's vulnerability to other hazards. Communities that are considering incorporating sea level rise adaptation into their Local Mitigation Strategy may want to consider all the possible ways that sea level rise may influence hazards and thus future vulnerability. It

will be up to individual communities to consider how they can incorporate sea level rise into other hazard profiles, should they so choose, whether it be through adding an additional subsection to the profile, inserting it within the general discussion of future vulnerability, or some other method. It is worth noting that it may also be difficult to incorporate certain aspects of sea level rise into certain parts of a Local Mitigation Strategy. For example, the desire, the tools, or capacity to use the tools may not exist to provide an estimate of the potential dollar losses of the number of critical facilities that may be impacted by a potential increase in storm surge exacerbated by sea level rise. However, it may certainly be possible to determine how many critical facilities are susceptible at different projected levels of sea level rise without considering storm surge. As sea level rise lends itself to an ability to provide more information across the multiple parts of a hazard profile, communities may wish to at least consider identifying sea level rise as its own hazard so that it can be profiled to the greatest extent possible (i.e. with scenario mapping and vulnerability analysis). Overall, the planners working on the Local Mitigation Strategy will have to recognize which aspects of the risk assessment lend themselves to inclusion of sea level rise and which aspects may need to wait until technology improves or scientific uncertainly is lowered.

2.3.3 Mitigation Strategy (44 CFR § 201.6(c)(3))

The mitigation strategy is the "heart" of the Local Mitigation Strategy as it is the blueprint for how communities will reduce potential losses identified through the risk assessment (FEMA, 2013). There are three major required parts to the mitigation strategy:

- Goals;
- A list of specific mitigation actions and projects;
- Action plan describing how the actions identified will be prioritized, implemented, and administered.

2.3.3.1 Goals (44 CFR § 201.6(c)(3)(i))

> *44 CFR § 201.6(c)(3)*
> *This section shall include:*
> *(i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Mitigation goals are guidelines explaining what a community wants to achieve through the mitigation plan. According to FEMA (2013), "they are usually broad policy-type statements that are long-term, and they represent visions for reducing or avoiding losses from identified hazards." Goals are generally not

measurable. Sometimes, communities may opt to create objectives under the goals that are measurable but still not as specific as actions, though these are not required.

When incorporating sea level rise into the mitigation strategy section, the first consideration will normally be the establishment of goals as they relate to adapting to future vulnerability. As goals are broad in nature and different communities handle establishing goals different ways, how potential increases in vulnerability due to sea level rise is addressed in goals may be accomplished in many different ways. How this integration takes place will mostly depend on the, goals and objectives if applicable, already in the plan. Some counties may decide that the existing goals (and objectives), are broad enough to encompass sea level rise considerations. Other communities may want to create one or more goals and/or objectives that directly relate to sea level rise adaptation. As an example, Broward County's Enhanced Local Mitigation Strategy includes a total of seven goals. However, the county also incorporates varying numbers of objectives under each of these goals. When integrating sea level rise considerations into their goals and related objectives, Broward County adopted two objectives – one under Goal #2 and one under Goal #6. The language of Broward County's goals and objectives related to sea level rise can be found below.

> ***"Goal #2 – To increase business, residential, and community awareness and implementation of hazard mitigation."***
> *Objective "2.7 Create and maintain a list of highly successful sea level rise adaptation projects to showcase best practices utilized in the South Florida region."*
>
> ***"Goal #6 – Develop and enhance regional mitigation efforts"***
> *Objective "6.1 Coordinate with other government agencies to develop regional mitigation efforts to include a variety of current hurricane events and potential future sea level rise threats."*
> *(Broward County, 2012, p. 280-281)*

At this time, there is not a standardized approach for incorporating sea level rise-specific language into goals, and/or objectives, and communities will have to discuss what they wish to get out of sea level rise adaptation and how in depth they wish to go. Part of this discussion may consider how sea level rise adaptation has already been addressed in the community. When working towards creating goals, FEMA recommends considering the findings of your risk assessment, common themes from outreach and planning team meetings, the goals of the State Hazard Mitigation Plan, and other community goals from existing plans and policy documents. Considering community goals from existing plans and policy documents that relate to sea level rise may be able to help shape the goals and/or objectives included in the mitigation plan while allowing for consistency across planning mechanisms.

2.3.3.2 Specific Actions (44 CFR § 201.6(c)(3)(ii))

> *44 CFR § 201.6(c)(3)*
> *This section shall include:*
> *(ii) A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

Following the establishment of goals, the next important step is to identify a comprehensive range of specific mitigation actions and projects for each jurisdiction within the county to reduce the effects of hazards. According to FEMA (2013), "Mitigation actions are specific projects and activities that help achieve the goals." They are specific actions, projects, activities, and processes taken to reduce or eliminate long-term risk to people and property from the impacts of hazards. Types of mitigation actions that reduce long-term vulnerability may include: local plans and regulations, structure and infrastructure projects, natural systems protection, and education and awareness programs (FEMA, 2013). This identification of action items may be assisted through first reviewing the risk assessment and identifying vulnerabilities through problem statements.

The planning team will also want to assess capabilities, to "identify gaps to be addressed and strengths to enhance through new mitigation actions." For more information on assessing capabilities, chapter 6 of the FEMA Local Mitigation Planning Handbook provides detailed information. Generally though, in regards to sea level rise adaptation, it is important to consider how existing authorities, policies, programs, and resources contribute to sea level rise adaptation and how these can be enhanced to increase resiliency and reduce potential losses.

The planning team might also want to consider that there are two ways that sea level rise adaptation might be incorporated into potential mitigation actions- through altering the project scope of proposed mitigation actions for hazards that sea level rise may impact, and the proposal of new mitigation actions that address some of the directly identified sea level rise vulnerabilities. As an example of the prior, coastal flooding may already be a major hazard for a certain low-lying municipality within the county and, as such, a proposed mitigation action may be to build a six (6) foot tall seawall along a certain part of the coastline. However, in considering future vulnerability, sea level rise may have the potential to increase the intensity of that coastal flooding a certain amount of years into the future. Consequently, the proposed mitigation action may want to consider this potential increase in vulnerability and possibly build a higher seawall (e.g., seven (7) foot; or other alternatives). Other mitigation actions the county may want to consider are

those that address assessing future risk through trying to increase understanding. For example, Broward County's list of proposed actions (projects) includes "Broward County 21st Century Hazard Mapping for Storm Surge and Sea Level Rise- Countywide" (Broward County, 2012).

2.3.3.3 Action Plan (44 CFR § 201.6(c)(3)(iii))

> *44 CFR § 201.6(c)(3)*
> *This section shall include:*
> *(iii) An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

Finally, after identifying a list of potential actions, the next step is creating an action plan that prioritizes the mitigation actions and describes how the actions will be implemented and administered. It is likely that the community already has a methodology for prioritization of action items. If they do not, or if they want to revamp their prioritization process, FEMA's Local Mitigation Handbook provides detail on how to evaluate and prioritize mitigation actions in Task 6 (see Develop a Mitigation Strategy; FEMA, 2013). How adding sea level rise in the Local Mitigation Strategy impacts the prioritization process will depend on the unique prioritization methodology utilized by each county. The planning team will need to determine whether or not the integration of sea level rise impacts the prioritization process.

Palm Beach County provides an example of how the project prioritization methodology might change when sea level rise is included in the Local Mitigation Strategy. Palm Beach County uses a scoring procedure which was first established in 1999. The overarching requirements of the scoring procedure include community benefit, community commitment, and project implementation. Under community benefit, Palm Beach County identifies a new way of earning points based on flood mitigation and/or sea level rise adaptation. The language from this proposed amendment to the Local Mitigation Strategy can be found below:

4.1.2.1 Flood Mitigation and/or Sea Level Rise – Does the proposed project or initiative mitigate against flooding and/or sea level rise?

Flood Mitigation	Points Awarded (maximum of 5)
Flood and/or Sea Level Rise Damage Reduction	5
Mapping and Regulatory	4
Flood Preparedness	3
Public Information	2
Other	1

(Palm Beach County, 2014)

It is important to note that Palm Beach County's decision to combine flood and sea level rise into one point-distributing category allows for more fairness in prioritization as inland municipalities will not be adversely impacted from not having projects that qualify under an individual sea level rise prioritization category.

After action items are prioritized, the county must also describe how they will be implemented and administered. This depends upon a community determining how to integrate the action plan into existing plans and procedures. This is described in detail in section 2.3.4.2 (see below).

2.3.3.4 Multi-jurisdictional Plan Considerations (44 CFR § 201.6(c)(3)(iv))

> *44 CFR § 201.6(c)(3)*
> *This section shall include:*
> *(iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*

Finally, one last consideration of the mitigation strategy is that every jurisdiction within the county must have identifiable action items specific to their jurisdiction when requesting FEMA approval or credit of the plan. This further enhances the need to have an inclusive planning process so that all jurisdictions

may find ways to incorporate hazard mitigation and sea level rise adaptation actions that address their level of vulnerability. Another requirement is that there is a project for every hazard. If sea level rise is listed as its own hazard, there must be a project addressing it within the mitigation strategy.

2.3.4 Plan Maintenance Process (44 CFR § 201.6(c)(4))

> *44 CFR § 201.6(c)(4)*
> *A plan maintenance process that includes:*
> *(i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

A Local Mitigation Strategy guides action over time and should be considered a living document that adapts to changing conditions, progressing actions, and new information. As such, the plan will need to be maintained and plan adjustments may become necessary to maintain the relevance of the Local Mitigation Strategy. This is especially important with sea level rise adaptation as currently there is a lot of uncertainty in the amount of rise, and therefore the amount of vulnerability. As sea level rise science and modeling progresses, counties may wish to look to these updates and incorporate them, as relevant, into their Local Mitigation Strategy.

2.3.4.1 Methods and Scheduling (44 CFR § 201.6(c)(4)(i))

This section of the mitigation plan serves the purpose of the methodology for monitoring, evaluating, and updating the plan within a five-year cycle. FEMA states that these procedures help to:

- "Ensure that the mitigation strategy is implemented according to the plan.
- Provide the foundation for an ongoing mitigation program in your community.
- Standardize long-term monitoring of hazard-related activities.
- Integrate mitigation principles into community officials' daily job responsibilities and department roles.
- Maintain momentum through continued engagement and accountability in the plan's progress." (FEMA, 2013, p. 7-1)

The planning team should consider how changes in sea level rise science during the five-year plan period may affect the Local Mitigation Strategy. There may be more available information regarding the community's vulnerability to sea level rise and associated hazards when the plan is next due to be updated. As such, the plan maintenance process needs to consider how the planning team will update the sea level rise risk assessment and associated mitigation strategies when updating the plan. These strategies may differ from how other elements of the plan are adjusted as it may involve more actions

during the planning process, such as engaging different task forces or reviewing different documents. Overall, the planning team must consider what they want to see in the next plan update regarding sea level rise adaptation. Reflecting upon the goals related to sea level rise may be a good place to start when deciding how the plan will be maintained in the future.

2.3.4.2 Incorporating Sea Level Rise Adaptation into Other Planning Mechanisms (44 CFR § 201.6(c)(4)(ii))

> *44 CFR § 201.6(c)(4)*
> *A plan maintenance process that includes:*
> *(ii) A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Incorporating a process by which local governments will integrate the Local Mitigation Strategy into other planning mechanisms is extremely important. As FEMA states, "For a community to succeed in reducing risks in the long term, the information and recommendations of the mitigation plan should be integrated throughout government operations" (FEMA, 2013, pp. 6-9). Local plans, such as the comprehensive plan, the capital improvement plan, the post-disaster redevelopment plan, the floodplain management plan, the stormwater management plan, sea level rise action/adaptation plans, sustainability plans, area plans, and other plans allow for the opportunity to incorporate hazard mitigation and climate adaptation to support community goals. Local Mitigation Strategies must describe the process of how data, analysis, and mitigation goals and actions are incorporated into these other planning mechanisms. Integrating these aspects of the Local Mitigation Strategy into existing planning mechanisms allows for more successful implementation in addition to consistency across planning mechanisms.

The first step in coming up with a planning process by which local governments can incorporate the requirements into other planning mechanisms requires identifying the existing planning mechanisms where parts of the Local Mitigation Strategy may fit into. These mechanisms will generally be those governance structures which manage local land use development and community decision making (FEMA, 2013). The planning team should already be generally aware of these planning mechanisms through the collaboration process and through the literature review conducted during the planning process which focused on collecting and reviewing sea level rise information. Overall, FEMA's Local Mitigation Handbook provides guidance in Task 6 of how to integrate the Local Mitigation Strategy into other plans, programs, and procedures. Sea level rise adaptation strategies may be unique from other hazard mitigation strategies in that the planning team may identify more or different planning mechanisms to incorporate sea level rise information and adaptation strategies into. The planning team may also find ways that sea

level rise adaptation strategies may be incorporated differently from other hazard mitigation strategies into the same planning mechanisms.

One example of incorporating sea level rise adaptation from the Local Mitigation Strategy may be through comprehensive planning. The Local Mitigation Strategy planning team, along with comprehensive planners, might identify ways to reduce vulnerability to sea level rise within the comprehensive plan's coastal management element. One way this may be done is through the adoption of Adaptation Action Areas. Florida Statutes (§163.3164) defines an Adaptation Action Area "Adaptation action area" or "adaptation area" as:

> *"[A] designation in the coastal management element of a local government's comprehensive plan which identifies one or more areas that experience coastal flooding due to extreme high tides and storm surge, and that are vulnerable to the related impacts of rising sea levels for the purpose of prioritizing funding for infrastructure needs and adaptation planning."*

Finally, one other important fact to remember is that for multi-jurisdictional plans, each participating jurisdiction must describe their individual process for integrating the Local Mitigation Strategy into their local planning mechanisms.

2.3.4.3 Continuing Public Participation (44 CFR § 201.6(c)(4)(iii))

> *44 CFR § 201.6(c)(4)*
> *A plan maintenance process that includes:*
> *(iii) Discussion on how the community will continue public participation in the plan maintenance process.*

The final part of the plan maintenance process that must be addressed within the Local Mitigation Strategy is how public participation will be continued in the plan maintenance process. This part of the plan may reflect upon how public participation was handled during this plan update and state strategies for public engagement during the upcoming plan update cycle. This part of the plan, if detailed, may also identify how the planning team will engage with sea level rise adaptation stakeholders as well.

3.0 Conclusion

Sea level rise has the potential to introduce new vulnerabilities through slow-onset inundation and through exacerbating other hazards and increasing the risk of communities to these hazards. Planning

and adapting to this increased vulnerability has the potential to better prepare a community for reducing risks to people and property. There are many ways a community may considering changes in future vulnerability in their risk assessments and through the mitigation strategy that can address these risks and allow for the implementation of sea level rise adaptation strategies. Through the choices made when integrating sea level rise into the Local Mitigation Strategy, local governments have the opportunity to implement policies that coincide with their specific risk profile, resource availability, and political will. This document has aimed to present a variety of ideas that may help inform a decision making framework that asks both "how do we include the potential change in vulnerability in our risk assessment" and "how do we adopt mitigation strategies that address the potentially increased vulnerability?" As discussed, there is no one way of incorporating these factors, however considering a process-oriented approach that aligns with the current Local Mitigation Strategy planning process can help to establish logical steps of incorporation.

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