

## Appendix F

### Adaptation (ADP) Policy Options

#### Summary List of Draft Policy Options

Option No.	ADP Policy Option	Level of Support
ADP-1	Advancing Science Data and Analysis for Climate Change	Approved
ADP-2	Comprehensive Planning	Approved
ADP-2.1	Local Government Level	Approved
ADP-2.2	Regional Government Level	Approved
ADP-2.3	State Government Level	Approved
ADP-3	Protection of Ecosystems and Biodiversity	Approved
ADP-3.1	Uplands, Freshwater and Marine Systems	Approved
ADP-3.2	Beaches and Beach Management	Approved
ADP-3.3	Species Protection	Approved
ADP-4	Water Resource Management	Approved
ADP-5	Built Environment, Infrastructure and Community Protection	Approved
ADP-5.1	Building Codes and Regulation	Approved
ADP-5.2	Flood Protection	Approved
ADP-5.3	Beaches as Infrastructure	Approved
ADP-5.4	Transportation and Other Infrastructure	Approved
ADP-6	Transportation and Other Infrastructure (moved into ADP-5)	Approved
ADP-7	Economic Development	Approved
ADP-7.1	Tourism	Approved
ADP-7.2	Other Resource-based Industries	Approved
ADP-7.2.1	Agriculture	Approved
ADP-7.2.2	Forests	Approved
ADP-7.2.3	Marine	Approved
ADP-7.2.4	Aquaculture	Approved
ADP-7.2.5	Mining	Approved
ADP-7.3	Construction	Approved
ADP-8	Insurance (Property and Casualty)	Pending
ADP-9	Emergency Preparedness and Response (Extreme Events)	Pending
ADP-10	Human Health Concerns	Pending
ADP-10.1	Health Care	Pending
ADP-10.2	Air Quality	Pending
ADP-10.3	Wastewater Treatment	Pending
ADP-10.4	Disaster Response	Pending
ADP-10.5	Medical Treatment and Biomedicine Development	Pending
ADP-11	Social Effects	Pending
ADP-11.1	Social Justice Issues	Pending

Option No.	ADP Policy Option	Level of Support
ADP-11.2	Food and Water Security	Pending
ADP-11.3	Housing	Pending
ADP-11.4	Intersection of Climate Change and Human Behavior	Pending
ADP-12	Organizing State Government for the Long Haul	Pending
ADP-13	State Funding and Financing	Pending
ADP-14	Coordinating with Other Regulatory and Standards Entities	Pending
ADP-14.1	Federal Government	Pending
ADP-14.2	Professional Societies	Pending
ADP-15	Public Education and Outreach	Pending

Note: The numbering used to denote the above pending priority policy options is for reference purposes only; it does not reflect prioritization among these important draft policy options.

Strategies in the following text with an asterisk before them have been approved by the TWG. Those without an asterisk have not been approved by the TWG.

## ADP-1. Advancing Science Data and Analysis Climate Change

### Description of Issues

Florida is one of the most vulnerable areas in the world to the consequences of climate change, especially sea level rise (SLR), and the possibility of increased hurricane activity.<sup>1</sup> Regardless of the underlying causes of climate change, glacial melting and expansion of warming oceans are causing SLR, although the extent or rate for Florida cannot be predicted with certainty. In addition, hurricane activity in the North Atlantic Basin has increased significantly in recent years, but there is controversy over whether the primary cause is global warming or natural weather cycles, making the long-term trend indeterminate at this time. Not knowing which of Florida's barrier islands, floodplains, and what portions of major cities will be inundated, or when are among the factors that make planning for adaptation to climate change difficult. However, there is sufficient information to justify implementing many adaptations. Climate change and the length of time needed to implement some adaptations further justify the need for action in spite of these uncertainties. However, in all cases, adaptation should be guided by good science.

### Objectives

Scientific data, analyses, and predictive modeling are needed to understand how Florida's climate is likely to change, the consequences of change, and possible solutions. Focusing on four key issues will help advance the science.

- Reducing uncertainty in climate projections and enhancing predictive power of climate models for Florida is critical, especially their temporal and spatial resolution. Improving models requires addressing specific Florida considerations: strong marine influence and peninsula effect; the wide climate gradient from the temperate northern region to subtropical southern region of the state; lack of long-term physical climate measurements for historical trends (although some proxies are available); huge climate variability; complicating effects of the interaction of land-use change (e.g., wetland loss); and climate change.
- Given climate modeling limitations for Florida, the current planning focus on SLR and the potential for increasing hurricane strength is appropriate. Scientific data and analyses to predict other potential effects of global warming that could affect Florida are still extremely weak. There are no data available at this time that adequately assess potential effects, such as increased drought, wildfires, flooding, and invasive species. Until models improve, appropriate risk management and adaptive management will be challenging.

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<sup>1</sup> For recent review, see Florida Atlantic University. 2008. "Florida's Resilient Coasts: A State Policy Framework for Adaptation to Climate Change." Fort Lauderdale, FL: Florida Atlantic University.

- Recognize that adaptability refers to the ability of humans to manage the resilience and capacity of the system (e.g., ecological, economic, social) to absorb the disturbance of climate change. Our science needs to address three crucial aspects of resilience: the amount of change Florida can withstand before switching over to another state or condition from which it cannot recover its former function, the ease or difficulty of making changes, and how close the current system is to a switching threshold.
- Improving our understanding of socioeconomic responses to alternative climate predictions will better guide public policy and incentive programs. New approaches and tools, such as agent-based models (ABMs) will provide a better framework to examine interactions of socioeconomic and climate change.

### Assets at Risk

Not applicable.

### Existing Actions

House Bill (HB) 7135, passed in the 2008 Legislative Session, directly addressed collecting and acquiring better emissions data, as well as ensuring improved analysis of all emissions data. Among other actions, the bill creates the Florida Energy Systems Consortium (FESC) as a “supercenter of excellence” within the State University System (SUS) to better coordinate energy-related research in support of Florida’s energy and climate change policy objectives. The bill did not address research that can support adaptation.

### Goals and Strategies

**Goal 1:** Provide a measurable outcome and scientific evaluation for each of the goals and strategies outlined in the Adaptation Policy Options to assess whether they have been met. Evaluation should be science-based, using the complementary skills of climate scientists, ecologists, hydrologists, social scientists, and economists. Test programs and pilots to measure and assess alternative outcomes are encouraged.

**Strategy A:** HB 7135 in the 2008 Florida Legislative Session created the FESC as a “supercenter of excellence” within the SUS. The center should consider, as a priority order of business, the appointment of a scientific advisory council composed of members from identified disciplines which are relevant to adaptation to climate change and representatives of each participating institution to better coordinate research in support of Florida’s adaptation and climate change policy objectives.

**Strategy B:** The Florida Energy and Climate Research Trust Fund should be created by the Legislature and a dedicated revenue stream should be provided.

**Goal 2:** Foster and support a climate science research agenda for Florida with broad priorities as outlined below. Consider instituting a new scientific advisory council on climate change to advise state government on this research agenda. Identify and establish long-term funding to support research. Funding should be protected from short-term economic or political cycles.

**\*Strategy A:** HB 7135 in the 2008 Florida Legislative Session created the Florida Energy Systems Consortium as a “super center of excellence” within the State University System. The center should consider, as a priority order of business, the appointment of a scientific advisory council composed of members from identified disciplines adaptive to climate change and representative of each participating institution to better coordinate research in support of Florida’s adaptation and climate change policy objectives.

**\*Strategy B:** The Florida Energy and Climate Research Trust Fund should be created by the Legislature, and a dedicated revenue stream should be provided.

**Goal 3:** Conduct research needed to support incorporation of climate change into the protection of Florida’s ecosystems and biodiversity.

**Strategy A:** Calculate the economic value and services provided by Florida’s natural communities and associated species to inform decisions regarding state budget and policy requirements. Disseminate information broadly.

**\*Strategy B:** Define the likely new “states” of Florida ecological systems to determine state budget and policy requirements. Identify species and habitats that are likely unable to migrate naturally and craft strategies to assist their relocation or re-create habitat elsewhere to facilitate this shift.

**\*Strategy C:** Expand the newly developed Critical Lands & Waters Identification Project (CLIP) v1.0 database to incorporate impacts and adaptation to climate change. CLIP updates, unifies, and prioritizes existing geographic information systems (GIS) databases. Completed July 1, 2008, CLIP identifies and prioritizes statewide natural resource landscapes, biodiversity, and water and serves as a starting point for the Cooperative Conservation Blueprint project.

**Goal 4:** Enhance support for mapping, monitoring, and modeling. All of these will be necessary to provide information to support policy making. For example, the state is supporting use of light detection and ranging (LIDAR) to improve mapping of Florida’s coastlines. Such mapping should be done for the entire coastline of the state. In addition, effective monitoring programs are needed to detect impacts of climate change, as well as modeling to better project impacts.

**\*Strategy:** Create a new center to coordinate and align data from proxy data sets to build a more precise picture of climate change in Florida over the last few thousand years and predict the effects of climate change in the future. This data center could also track associated responses in vegetation, sea level, and disturbances such as fire.

**Goal 5:** Support projection of climate change at smaller scales to forecast state and local impacts and to pinpoint risks.

**Goal 6:** Collaborate to the greatest extent possible with other similar research efforts by the federal government, the private sector, and non-state research institutions and universities.

## Priorities for Further Research and Analysis

A number of plans and proposals for research that will support adaptation to climate change, among other things, have been published, including the “Annual Science and Research Plan” prepared by the Florida Oceans and Coastal Research Council and “A Strategic Implementation Plan for Florida COOS: 2008–2010” written by the Florida Coastal Ocean Observing System (FLCOOS). Such plans can be consulted for specific ideas on research that will enhance Florida’s ability to manage marine and coastal resources vulnerable to climate variability and change. It is not known whether there is an integrated research priority list counterpart to this for Florida’s terrestrial and freshwater systems; one research priority might be to initiate such a process and to cross-reference these lists for areas of synergy.

There are already a number of cross-cutting priorities for research and analysis that Florida should consider, including the following:

- *Emphasize collaborations with international climate scientists, to refine climate predictions for Florida.* The state, in partnership with federal agencies, international efforts, and Florida universities, should (a) undertake review of current studies and models, (b) consider updating model development to more precisely forecast changes in Florida’s weather patterns, and (c) undertake specific analysis of uncertainties and contingencies in climate scenarios for Florida.
- *Place special emphasis on establishing or enhancing programs to follow developments regarding the climate-related impacts of SLR and hurricane activity, considering that Florida is particularly vulnerable to potential impacts.*
- *Establish or enhance existing programs to monitor and determine trends in other climate-related impacts that could have consequences in Florida including increased drought, wildfires, flooding, storm water runoff, heat waves, problems with invasive species and insect-borne disease resulting from changes in temperature and rainfall regimes, adverse effects on native terrestrial species, natural communities and marine life, saltwater intrusion into aquifers, more frequent and intense storms, storm surges, tidal regimes, and coastal erosion. Build a decision support structure to guide and prioritize an ongoing Florida-specific research agenda.*
- *Deploy a “Florida Land and Sea Mesonet” to serve as a world-class network of integrated environmental monitoring stations, drawing from and contributing to existing terrestrial and marine networks, capitalizing and building on deployed meteorological stations, evapotranspiration (ET) stations, micro-meteorology towers, flow gauges and well/aquifer monitoring, and other critical monitoring networks to meticulously track changes in Florida’s climate and hydrology and fill gaps in statewide network coverage. The existing FLCOOS should include climate impacts.*
- *Support scientists working on availability of remote sensing data and methods for gathering it to provide actual continuous statewide coverage (and for coverage of the associated surrounding*

oceanographic area of influence), with consistent spatial grids and measurements, for common inputs for climate and hydrologic models.

- *Link climate scientists with ecologists, economists, and social scientists.* Issue a request for proposal (RFP) from interdisciplinary teams of social scientists, economists, and climate scientists to build interactive models that include non-linearities and feedbacks to better predict Florida's responses to anticipated changes. ABMs are appropriate here because of the complexity of climate change models and responses.
- *Build socioeconomic models to evaluate the effectiveness of alternative incentives and policies.* Select pilot areas and locations in the state to test policy programs. Evaluate effectiveness of adaptation strategies at regular intervals
- *Build better decision tools to incorporate total cost accounting for local and regional planning decisions,* so that proposed land-use change, agricultural policy shifts, water-use policies, transportation decisions, siting of major new industries, and other changes will have a full assessment of all public costs, including the likely carbon or greenhouse gas (GHG) footprint and water use. Decision tools should also include assessments of proposals for land-use changes in light of the predicted climate changes.

## ADP-2. Comprehensive Planning

### Description of Issues

Florida has an integrated planning process that local, state, and regional governments can use to prepare plans that direct future growth and development, conservation of natural resources, and provision of public facilities. Under state law, planning in Florida is guided by standards that require a consistent policy direction and coordination among plans.

The framework for the integrated planning process starts with Florida’s State Comprehensive Plan (SCP), which contains goals and policies that set broad directions on energy, land use, and other issues relevant to future adaptation to climate change. At the state level, there is a transportation plan and a water plan. At the regional level, there are 11 planning councils, each of which has adopted a strategic policy plan. In addition, at the regional level, there are five water management districts and seven transportation districts, each with planning documents that guide programs and decision making. At the local level, each county and municipality in Florida has adopted a comprehensive plan that includes goals, objectives, and policies that address future land use, conservation, coastal management (where applicable), transportation, public facilities, parks and recreation, housing, intergovernmental coordination, and capital improvements. Local land development regulations and permits must be consistent with the comprehensive plan.

The 2008 Florida Legislature amended the SCP to address GHG reduction strategies with attention to facilities that generate electrical power. The 2008 requirements for local comprehensive plans represent an important initial step but are oriented more toward energy use and GHG emission reductions than on adaptation to changing climatic conditions.

### Objectives

Chapter 187 of the Florida Statutes says, “The State Comprehensive Plan shall provide long-range policy guidance for the orderly social, economic, and physical growth of the state.” It also states that the plan is a “direction setting document” that should be “reasonably applied where they are economically and environmentally feasible, not contrary to the public interest, and consistent with the protection of private property rights.”

Florida’s local, state, and regional comprehensive plans should be amended, based on best available data, to include goals, objectives, and policies that will prepare the state for adapting to the future impacts of climate change, such as SLR. Future policies should use incentives to encourage desired actions, including encouragement not to repeat past decisions that will leave new development exposed to SLR and other climate change consequences.

## Assets at Risk

Florida may be one of the states most at risk to climate change. It is surrounded by water on three sides, and its relatively flat terrain means that large areas of the coast are at risk of inundation from SLR or coastal storm exposure (i.e., hurricanes).

SLR will affect Florida’s valuable shoreline resources, including the beach, coastal vegetation and habitat, and significant public and private built investment. Decisions will need to be made about relocation, redevelopment and, where appropriate, retreat from the shoreline. Between now and 2030, the state will need to develop residential, commercial, and retail areas to serve twice our current population.

The projected consequences from climate change, such as SLR, may lead to future questions about reducing risks in hazard-prone areas and areas that could face increased risks under climate change as well as the rights of private property owners and the police power and trusteeship responsibilities of state and local governments to protect the community at large. These issues will likely be focused on private property adjacent to the beach and in low-lying areas subject to increased flooding.

## Existing Actions

Governor Crist created the Florida Energy and Climate Change Action Team through executive order. That Action Team has appointed Technical Work Groups (TWGs) to address these issues. One TWG is reviewing the state’s Transportation and Land Use (TLU) planning in particular, and the Government Policy (GP) TWG is addressing these issues as well.

The 2008 Florida Legislature passed HB 7135, which created the Florida Energy and Climate Commission (FECC) to continue the work of the Action Team and consider and coordinate certain recommended Action Team adaptations to the land-use planning process. The bill also amended Section 339.175, Florida Statutes, to encourage metropolitan planning organizations (MPOs) to consider GHG emissions in their planning processes.

## ADP-2.1 Local Government Level

### Goals and Strategies

**Goal 1:** Ensure that all relevant elements of local government comprehensive plans (e.g., future land use, coastal zone management, and capital facilities) are updated to reflect the best available data and strategies for adapting to future climate change impacts.

**Strategy A:** The Florida Department of Community Affairs (DCA) should work with the FECC to create a phase-in formula requiring future updating of local plans through the Evaluation and Appraisal Process (EAR).

**Strategy B:** The FECC and DCA will recommend to the Florida legislature new authority to provide necessary direction for local government comprehensive plans to address the range

of adaptation actions, including built environment, anticipated from climate change impacts.

**Goal 2:** State and regional agencies should provide financial and technical assistance to local governments to ensure timely updates of local plans.

**\*Strategy A:** Update the climate change section of the FL DCA Planning Tools Web site with adaptation information from the Action Team and other sources.

**Strategy B:** Tie state and regional agencies into a broadly available state digital database focused on climate change and ensure that all pertinent state records are digitized to provide local government planners with instant access to the information they need to better consider the impacts of updates to local plans.

**Goal 3:** Counties and municipalities located within each county should collaborate to create working groups (e.g., Miami-Dade County Climate Change Advisory Task Force) to study their comprehensive plans and recommend changes that better address adaptation to local climate change.

**Goal 4:** Local governments should review elements of their coastal management plans to determine whether there are any amendments that could make their coastal areas (especially the coastal high-hazard areas) more resilient to the impacts of climate change, including SLR.

**Strategy A:** Amend Chapter 163.3178 (8), to provide for coastal counties to include SLR as a criteria when prioritizing lands for acquisition through state programs.

**\*Strategy B:** Create a best practices manual for local governments to use that incorporates risk from SLR when identifying coastal lands for state acquisition using new adaptation language incorporated into local, state, and regional government land acquisition processes.

**\*Strategy C:** Identify and revise statutory direction for local, state, and regional planning processes to identify potential within planning areas, particularly coastal areas, for SLR. Provide for an assessment of

- The potential movement of the coastal construction control line and related changes,
- The extent and potential for expansion of floodplains, and
- Habitat and wildlife migration potentials.

**Strategy D:** DEP, DCA, and the state’s Regional Planning Councils (RPCs) should jointly develop, assess, and recommend a suite of planning tools and climate change adaptation strategies for local governments so they can maximize opportunities to protect the beach/dune system, coastal wetlands, and other coastal resources in an era of rising seas. The tools should include strategies to encourage the landward siting and relocation of

structures and public facilities in areas adjacent to receding shorelines through acquisition, rolling easements, transfer of development rights, stronger setbacks, and tax incentives.

## ADP-2.2 Regional Government Level

### Goals and Strategies

**Goal 1:** RPCs should update their Strategic Regional Policy Plans (SRPPs) to reflect important regional issues concerning adaptation to the impacts of climate change.

**Strategy:** DCA, RPCs, and the FECC should agree on guidance in the DCA-RPC annual contracts that directs how adaptation language is to be made part of the SRPPs.

**Goal 2:** Water management districts should modify regional water supply plans and other regional water management activities to include adaptation measures that address impacts from climate change.

**Strategy:** DEP, the five water management districts, and the FECC should agree on future guidance for updating regional water supply plans and other water management activities to ensure that they address adaptation to climate change impacts such as SLR.

## ADP-2.3 State Government Level

### Goals and Strategies

**Goal 1:** The SCP and comprehensive plans of other relevant state agencies should be updated to reflect future actions that promote adaptation measures that address the impacts from climate change.

**Strategy A:** The Governor, acting as Chief Planning Officer of the state, should direct the Office of Planning and Budget to work with the FECC, state and regional agencies, local governments, special districts, and interested parties to propose changes to the SCP that address climate change adaptation for review by the Legislature.

**Strategy B:** The SCP, Chapter 187.201(8), Coastal and Marine Resources, goals and policies should be amended to address adaptation to the consequences of climate change.

**Strategy C:** The Florida DCA should explore using the Areas of Critical State Concern Program as a way to provide special assistance in planning and redevelopment for areas of the state at high risk of change due to SLR.

**Strategy D:** The Florida Division of Emergency Management (DEM) should incorporate SLR and increasing storm surge impacts into its efforts to remap potential hazard areas in coastal zones. Revised hazard area **designations** should better reflect the risks to communities

associated with climate change and allow reevaluation of suitability for development in these areas.

**Goal 2:** The FECC should encourage cooperation at all levels of government and recommend additional goals and strategies to ensure that adequate measures are taken to adapt to future impacts from climate change.

**Strategy:**

**Goal 3:** A balance should be achieved between protecting property rights and protecting communities and natural resources.

**\*Strategy A:** The Office of the Florida Attorney General should monitor state, regional and local actions to address the impacts of climate change for potential conflicts between private property rights and the government’s responsibilities to protect its communities, natural resources and public usage and access to government lands. Specific attention should be given to possible conflicts with the individual rights of private landowners who are affected by sea level rise, beach erosion and other impacts of climate change. The Attorney General should issue a report with recommendations every five years.

## ADP-3. Protection of Ecosystems and Biodiversity

### Description of Issues

Florida's terrestrial, freshwater, and marine systems extend from temperate north Florida to subtropical south Florida. Many tropical species are at their northern range limits in Florida; many temperate species are at their southern limits. The result is a highly diverse, unique assemblage of species and, in terrestrial and freshwater systems, high levels of endemism. Florida has 1,350 miles of coast that is home to a diverse array of marine and coastal natural communities and associated species, including the world's third largest fringing barrier reef and a barrier island system that has high morphological diversity.

The State of Florida has the third highest number of species in the United States (over 5,000), of which approximately 670 are endemic. Its approximately 4,000 native and exotic plant species are distributed over 81 plant communities. According to the U.S. Fish and Wildlife Service (US FWS), 114 species are listed as endangered or threatened (2008), including the West Indian manatee, green sea turtle, and brown pelican.

Florida's upland ecosystems are characterized by temperate climate, dry soils, and gently sloping, forested hills. The dominant plant species in dry uplands include pines and oaks. Plant species in the wetter uplands include southern magnolia, beech, spruce pine, Shumard oak, Florida maple, and other hardwoods. Coastal uplands feature sandy soils, and their plant communities consist of sea oats and mixed salt-spray-tolerant grasses, shrubs, and herbs.

Florida's freshwater ecosystems include wetlands, streams, lakes, and ponds. Vegetation includes mixed hardwoods, sphagnum moss, cypress, hydrophytic shrubs, and grasses. Coastal wetlands and swamps are generally inundated with freshwater but are subject to tidal cycles and are saltwater-tolerant.

Wetlands cover approximately 30% of the State of Florida and play an important role in flood protection. Streams can vary from seasonal to permanent waterways, and plant species generally grow along stream edges.

Beaches are one of the state's most important economic engines, generating tens of billions of dollars in annual revenues through jobs, tourism, recreation, and taxes. Beaches are Florida's primary tourist attraction. Beach-related tourism has a \$41.6 billion annual impact on Florida's economy. In addition, over 25% of the value of Florida's coastal real estate can be attributed to beaches.<sup>2</sup>

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<sup>2</sup> Stronge, W.B. 2002. "The Economic Benefits of Florida's Beaches: Local, State, and National Impacts." Boca Raton: Florida Atlantic University.

A healthy beach/dune system provides protection for upland property and infrastructure and increases a beach's resiliency (i.e., its ability to recover from storm events). Florida's beach/dune system also provides important habitat for marine turtles, shorebirds, beach mice, invertebrates, and other species. Currently, more than half of Florida's 825 miles of sandy beaches are experiencing chronic erosion, and about 42% are designated as critically eroding (meaning they need long-term maintenance in order to ensure protection of vulnerable upland properties, recreational interests, wildlife habitat, or important cultural resources).

Reefs are affected by disease and bleaching. In addition, overfishing, polluted runoff, and reduced freshwater inflows also threaten the health of this ecosystem. The state is making an effort to establish marine sanctuaries to protect its marine ecosystem from further damage. Species found here include seabirds, dolphins, whales, and manatees, as well as many types of invertebrates, crustaceans, and fishes (e.g., bony fishes, sharks, skates, rays, and eels). Alligators, crocodiles, and turtles can also be found in this area. Habitats include sea grass beds, sandy bottoms, reefs, and open ocean.

These natural resources provide many economic benefits to Florida. For example, 4.2 million people participated in some form of residential or nonresidential wildlife viewing in Florida in 2006, with related total retail sales estimated at \$3.1 billion (\$2.4 billion by residents and \$653.3 million by nonresidents) for that period.

## Objectives

The Florida Constitution calls for the "management, protection, and conservation of wild animal life and freshwater aquatic life." Florida law notes that the "State of Florida harbors a wide diversity of fish and wildlife and that it is the policy of this state to conserve and wisely manage these resources" and calls the state to "protect and acquire unique natural habitats and ecological systems...and restore degraded natural systems to a functional condition." With regard to coastal and marine resources, the "development and marine resource use and beach access improvements in coastal areas do not endanger public safety or important natural resources."

Managing ecosystems for resilience enhances their ability to naturally adapt to the stresses of climate change and other pervasive threats. Specifically, good management should

- Maximize the resilience of species and habitats to climate change impacts by minimizing other human induced threats;
- Facilitate and maintain the persistence of coastal ecosystems and the ecological and human services they provide;
- Increase understanding of how Florida's marine and coastal ecosystems may migrate and change because of climate change;
- Identify areas, natural communities, and species of particular ecological vulnerability;

- Protect natural communities vulnerable to SLR from loss resulting from shoreline hardening and other actions that prevent or inhibit natural upslope migration;
- Identify and secure paths for other inland habitats to migrate with changes in temperature, rainfall patterns, and groundwater levels; and
- Protect inland natural communities from competing climate change adaptation pressures, such as the landward relocation of coastal development, human demands for ground and surface water, and engineered solutions for flood mitigation.

Specific objectives for beaches include ensuring the long-term protection of the beach/dune system and preserving its ecological functions as well as

- Considering how climate change could be incorporated into all aspects of the beach management and coastal construction regulatory programs.
- Developing policies to discourage development adjacent to eroding shorelines and encouraging the placement of structures and infrastructure away from retreating shorelines; these measures may reduce future reliance on coastal bulkheading, which can accelerate beach loss.
- Purchasing private coastal lands that have been strategically targeted to provide buffers for retreating shorelines, to preserve and protect habitats and ecosystem function, and to increase the resiliency of the shoreline to recover from storm events.
- Enhancing communication on coastal resource protection between and within state regulatory agencies, such as the Florida DCA and the Florida Department of Environmental Protection (DEP), can ensure more efficient use of resources and expertise in developing adaptation responses and strategies.

### **Assets at Risk**

Temperature, rainfall, sea level, and ocean chemistry play critical roles in determining where individual species of plants and animals can live, grow, and reproduce. The effects of climate change on species and ecosystems can be direct and indirect. Climate change will change the structure and composition of ecosystems and communities; coastal and estuarine habitats; ocean chemistry (lower pH levels adversely affect growth of corals, shellfish, and some algae); geographic range of species; timing of species' life cycles, which may become out of sync with other species they depend on; plant growth, nutrient composition, plant-animal interactions, and ecosystem nutrient cycles; and the intensity and magnitude of existing stresses, such as invasive species and wildfire regimes, on biodiversity and ecosystem structures, functions, and processes. In addition, climate change is also projected to result in increased risk of extinction for some species (e.g., those with limited dispersal capabilities or those that live in specialized habitats) and opportunity for range expansion of invasive species.

SLR and other predicted impacts of climate change (e.g., increases in frequency and intensity of coastal storms and higher storm surges) increase beach erosion, shoreline recession, and barrier

migration and have a profound impact on Florida’s beaches, the beach-using public, and the tourism industry.

As beaches erode and recede, many of the values and benefits they provide are threatened. In addition, public access to lands held in trust for the public, including the wet sand beach and near shore-submerged lands, is greatly diminished. Conflicts over public usage and private property rights will likely increase as beaches recede and the area of dry sand beach decreases.

### Existing Actions

The DEP includes in its annual “Florida Forever Work Plan” a list of lands that sequester carbon, provide habitat, protect coastal lands or barrier islands, and otherwise mitigate and help adapt to the effects of SLR. DEP’s Office of Coastal and Aquatic Managed Areas (CAMA) has 42 aquatic preserves around the state that are managed to protect natural values. CAMA also co-manages with the National Oceanic and Atmospheric Administration (NOAA) the Florida Keys National Marine Sanctuary, and three National Estuary Research Reserves. Across Florida’s major terrestrial, freshwater, and marine systems, the Florida Fish and Wildlife Conservation Commission (FWC) oversees the Florida Wildlife Legacy Initiative that strives to keep common species common. In addition, DEP (state parks and Florida’s Division of Forestry [DOF]), the Florida Fish and Wildlife Conservation Commission (FWC), and other state agencies have ongoing programs to maintain natural systems in a healthy state. On a parallel track, federal and local governments and private organizations, such as The Nature Conservancy and the Audubon Society, maintain parks and natural areas.

## ADP-3.1 Uplands, Freshwater and Marine Systems

### Goals and Strategies

**Goal 1:** A representative portfolio of Florida’s terrestrial, freshwater, and marine natural communities with redundant representation of habitats and species and connecting corridors (e.g., Florida’s Biodiversity Blueprint) is protected and well managed in a manner that maximizes the health and resilience of these systems to climate change impacts.

**\*Strategy A:** Tie into existing and expanded databases such as CLIP to examine existing local, state, regional, and federal land holdings and categorize these holdings with regard to the representative portfolio.

**\*Strategy B:** Provide an accessible, expanded, and updated database to track changes to the natural communities and corridors.

**Strategy C:** The FECC should consider the recommendations for biodiversity and ecosystem adaptation to climate change developed through the Florida’s Wildlife: On the Frontlines of Climate Change summit.

**Strategy D:** DEP should maintain and enhance where possible increase efforts to reduce nutrient loading and set numeric criteria for nutrients, particularly in estuaries and coastal waters by requiring “performance-based treatment systems” (new technology that significantly reduces nutrients and other pollutants) in coastal and other sensitive areas or consider piping into nearby existing systems; reducing phosphorous and nitrogen in the Everglades by lowering total maximum daily loads (TMDLs); building storage treatment areas (STAs); and setting a nitrogen standard for the Comprehensive Everglades Restoration Plan (CERP).

**Goal 2:** Acquire and appropriately manage lands needed to complete critical south-to-north migration corridors to accommodate range changes in species and natural communities driven by climate change.

**Goal 3:** Important natural communities vulnerable to SLR (e.g., intertidal and coastal habitats) are buffered or protected (from shoreline stabilization and hardening) to maximize the probability of their persistence into the future.

**Strategy A:** DEP and other relevant agencies should develop state wetlands conservation and restoration plans that clearly designate wetland migration corridors as the sea level rises.

**Strategy B:** The Legislature should place a priority on coastal land acquisition through the Florida Forever program, a separate dedicated funding source, or through other means. Greater incentives should be provided to local governments and private organizations to acquire and manage ecologically important coastal lands, including upland buffers. Acquisition efforts should be strategically targeted to protect coastal resources, reduce insured risk, and reduce the impacts of climate change on both ecosystems and communities.

**Goal 4:** Areas that may serve as refuges for at-risk species are identified, prioritized, protected, and managed in a manner that maximizes the persistence of at-risk species.

**Strategy:**

**Goal 5:** Enact legislation to define newly submerged lands contiguous to existing state aquatic preserves, parks, and others as part of the contiguous state-managed areas.

**Strategy:**

**Goal 6:** Establish an integrated network of early warning sites on protected lands to track long-term changes in biological communities and processes; establish a Center for Climate Archives for baseline and associated data.

## ADP-3.2 Beaches and Beach Management

### Goals and Strategies

**Goal 1:** Reduce and discourage future reliance on bulkheading/hardening to stabilize estuarine and beach shorelines. Shoreline hardening should be considered only after a full and cumulative assessment of short- and long-term impacts to coastal resources and coastal ecosystems.

**\*Strategy A:** Address local, state, and regional permitting programs and planning elements to fully assess and consider potential impacts and changes to coastal resources and ecosystems from proposed coastal protection measures in light of potential impacts of climate change.

**\*Strategy B:** Add an overview element to state and regional planning documents describing statewide strategies and circumstances for coastal and shoreline retreat and erosion.

**\*Strategy C:** The state should undertake a comprehensive reevaluation of the Coastal Construction Control Line Program to ensure that it is accomplishing its intended goal of protection of the beach and dune system. The reevaluation should consider, among other things, the adequacy of existing coastal setbacks, building siting and design requirements, and post-storm redevelopment policies in light of SLR scenarios.

**Goal 2:** Estimate the ecological value of beach resources around the state in order to give the highest priority to protecting beach resources with the highest ecological values.

**Strategy:**

**Goal 3:** Minimize conditions inhibiting natural long-shore sand movement to reduce coastal erosion, protect existing investment in and reduce the future need for beach re-nourishment, and increase beach system resiliency.

**Strategy:** DEP should be funded to support the design and implementation of inlet management plans for all of the state's modified inlets and should undertake all reasonable efforts to maximize inlet sand bypassing.

**Goal 4:** Require the state Acquisition and Restoration Council conduct a review of management plans for those lands under its authority every 10 years and include property-specific analyses of vulnerability to climate change in each management plan.

**Strategy:** Consider a Full Disclosure Law that alerts buyers of coastal property about erosion rates, storm history, SLR concerns, and other relevant information.

**Goal 5:** State and local governments establish policies and regulations that clearly define when, how, where, and under what circumstances emergency beach stabilization is allowed.

**Strategy:**

**Goal 6:** State and local governments establish policies and regulations that address coastal retreat and at what point vulnerable structures will have to be abandoned.

**Goal 7:** State and local governments establish policies and regulations to protect coastal resources from contamination resulting from inundation, structural failure, or abandonment of residential, industrial, and municipal assets resulting from SLR or storm events.

**Strategy:**

**Goal 8:** Ensure that the state’s beach management program can accomplish its intended goals, including the long-term protection and resiliency of the beach/dune system, in an era of climate change and rising seas.

**Strategy:** DEP’s Strategic Beach Management Plan should incorporate a range of sea level rise scenarios over at least a 50 year time horizon.

**Goal 9:** Provide incentives to encourage public and local governments to site structures and infrastructure away from areas at high risk from the impacts of climate change and SLR.

**Strategy:** See ADP 2.1, Goal 4, Strategy D

### ADP-3.3 Species Protection

#### Goals and Strategies

**Goal 1:** The vulnerability of Florida’s fish and wildlife to climate change impacts is assessed, the most vulnerable species are identified, and plans are prepared to enhance their chances of persistence where there is a reasonable likelihood that the species will persist over the next 50 years.

**\*Strategy A:** Utilize the CLIP and similar expanded and centralized digital databases to determine potential species and habitat vulnerability.

**\*Strategy B:** Incorporate species and habitat vulnerability from climate change into state and regional planning/zoning, government land acquisition, or determinations for conservation easements.

**Goal 2:** Put in place a system for monitoring how Florida’s natural communities and associated species are responding to climate change impacts and widely distribute the results of this monitoring to all interested stakeholders.

**Strategy:**

**Goal 3:** Consider how climate change affects the nexus between species and habitat and act to protect habitat for vulnerable species in light of additional risks posed by climate change.

**Goal 4:** Evaluate likely persistence of Florida’s rare species, natural communities, coastal ecosystem, and parks and protected areas under climate change.

**Strategy:** Conduct a review of required management plans for public parks, forests, and wildlife areas every 10 years and include analyses of vulnerability to climate change for each area.

## ADP-4. Water Resource Management

### Description of Issues

The State of Florida is currently facing many water resource management challenges, including shortages due to drought, saltwater intrusion, and deterioration in quality and limits on the availability of its groundwater sources. The system is stressed even further by continued pressures from population growth, development styles, and potential new challenges resulting from climate change. Although there are uncertainties about climate change, water managers must nonetheless plan for potential increased variability in precipitation regimes, storm events, and rising sea levels. Significant changes in these phenomena are likely to result in changes to the amount of freshwater resources and land available to sustain life and maintain healthy water-dependent natural systems.

While Florida’s extensive coastline provides a unique ability to tap saltwater as a future water source, primary water resource concerns revolve around changes to water-dependent ecosystems, impacts to and from human activity, and the quality of groundwater and surface water. There may be shifts in water demands for agricultural and municipal supply; increased energy consumption for advanced water treatment, transmission, and disposal; and changing environmental needs.

The rate of climate change and potential consequences over the next 100 years is uncertain, but the more rapid the rate of change, the more quickly Floridians will have to respond to manage Florida’s water resources effectively. Planning and action now may significantly reduce the cost of deferring action.

### Objectives

Local, state, and regional policies to protect groundwater and other water resources are designed to ensure adequate supplies to meet the needs of humans and the environment. Policies and measures to encourage conservation, protect existing supplies, identify and develop new supplies, and further invest in innovative technologies to treat water will be needed. Florida recognizes four areas of responsibility (AOR) critical to water resource management, as expressed in Chapter 373, Florida Statutes.

1. Water Supply—Managing water resources to ensure that there are adequate supplies for current and future Floridians.
2. Water Quality—Implementing measures to ensure that changes to existing landscapes will not cause degradation of existing groundwater and surface water quality.
3. Flood Protection—Identifying and protecting flood-prone areas to minimize the risk of floods to human activities through structural and non-structural means.

4. Natural Systems Protection—Managing water and related land resources to ensure that there are supplies of adequate quantity and quality to protect and maintain healthy natural systems.

In order for to Floridians to have adequate freshwater supplies available to meet basic reasonable and beneficial needs and the requirements of natural systems, these principles should be followed:

- Intense conservation of all water uses and alternative water sources will need to play a larger role in meeting Florida’s future water needs.
- Provide for stakeholder involvement in statewide and regional water supply planning processes.
- Incorporate methods to quantify and plan for uncertainties and risks related to population growth, climate change, and environmental regulations.

It is important that the five water management districts have consistent and coordinated water policies to address climate change.

### Assets at Risk

The majority of Florida’s population and the water infrastructure to serve them reside within 50 miles of the coast. The Florida population is projected to increase by an additional 50% by 2030. In addition to new infrastructure required to develop and distribute water supplies to meet the needs of that growing population, existing coastal and groundwater resources may be at risk due to saltwater intrusion and SLR. Additional consumptive use of freshwater will further diminish the head of pressure needed to stave off saltwater intrusion.

Florida could face rising seas, decreased precipitation, and more intense storms. These three currently predicted impacts alone could have serious implications for Florida’s major areas of water resource responsibility.

### Goals and Strategies

**Goal 1:** Identify and quantify the vulnerabilities and reliability of existing water supplies to potential effects of differing climate change scenarios with emphasis on source water availability and quality.

**Strategy A:** Develop an inventory of water supply facilities (source, storage, treatment, and distribution) and conduct a study to develop different climate change scenarios and potential impacts and adaptation strategies for high-risk utilities.

**Strategy B:** DEP, water management districts, and local and regional staff should evaluate and prepare for relocation and/or protection of drinking water well fields and groundwater recharge areas from saltwater intrusion.

**Goal 2:** Develop regional and statewide water demand projection scenarios that account for potential changes in (1) agricultural demand due to changes in the growing season or impacts on crop production; (2) municipal and industrial demand as temperatures increase and drought (seasonal or intra-annual) persists; and (3) water demand for energy generation due to possible changes in fuel sources over a 100-year planning horizon, with consideration for Florida’s statutory obligation to provide water for the environment.

**Strategy A:** DEP, water management districts, and local and regional planners must evaluate and implement maximum wastewater treatment and reuse options to optimize drinking water and water for the environment and other beneficial uses.

**Goal 3:** Develop conservation programs that address and incentivize water and energy usage efficiencies.

**Goal 4:** Encourage water reuse.

**Goal 5:** Implement local, state, and regional water supply planning processes that quantify potential changes in existing water supplies and identify potential new water sources, including synergies between flood management structures and water supply. Promote coordination across jurisdictions within and across watersheds as appropriate. Incorporate methodologies that use not only historic hydrologic data, but also consider changes that may result from climate change and prioritize water for natural systems.

**Goal 6:** Integrate land-use considerations, flood management, and storm-water best management practices (BMPs) designed to protect water quality, water demand/supply management, and water reservations for the environment in watershed planning and design standards.

**Goal 7:** Incorporate methods that consider energy, environmental, and economic sustainability when evaluating potential water management strategies (e.g., in developing new surface water supplies or desalination projects).

**Goal 8:** Change monitoring compliance with minimum flows and levels and water/consumptive use permits, how structures are operated, and when alternative supplies sources are needed.

**Goal 9:** Change the basis for current Environmental Resource Permits (ERPs), watershed and water quality modeling, structural operations, and other flood management methodologies.

**Goal 10:** Address water quality changes and flooding of coastal and tidally influenced bodies of water that may occur due to more intense storms, higher surface water temperatures, and rising sea levels on coastal aquifers.

**Goal 11:** Increase freshwater pressure to offset SLR, retain as much freshwater in natural systems as is reasonable, and restore previously drained systems.

**Goal 12:** Redesign as necessary coastal recovery strategies, coastal restoration projects, coastal land acquisition, and other measures to allow for natural adaptations and movement inland.

**Goal 13:** Protect and maintain the natural mosaic of ecosystems, such as upland and lowland interfaces, to ensure the health of water and related natural resources.

**Goal 14:** Allow coastal estuaries, riverine, and other water dependent ecosystems to migrate or adapt to maintain healthy wildlife and fish populations consistent with new climate regimes.

**Goal 15:** Well fields, surface or subsurface storage facilities, and water treatment plants may be vulnerable. Siting and plans for new facilities should be closely examined to mitigate impacts or locate the facilities to reduce risks from increased winds and flooding.

## ADP-5. Built Environment, Infrastructure, and Community Protection

### Definition of Issues

The built environment can be defined as the aggregate of all buildings, facilities, and structures designed and built to provide shelter or to house the full breadth of human activity, as well as the infrastructure designed and built to supports or protect such human activity.

The conjugation of these factors has resulted in more than 75% of the population living in coastal counties, and perhaps close to 85% of the built environment (on the basis of total area of construction) is located in coastal counties with a high concentration in large urban areas such as the tri-county (Palm Beach, Broward, and Miami-Dade) corridor in Southeast Florida, the west-central region around Hillsborough and Pinellas counties, and the Jacksonville-St. Augustine region.

U.S. Census Bureau projections and other studies estimate that Florida’s population will reach close to 29 million by 2030, which means an increase of some 10 million people over the estimated 2007 state population and 7 to 8 million more residents in coastal counties. If these projected trends continue, the concentration of built environment will likely continue to increase along the same parameters as those currently in place.

Florida is vulnerable to a wide range of natural hazards, including hurricanes, coastal storms, floods, tornadoes, wildfire, drought, extreme heat, winter storms and freezes, erosion, sinkholes, landslides, and tsunamis. Some of these hazards will be exacerbated by climate change, while others will be ameliorated.

Design criteria are part of building codes used to design buildings that are expected to have a minimum service life of 75–100 years and that can withstand extreme events. The Florida Building Code became the single-state building code as of March 1, 2002. The expressed intent of the Florida Building Code is “...to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment...”

One of the most important issues with regard to adapting the built environment to climate change is that buildings and structures are designed on the basis of the minimum requirements established by the building code, which are primarily based on historical data on forces such as wind loads and hydrodynamic pressure from storm surge. As the risks from such natural hazards are exacerbated by climate change, existing buildings and those being designed today may be subjected to impacts that exceed the designed capabilities. This could lead to catastrophic damage. Adapting the built environment to the impact of climate change will require design criteria and building codes that consider potential future impacts in establishing minimum design requirements.

## Objectives

1. Make reduction of the potential for damage to the built environment from the impact of natural hazards, especially from those hazards caused or exacerbated by climate change, a high priority for all levels of government and the private sector in Florida.
2. Make the practice of adaptation of the built environment to the impact of climate change an integral component of comprehensive planning, building codes, life-safety codes, emergency management, land development and zoning regulations, water management, flood control, coastal management, and community development.
3. Make the practice of adaptation of the built environment to the impact of climate change a preferred objective of building design, siting, and construction research funded by public monies in Florida.
4. Foster an environment of communication and shared knowledge about adaptation to climate change and the adaptation/protection of the built environment among the scientific community, lawmakers, various professional sectors (practitioners), and the general public.
5. Promote an environment to connect science with decision making regarding climate change and the need to adapt the built environment to its impacts.
6. Promote an environment for connecting scientific research with practical applications that will contribute to the adaptation of the built environment to the impact of climate change.
7. Encourage the search for practical and effective solutions to ensure that existing and future built environment in Florida will remain inhabitable, providing a viable shelter for the full range of human activity and ensuring continuity of critical and essential functions in the aftermath of impact by climate change–exacerbated hazards.
8. Establish educational and professional licensing requirements to ensure that key professional sectors become practitioners of adaptation in support of planning, building design, and construction activities.
9. Require the state, county, and municipal governments throughout Florida to develop and maintain a local climate change adaptation plan, to provide a framework for assessing vulnerability, identifying risks, defining and quantifying the value of the built environment that is at risk, and identifying and implementing effective adaptation measures at each jurisdictional level (i.e., state, county, municipality, and individual facility).

Exercise fiscal responsibility in recognizing not only the magnitude of the problem to be confronted by future generations but also the need to start implementing and paying for solutions now while also creating reserves to pay for future measures, especially those that may be community-wide or regional in scope.

Objectives for beaches in ADP-3 are relevant to this ADP Policy Option.

## Assets at Risk

Climate change will modify or exacerbate most of the factors mentioned above, which were used to establish design criteria, during the remaining service life of existing buildings and new buildings just now being built. For example, certain aspects of climate change (specifically, global warming and SLR) have the capacity to exacerbate particular damage components of a hurricane. SLR will have a direct impact on storm surge, perhaps the most destructive component of hurricanes, as they impact the built environment in the coastal region. There will also likely be higher incidence of extreme rain events.

This means that a building created on the basis of current design criteria and the minimum requirements of the Florida Building Code may be subjected to higher loads from storm surge, wave impact, and precipitation during hurricanes than what it was originally designed for during its remaining service life. It is likely and perhaps highly probable that a building under such conditions will suffer severe damage and even structural failure. Those buildings constructed before the Florida Building Code came into effect are at much higher risk of suffering catastrophic damage under the impact of climate change–exacerbated hazards.

## Existing Actions

HB 7135, passed by the 2008 Florida Legislature, provides certain “lead by example” improvements to local, state, and regional government building and renovation standards, including the use of specified green building standards and energy-efficient design. The Bill also creates the FECC (within the Executive Office of the Governor) to centralize policy development and program implementation for energy and climate change and to review and consider recommendations by the Action Team concerning building standards and adaptation. In addition, the Bill created the FESC as a “supercenter of excellence” within the SUS to better coordinate energy-related research that supports Florida’s policy objectives for energy and climate change.

This ADP Policy Option covers the entire infrastructure and is divided into the following categories: building codes and regulations, flood protection, beaches as infrastructure, and transportation. Many of the issues regarding climate change, goals, and strategies can be applied to other infrastructure, such as communications; electric power production, transmission, and distribution; education; and government.

## ADP-5.1 Building Codes and Regulations

### Goals and Strategies

**Goal 1:** Require that the Florida Building Code incorporate design criteria for buildings to resist future loads that may result from the impact of climate change–exacerbated hazards during a minimum service life of 50 years.

**\*Strategy A:** Strengthen Florida Building Code requirements for new structures and appropriate renovations to encourage resistance to the impacts of climate change.

**\*Strategy B:** Conduct research on how building codes can be routinely updated to account for changes in climate and to develop options on how such codes could account for potential future changes in risks from climate change.

**Strategy C:** Determine whether existing construction siting and design requirements under the Coastal Construction Control Line (CCCL) Program intended to ensure avoidance of “significant adverse impacts” to the coastal system are adequate under a range of SLR scenarios.

**Goal 2:** Require the Florida Building Commission (FBC) to establish a technical committee that focuses on vulnerability to climate change and that will recommend updates to the building code as evidence of new trends of risk factors from climate change arise.

**Strategy:**

**Goal 3:** Encourage builders to construct new buildings that meet Leadership in Energy and Environmental Design™ (LEED) standards. Reducing energy demand is also an adaptation strategy, because less energy will be demanded during heat waves and the need for water to support energy production will be reduced.

**Goal 4:** Develop a required training program to educate professionals in relevant fields (e.g., architecture, engineering, and construction management) on the need to incorporate adaptation to climate change as a basis for establishing design criteria for new infrastructure. Completion of such required training should be a condition for relicensing.

**\*Strategy A:** Examine licensing and recertification requirements for building professionals and revise them to include design criteria that account for the impacts of climate change.

**\*Strategy B:** Add an adaptation criteria to professional education curricula at state universities and trade schools for building and design degrees.

**Goal 5:** Empower the Department of Business and Professional Regulation (DBPR) and the various professional licensing boards to incorporate sections on climate change vulnerability and built-environment adaptation methodologies in all licensing examinations.

**Strategy:**

**Goal 6:** Create and fund a Built Environment Climate Change Adaptation Program as a state research initiative. The program would be charged with engaging the scientific and research community, by way of competitive research projects and annual announcements of funds availability, in the assessment of vulnerability and risk of the built environment to the impact of

climate change. It should focus on the development of adaptation methodologies based on new design criteria, methods and materials of construction, and similar initiatives.

**Strategy:**

**Goal 7:** Encourage public universities in Florida to develop educational programs for building design and construction professionals, planners, and those in other pertinent fields, focusing on vulnerability to climate change and adaptation methodologies.

**Strategy:**

## ADP-5.2 Flood Protection

### [INSERT ENTIRE 5.2 SECTION INTO ERRATA]

**Goal 1:** Reduce or eliminate the potential for damage from flooding by requiring all new or substantially renovated buildings to be elevated above potential threshold flood depth (considering climate change), which is to be determined on a site-specific basis for the projected service life of the building.

**Strategy:** Implement zoning criteria and/or building code design criteria that will require all new buildings or buildings that are substantially renovated to have a zero-flood-depth elevation that is a minimum of one foot above a projected site-specific flood depth with an annual probability of flooding of 0.5% during the remaining service life of the building. For purposes of these requirements, a substantially renovated building is one where work to be done is equal to or above 25% of the current replacement value of the structure.

**Goal 2:** Substantially reduce or eliminate storm water runoff as a contributor to flooding.

**Strategy:** Implement land use and zoning regulations and/or building code design criteria requiring all new or substantially renovated buildings to incorporate porous materials and other low-impact development techniques for site work, sidewalks, curbs, driveways, and other locations in order to promote water percolation into the ground to reduce runoff volume during rain events.

**Goal 3:** Set new parameters for water management with the objective of reducing the potential for flooding from extreme rain events.

**Strategy:** Encourage the five water management districts in Florida to work with pertinent federal and state agencies and the research community to develop extreme-precipitation threshold models, which will be used to activate water management actions to reduce the potential for flash floods. These models and related water management actions are to be linked to monitoring systems using virtual rain gauges, satellite observations, and other

technology to forecast the risk of a given amount of precipitation occurring within a given time frame.

**Goal 4:** Substantially reduce or eliminate currently developed building sites subject to repetitive flood loss events.

**Strategy:** Charge counties and municipalities with cataloging currently developed building sites that have been flooded three or more times within the last 10 years. Target those sites for future use conversion to reduce the human risk or the potential for property damage.

**Goal 5:** Incorporate regional or community-wide flood protection, on the basis of projected SLR and other flood threats, into regional and/or comprehensive plans that focus on development and redevelopment over the next 50 to 100 years.

**Strategy:** Fund studies to identify community-wide or region-wide adaptation alternatives to reduce the potential for damage from coastal flooding exacerbated by projected SLR. Such studies will incorporate a comparative analysis, estimated costs, timelines, and associated economic, social, and environmental impacts of a range of adaptation measures, including engineering and structural works as well as land-use and zoning measures.

**Goal 6:** Develop scenarios for land-use conversion that accommodate future population growth and development and that incorporate flood prevention criteria on the basis of projected flood threats 50 to 100 years from now.

**Strategy:**

### ADP-5.3 Beaches as Infrastructure

#### Goals and Strategies

**Goal 1:** Examine where, how, and to what extent coastal ecosystems confer protection to vulnerable human communities. Set priorities for protection and for the appropriate management of these systems.

**Strategy A:** Undertake comprehensive research and analysis to determine alternative solutions and establish the engineering and economic feasibility of whether or not selected sections of the coasts can or should be protected.

- Determine the engineering feasibility of protecting selected coastal areas, taking into consideration the porous nature of much of Florida’s coastal geology.
- Compare the economic cost of armoring and other protection alternatives versus the cost of abandoning major coastal urbanized areas.

- Assess economic, political, social, and environmental impacts of alternative solutions or no action on Florida’s beaches, coastal wetlands, other ecologically important areas, and near-shore coastal marine habitats.
- Begin the evaluation in the relatively near future since public works projects of this magnitude take many decades from concept to completion.

#### ADP-5.4. Transportation and Other Infrastructure

There are 121,525 miles public roads in the state: 12,062 on the state highway system (owned by FDOT), 107,421 city and county roads, and 2,042 owned by other federal entities.<sup>3</sup> There are 19 commercial airports, 14 of which are international. In addition, the state has 14 deepwater ports.<sup>4</sup>

Roads, airports, rail, pipelines, ports, beaches, and other infrastructure along and close to Florida’s coastline are potentially vulnerable to climate change impacts. Unfortunately, a comprehensive listing of transportation infrastructure at risk in the United States has not been prepared. Improved information about projected climate change impacts and timing of such events will be needed to identify specific transportation and other infrastructure at risk.

In Florida, potential impacts of climate change include rising temperatures, increases in the intensity of heavy rainfalls and hurricanes, and rising sea levels. Because of this, transportation and other infrastructure along the coast and in low-lying areas are susceptible to damage from SLR, storm surge, erosion, flooding, and higher temperatures. However, adaptation, particularly related to transportation, has not yet received as much attention or research as climate change mitigation.

#### Goals and Strategies

**Goal 1:** Inventory the critical transportation infrastructure at risk; determine whether, when, and where projected impacts from climate change might be significant; and evaluate the costs and benefits of alternatives.

**Strategy:**

**Goal 2:** Ensure the coordination of adaptation efforts on transportation across jurisdictional boundaries and the exchange of information, resources, and best practices among government, the private sector, and other stakeholders.

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<sup>3</sup> FDOT Website, Highway Mileage Reports at <http://www.dot.state.fl.us/planning/statistics/mileage-rpts/shs2007.pdf>  
2007 SHS Annual Report at [http://www2.dot.state.fl.us/planning/mileage/word/pdf/pdf\\_report\\_final\\_inet.asp](http://www2.dot.state.fl.us/planning/mileage/word/pdf/pdf_report_final_inet.asp)

<sup>4</sup> State of Florida.com “Florida Quick Facts,” available at: <http://www.stateofl.com/Portal/DesktopDefault.aspx?tabid=95>, accessed. July 23, 2008.

**Strategy:**

**Goal 3:** Ensure that the long-range planning process on transportation addresses adaptation and the protection of critical infrastructure.

The following strategies support all three goals:

**Strategy A:** The Florida Department of Transportation (FDOT) should update the Florida Transportation Plan in cooperation with federal, state, regional and local governments and modal partners to develop long range goals, objectives, and strategies for addressing climate change and adapting to potential impacts from climate change.

**Strategy B:** State, regional and local governments and modal partners in Florida should work cooperatively to identify and evaluate transportation infrastructure at risk and for coordinating adaptation efforts, that infrastructure that are immediately landward of coastal high hazard areas or provide emergency evacuation routes for coastal populations.

**Strategy C:** FDOT should continue its analysis of rainfall statistics and hurricane surge (including updating such statistics and analyzing the accompanying affects of wave forces and erosion on highways and bridges) and in other areas to identify infrastructure at risk.

## **ADP-6. Transportation and Other Infrastructure**

This section has been moved to ADP-5.4.

## ADP-7. Economic Development

### Description of Issues

Florida's gross state product in 2007 was more than \$734.0 billion. Of that, agriculture was \$7.0 billion, mining was \$1.0 billion, and construction was \$45.0 billion. In 2007, Florida had more than 85 million visitors, generating more than \$65.0 billion in revenues.

### Objectives

- To adapt Florida to new economic trends and realities brought on by the powerful drivers of energy and climate change;
- To generate useful economic trend analysis and data to guide economic development decision making; and
- To create policies, programs, and implementation mechanisms that support the ability of Florida's economy to adapt to climate change.

### Assets at Risk

Climate change is likely to have a significant effect on all sectors of Florida's economy. Some sectors will likely face acute challenges, while others will likely enjoy growth opportunities. There could be significant damage to some economic sectors, such as real estate, tourism, agriculture (e.g., productivity and export markets), and other resource-based industries.

The state would benefit by early identification of business opportunities (and risks) associated with climate change to increase its global competitive advantage and to increase the creation of new jobs within the state. An impact assessment is needed to forecast potential disruption to Florida's major economic sectors due to climate change impacts, such as more frequent tropical storms, SLR, drought, acute flooding events, saltwater intrusion, and possible habitat and species disruption.

Successful economic adaptation will require anticipating and responding to the challenges and opportunities, given such economic trends.

### Existing Actions

To be drafted by DEP staff:

The DEP...

The FWC...

The Florida Department of Agriculture and Consumer Services (FDACS)...

## Goals and Strategies

**Goal 1:** The Office of Tourism, Trade, and Economic Development (OTTED) and Enterprise Florida—in conjunction with the FECC—should undertake an analysis to look at new opportunities and at economic sectors that may be negatively impacted.

**Goal 2:** Establish the economic value and importance of natural resources to the state economy overall and to tourism and other resource-based sectors.

**Goal 3:** Identify policy issues related to habitat and species management, human needs, hunting, fishing, boating, and outdoor recreation.

## ADP-7.1 Tourism

Tourism in Florida constitutes more than 10% of the state's economy. The state's thriving tourism sector depends on the richness and diversity of Florida's natural resources. Its climate, forests, parks, waterways, beaches, marine systems, habitat, species, flora and fauna, and other attractions bring more than 70 million tourists to the state each year.

SLR, increased hurricane intensity, increased storm intensity, drought, wildfires, human health risks, and other outcomes of climate change could be threats to Florida's tourism industry. In addition, rising temperatures could make locations further north relatively more attractive to tourists.

## Goals and Strategies

**Goal 1:** Assess the economic impact of climate change on the tourism sector.

**Goal 2:** Given the state's interest in ensuring a healthy tourism sector, assess the level of appropriate investment in the state's natural resources.

## ADP-7.2 Other Resource-Based Industries

Resource-based industries include tourism as well as agriculture, forestry, marine resources (e.g., commercial fishing), aquaculture, and mining. While these constitute only about 1.0% of the state's economy, such industries are important to Florida's way of life and character. The state should contemplate its interest and role in mitigating the impact of a changing climate on these sectors.

## ADP-7.2.1 Agriculture

The productivity of many crops may be impacted by warmer temperatures, altered precipitation patterns, more intense storms, changes in runoff patterns, invasive species, and new pests. Biofuels may present new growth opportunities; however, adequate care should be

taken not to displace food crops. Planning for adequate water supplies may be important to sustaining this sector.

### Goals and Strategies

**Goal 1:** Assess potential changes in the geographic range, climate tolerances, and economic viability of current and potential new annual and perennial crops and livestock.

**Goal 2:** Review land-use, tax, and subsidy policies to encourage appropriate adaptation in the agriculture sector.

**Goal 3:** Assess potential changes in the extent and distribution of irrigation demand and supply for agriculture that are due to climate change and incorporate long-term planning for agriculture.

### ADP-7.2.2 Forests

Aside from the inherent value of Florida’s forests as habitat for many native species, they have economic value as recreational areas for ecotourism activities and in traditional commercial applications as a resource for building products. In addition, Florida’s many acres of longleaf pines and bottom hardwoods on public and private lands are excellent carbon sinks and could be a source of revenue for public and private landowners through a carbon-credit trading system.

Forest resources must be conserved and expanded. Work needs to be done to determine the level and areas of risk from climate change impacts (e.g., drought, pests, storms, saltwater intrusion, and invasive species) for this valuable resource.

### Goals and Strategies

**Goal 1:** Continue existing land acquisition/management programs for forested lands.

**Goal 2:** Adopt land acquisition/management programs with a climate change component.

**Goal 3:** Explore adaptation of forest stocks through genetics to strengthen stocks against risks associated with climate change.

### ADP-7.2.3 Marine

Florida’s industries based on living marine resources include commercial and recreational fishing, marine ecotourism (including coastal parks and conservation areas), marine pharmaceuticals, and marine research and education. The direct 2006–2007 value of these industries to Florida’s economy was \$4.4 billion (National Ocean Economics Program [NOEP], 2008), and the indirect value of related infrastructure and support was many times larger. Adaptive responses to protect the core living resources these industries rely on are addressed in ADP-3, Protection of Ecosystems and Biodiversity. This section addresses threats to the

availability and human uses of the resources, beyond considerations made in other adaptation response actions.

The adaptive management of Florida’s marine resources and their sustainable use in a changing climate will be designed to protect the living resources and the social, economic, and cultural systems that form Florida’s industries.

The geographic ranges and abundances of living marine resources are likely to change as climate, ocean temperatures and currents, water quality, and related controlling factors change. Likewise, the ranges, abundances, and impacts of marine diseases, invasive species, parasites, and harmful algal blooms could change.

Fisheries, principal fishing grounds, ecotourism destinations, and the land-based operations and facilities that support these industries may migrate to different areas in the state as a consequence of these changes. Such changes have the potential to impact the economic viability of industries dependent on living marine resources. The same changes can also have negative effects on the health and safety of industry workers and consumers of industry products and services. Public and private investments in land acquisition for future parks and conservation areas, future working waterfronts for fishing and ecotourism, and future marine research and education facilities will be influenced by climate change, and the effects could be significant. The same processes that may diminish Florida’s existing marine industries may lead to new opportunities for fisheries, ecotourism, and allied economies. Adaptive management will require an ability to detect and exploit such possibilities.

## Goals and Strategies

**Goal 1:** Provide an integrated tracking and reporting system for the ranges, abundances, and condition of species valued for their roles in fisheries, ecotourism, aquaculture, pharmaceuticals, and research.

**Goal 2:** Develop and implement an integrated screening and tracking program for species die-offs, marine diseases, invasive species, and parasites that is modeled after programs that monitor the state’s harmful algal blooms.

**Strategy:** Goals 1 and 2 will be met through the use and expansion of existing state and federal programs and platforms for monitoring, event responses, data management, and public reporting.

**Goal 3:** Implement educational programs to reduce vessel-based conveyances of unwanted species into Florida waters and to protect industry workers and consumers from novel health and safety challenges.

**Strategy:** Collaborate with the Florida Sea Grant College Program (FSG) to implement the programs.

**Goal 4:** Develop conceptual plans for the co-location of new working waterfronts for activities such as fishing, ecotourism, and marine research that employ green infrastructure adapted to emerging challenges of climate change.

**Strategy:** Engage university planning, engineering, and architectural schools in developing the conceptual plans.

#### **ADP-7.2.4 Aquaculture**

Aquaculture is a rapidly developing industry in Florida. As the state’s fisheries become depleted, either through over-harvest or climate change impacts, cultured seafood products will increase in importance. Florida producers sold \$74.9 million of aquaculture products in 2005, ranking Florida seventh in the nation in terms of aquaculture sales. More than 900 Florida aquaculturists produce the largest variety of aquatic species of any state in the nation. Tropical fish dominate the Florida aquaculture industry as the number one commodity with \$33.0 million in sales in 2005, also making the state the number one producer nationwide. The state is also a leading U.S. producer of farm-raised aquatic plants and an important producer of hard clams.

The industry could be threatened by warmer water temperatures, which may make current breeding grounds unsuitable in the future by exceeding thermal tolerances of the species in question, reducing dissolved oxygen levels, and allowing for the introduction of pests and disease. SLR can threaten facilities with inundation, turn freshwaters brackish, and inundate coastal wetlands. Increased intensity of hurricanes and other storms can damage or destroy fisheries and facilities. Drought can reduce freshwater flows and degrade water quality.

#### **Goals and Strategies**

**Goal 1:** Develop plans for increasing seafood product aquaculture to supplement declining ocean stocks.

**Goal 2:** Encourage expanded and increased leases for aquaculture on submerged state lands.

**Goal 3:** Review existing out-of-state marketing programs with an eye to increasing those sales of Florida aquaculture products.

**Goal 4:** Identify and institute management practices to ensure healthy growth of this industry.

**Goal 5:** Identify innovative and federal funding sources for mitigation and adaptive strategies.

#### **ADP-7.2.5 Mining**

Nationally, Florida ranks fifth in the production of limestone, sand and gravel, clay, peat, heavy minerals, and phosphate. The state’s mines supply one-quarter of the world’s and three-quarters of the U.S. domestic needs. Nearly all of the phosphate mined is used for the national and international production of agricultural fertilizer. In 2000, approximately \$1.13 billion

worth of fertilizer was exported. Phosphate mines in northern and central Florida have been a valuable resource for the national and international production of agricultural fertilizers, although many of these lands are now considered degraded and disturbed.

After mining operations have ceased, these lands could be used for rotation bioenergy crops, as well as for carbon sequestration. Mining also has implications for aquifers and water supplies and storage that should be noted here.

### Goals and Strategies

- Study soil carbon dynamics to estimate the long-term potential for carbon sequestration in new growth forest and through underground sequestration.
- Determine environmental and cost benefits of developing short-rotation woody crops on formerly mined lands.
- Review and select tree species appropriate for such sites.
- Identify management practices to ensure plant survival and maximize growth.

### ADP-7.3 Construction

Construction is more than 6.0% of Florida’s economic output. Construction employment represented approximately 8.5% of total non-agricultural jobs, and more than 210,000 annual building permits were issued as recently as the end of 2006. The industry has been affected by a change in supply and demand for key building materials (e.g., lumber, cement, reinforcing steel, and plywood), resulting in huge increases in prices that in some cases reached 200%, 300%, or higher in just one year. Climate change has the potential for exerting significant impact on the construction sector through such changes as extreme precipitation, drought, SLR, or the exacerbation of natural hazards such as storm surge and flooding.

Climate change–driven modifications in the construction industry have the potential to significantly impact the economy of the communities and regions affected. The consequences of climate change may include the following, all of which would likely result in increased costs:

- The need to adapt existing and future buildings so that they can withstand the impacts of climate change will require that design professionals carry out additional studies and calculations or engage other experts as consultants.
- Buildings may need to have deeper and stronger foundations, be elevated above a higher “zero flood elevation,” have much higher insulation values than currently required, have much higher roof drainage capacity, or incorporate green building features.
- Higher temperatures during the work day or higher and more frequent extreme precipitation events have the potential for affecting working conditions, which will increase not only the cost of construction but also the income of construction workers.

- Should the need for adaptation become a requirement for new construction, the demand for adaptation-related practices would increase.
- Retrofitting, demolition, or conversion projects of existing buildings may be needed to adapt them to climate change, or to retreat from hazardous zones.

Retreat may have an adverse effect on the volume of construction in relatively vulnerable areas, leading to economic losses and labor reductions in the construction industry.

## Goals and Strategies

**Goal 1:** Identify the sensitivity of the construction industry in Florida to a range of external, non-climate change–driven factors that have the potential for affecting the economic aspects of the construction industry.

**Strategy:**

**Goal 2:** Measure the economic impact resulting from climate change–driven consequences on the construction industry and related sectors and from non-climate change factors, with projected scenarios at 5-year intervals.

**Strategy:**

**Goal 3:** Identify those communities, regions, or sectors along with related or interlinked sectors that may suffer adverse economic consequences as a result of the impact of climate change on the construction industry, and commission a study to identify effective measures to reduce the potential for such adverse consequences.

**Strategy:**

**Goal 4:** Measure how adaptation procedures applied through construction methods, materials, or design criteria may reduce the risk of damage to the built environment and link such risk-reduction to a reduction in insurance premiums.

**Strategy:**

## ADP-8. Insurance (Property and Casualty)

### Description of Issues

With more than 2,000 miles of coastline, Florida is physically and financially vulnerable to the effects of climate change. Ninety percent of Floridians live within 50 miles of the coast, and the value of property in this area is approaching \$2.0 trillion. Additionally, the state's largest insurance company—Citizens Property Insurance Corporation—has 1.3 million policyholders and is financially supported by Florida's insurance consumers.

Insurance from flooding falls under the National Flood Insurance Program (NFIP), which is administered by the federal government, and Floridians account for 40% of NFIP's policyholders. Insurance for wind damage is typically covered by private insurance policies, which are regulated by state governments. The Citizens Insurance Company is the insuring entity of last resort for hurricane wind coverage.

### Assets at Risk

Insurance companies in Florida insure assets worth billions of dollars—homes, businesses, agriculture, infrastructure, parks, and beaches. All of these assets and more are at risk to the myriad effects of climate change. Florida's current pricing structure does not truly reflect the risk of loss, particularly for Florida's coastal regions.

Scientific studies have established that climate change increases the intensity of hurricanes. In addition, SLR will erode shorelines, threatening many properties, and will result in higher storm surge from hurricanes. Other climate outcomes, such as wildfire, intense rain events, and drought can also pose risks to lives and property. Given Florida's geography, coastal density, and a \$65.0 billion dollar tourism economy, plus eight major storms in 2004 and 2005, property insurance and affordability issues are one of Florida's greatest challenges.

### Existing Actions

In 2005, the Florida Legislature passed a law requiring all residential property insurance companies to file with the Office of Insurance Regulation (OIR) a range of premium discounts offered to customers who live in homes of certain construction types or who apply loss mitigation devices (like shutters) to their homes. Beginning on September 5, 2007, all property insurers were required to offer higher discounts in their insurance rates for policyholders who had recognized loss mitigation devices on their homes. Insurers are required to send a list of those discounts with exact dollar savings to all new and renewed policyholders.

The NFIP, managed by the federal government, provides insurance for damage from flooding (e.g., storm surge). Damage from wind and other causes is typically covered by private insurance. In 2007, Florida created the Florida Citizens Property Insurance Corporation (CPIC)

to provide multi-cause and wind-only insurance coverage to homeowners and businesses in Florida.

### Goals and Strategies

**Goal 1:** Encourage insurance companies to provide policyholders with greater disclosure about climate risk. Insurance companies need to adequately inform their customers and shareholders about the risks climate change poses to the insurance business and the ability of the industry to pay policyholders' claims. Insurance companies also need to take necessary steps to mitigate against these risks.

**Goal 2:** Understand the relationship between the threats of climate change, SLR, and providing affordable insurance premiums to Florida home and business owners. Address equitable and fair differences in insurance for coastal and inland properties.

**Goal 3:** Florida should develop policies that make coastal communities and infrastructure more resilient to natural disasters through programs such as the My Safe Florida Home program.

**Goal 4:** Fully define the issues surrounding risk-based pricing in the property and casualty insurance industry for Florida.

**Goal 5:** Insurance pricing and availability can encourage or discourage particular forms of coastal development. Subsidized coastal insurance policies such as the Florida CPIC, should be consistent with federal and state programs designed to reduce high-risk shoreline development, increase coastal system resiliency, and protect important coastal resources vulnerable to risks associated with climate change.

## ADP-9. Emergency Preparedness and Response (Extreme Events)

### Definition of Issues

Throughout the history of settlement in Florida, extreme weather events—particularly in the form of hurricanes—have played a major role in shaping culture, commerce, and community development. As a result, Florida’s state government has developed one of the more robust emergency preparedness and response infrastructures in the nation. This was particularly evident in the depth of aid provided by Florida to Mississippi during the 2006 hurricane season in the aftermath of Hurricane Katrina.

Global climate change is likely to increase Florida’s risk of extreme weather events. Whether hurricane frequency will increase, given rising sea-surface temperatures, is uncertain at present. Current science supports increased intensity and duration for storms that form in the Atlantic and the Gulf of Mexico. When coupled with rising sea levels, future hurricane events may yield greater storm surge effects to put coastal communities at greater risk for damage than is the case today. In addition, there could be more intense rain events, droughts, wildfires, and heat emergencies.

Extreme weather across the state can

- Overtax the emergency response systems and funding for flood response,
- Result in major storms and power outages,
- Affect buildings or transportation routes, and
- Cause drought-related fires.

Hurricanes, as Florida’s typical extreme weather event, may no longer be the only major threat to Floridians. An analysis of predictable climate change impacts would include projections for other intense rain events, not to mention increased droughts, wildfires, heat, and public health emergencies.

Additionally, given the many fronts that climate change is expected to present to Florida’s emergency infrastructure, there is the possibility that several of these impacts might occur simultaneously.

Delayed emergency response could become more common.

### Objectives

Florida’s current emergency preparedness and response functions are a coordinated effort between federal, state, and local governmental agencies, as well as nongovernmental organizations (NGOs). The objective of Florida’s future emergency preparedness and response

functions must be to build on the excellence gained through past experience to ensure sufficient capacity and efficacy in protecting public health and welfare in more severe storm events with increased incidence of storm surge and the associated coastal damage. As the impact of SLR and higher storm surges becomes more evident, development patterns must be constrained to increase the resiliency of coastal communities and to protect those communities.

Floridians must be prepared for an increased incidence of heat-related illness in large sectors of the public, particularly given Florida's large population of older persons. As temperatures rise and the climate becomes more tropical, water- and vector-borne diseases now associated with more equatorial climates might become commonplace in Florida. This situation will be aggravated by increased flooding events and their associated impacts on certain portions of the public infrastructure such as sewage systems, hospitals, and nursing homes.

Moreover, Florida must be prepared to address the synergistic effects of multiple climate stressors on its emergency response infrastructure and, prior to such occurrences, must devise an approach to deal with this by building on our existing skills in emergency preparedness and environmental response. Policy makers in particular need information and data on changes in risks from climate change and need to know where to get such information.

### **Assets at Risk**

While all of Florida's counties are subject to extreme weather events, our coastal communities and ecosystems are at particular risk from increased storm surge and increased hurricane intensity. The vast majority (70%) of Florida's population lives in the coastal zone. Likewise, the vast majority of the state's existing building stock is situated near the coast. While many coastal ecosystems have adapted to periodic extreme weather, system resiliency in some cases may be undermined because of the loss of habitat, pressures from invasive exotic species, or other perturbations that prevent post-hurricane recovery.

Aside from risk to the human population from hurricane events, increases in temperatures may cause certain water- and vector-borne diseases normally associated with more southern climates to migrate to Florida. Increased flooding and infrastructure damages resulting from increased heat and flooding could aggravate these risks.

### **Existing Actions**

Many of the impacts that climate change is projected to bring are already familiar to Floridians. Consequently, programs to address impacts such as increased intensity of hurricanes and major storm events, storm surge and erosion, saltwater intrusion, and the availability of potable drinking water supplies are already up and running. Additionally, Florida's excellent emergency response infrastructure has proven itself under many scenarios, and the planning mechanisms that are part of that infrastructure are in place to deal with a large variety of catastrophic events. However, it is uncertain to what extent these programs and infrastructure will be affected by future impacts associated with climate change, or to what extent additional financial resources will be needed to meet these future conditions.

## Goals and Strategies

**Goal 1:** Ensure sufficient response capability among regional, state, and local first responders to potential increases in extreme weather events.

**Strategy:**

**Goal 2:** Increase the resiliency of coastal communities to storm surge.

**Strategy:** See ADP 2.1, Goal 4, Strategy D

**Goal 3:** Assess the role of ecosystems such as coastal wetlands and beaches and dunes in reducing risks from extreme events.

**Strategy:**

**Goal 4:** Plan for other extreme events (e.g., flooding, wildfire, and heat waves).

**Strategy:**

**Goal 5:** Develop a process for early detection, evaluation, and handling of extreme events resulting from climate change. Effectively disseminate such information to key emergency preparedness and response personnel.

**Strategy:**

**Goal 6:** Invest in emergency response and mitigation strategies for extreme environmental events likely to be exacerbated by climate change.

**Strategy:**

## ADP-10. Human Health Concerns

### Description of Issues

Florida’s current population is over 18 million, and 17% are over 65 years of age (higher than the national average of 12%). By 2030, Florida is projected to be the nation’s third most populous state with almost 29 million residents, with 27% of the population projected to be over age 65. That keeps Florida as the state with the highest population of older persons as a percentage of total population. Older people have greater vulnerability to impacts of climate change than the population at large, although children under 5, those living in poverty, and those living in coastal areas can also be vulnerable.

### Objectives

The health and wellbeing of the citizens is of prime importance to the State of Florida. Incorporating considerations of climate change into the state’s health plan to protect the citizens is as important as designing water treatment infrastructure to reduce harm to human health.

Successful research in this area would identify the increasing risks to human health, which segments of the population are most vulnerable, and how risks to their health can be reduced.

### Assets at Risk

Climate change is expected to have a wide range of impacts on Florida’s health systems. The historical range of mosquito- and vector-borne diseases may shift with a changing climate. More intense extreme weather events, such as hurricanes, heat waves, flooding, and wildfires, will directly impact human health in Florida. Equally important are alterations in the moisture content of the atmosphere and wind patterns that will likely affect the concentration of air pollution in a given location.

Climate change may increase the risk of some infectious diseases; particularly those diseases that appear in warm areas and are spread by mosquitoes and other insects. These vector-borne diseases include malaria, dengue fever, yellow fever, and encephalitis. Also, algal blooms could occur more frequently as temperatures warm—particularly in areas with polluted waters—in which case diseases (such as cholera) that tend to accompany algal blooms could become more frequent. These diseases can be transmitted to people and can also affect livestock and wildlife, which can indirectly affect people.

### Existing Actions

To be drafted out by DEP staff.

### Goals and Strategies

### ADP-10.1 Health Care

**Goal 1:** Ensure that health codes and policies are adequate to protect against known risks from observed (current) climate and appropriately incorporate potential changes in risk that are due to climate change.

**Goal 2:** Regularly revisit health codes and regulations as evidence of new or altered risks from climate change arises.

**Goal 3:** Strengthen vaccine campaigns.

### ADP-10.2 Air Quality

**Goal 1:** Ensure that air quality polices provide an adequate level of safety to protect against known risks from the current climate.

**Goal 2:** Ensure that new air quality policies incorporate potential changes in risks from climate change to ensure appropriate design and adequate mitigation factors.

### ADP-10.3 Water Supply and Wastewater Treatment

**Goal 1:** Ensure that wastewater infrastructure provides an adequate level of safety to protect against known risks from the current climate.

**Goal 2:** Ensure that new wastewater infrastructure incorporates potential changes in risks from climate change to ensure appropriate design and capacity over the lifetime of projects.

**Goal 3:** Ensure that water treatment facilities are able to safely capture, store, treat, and distribute potable water as the climate changes, creating possible subsequent changes in rainfall patterns, SLR, and flooding. Water treatment systems should anticipate changes in source water quality and availability and plan for corresponding changes needed to ensure effective water treatment.

**Goal 4:** For aboveground storage, such as reservoirs, management and operations protocol should account for changes in rainfall patterns and the impacts such changes may have on the adequacy of the storage volume as well as the structural safety of the impoundment.

### ADP-10.4 Disaster Response

**Goal 1:** Establish communication mechanisms to coordinate efforts between disaster relief agencies and public health agencies.

**Goal 2:** Create communication systems and plans that address health issues associated with low-income and underserved populations and other vulnerable groups.

**Goal 3:** Provide adequate training for first responder and emergency responder personnel.

**Goal 4:** Limit growth in areas whose evacuation will be challenged by SLR and increased storm frequency or severity.

### **ADP-10.5 Medical Treatment and Biomedicine Development**

**Goal 1:** Increase the focus of medical schools at state universities to include diseases that can be attributed to climate change.

**Strategy:**

**Goal 2:** Promote the research and development (R&D) of biopharmaceuticals for treating diseases that can be attributed to climate change.

**Strategy:**

## ADP-11. Social Effects

### Description of Issues

Currently Florida’s population is over 18 million, and its projected growth is to 29 million by 2030. Additionally, Florida’s coasts are home to an estimated 70% of the population. The coastal environment provides diverse habitats for countless marine and terrestrial species. For centuries, humans have lived, worked, and played along the coasts, and the ocean has long been an important component of the economy, from fishing to tourism.

Sea levels are expected to rise in the foreseeable future at an accelerated rate as the earth’s climate warms, which makes Florida’s coastlines particularly vulnerable. Climate change will likely affect not only the physical coastline, but also the millions of people who live and work in Florida. Understanding the impacts of climate change on Florida’s coasts and inland areas therefore requires the perspectives of sociologists, economists, and scientists alike.

Society can deal with slow trends in climate, occurring over the many thousands of years that are characteristic of ice age cycles, but decade-to-century changes (i.e., those that occur on the timescale of a human lifetime) and the ability of societies to evolve quickly enough are potentially catastrophic.

### Objectives

Climate change has the potential to play a critical role on human behavior over the next century. Even if all human activities that contribute to global change were stopped today, change would continue, as the present surplus of GHG in the atmosphere will remain for centuries. At this time, the climate system is not well enough understood to “reverse-engineer” the climate to a state that best suits humanity. Therefore, Floridians need to decide today what changes they must make in their present behaviors in order to live in the changing climate.

Disaster management can provide some valuable lessons on encouraging changes in behavior. With Florida’s experience in preparing for and responding to hurricanes, the tactics and strategies that people have learned to use to mitigate the effects of climate variability are now very basic. People will make decisions based on what they know and how they have operated in the past. It will be more difficult to adapt to climate change if it is dramatic and sudden and causes large disturbances. Thus, education and outreach (see ADP-15) will be an important component of adaptation, as will understanding how people respond to changes in risks and information on changes in risks.

### Assets at Risk

Increased development to accommodate Florida’s projected population growth will most likely increase climate exposure and risks to Florida’s citizens and their current way of life. Florida must recognize that all regions of the state will encounter socioeconomic changes, including

- Increased housing and insurance costs, especially those related to storm events and SLR;
- Increased charges for energy consumption and transportation changes; and
- Increased cost of infrastructure improvements, including roads, sewer systems, wastewater treatment facilities, water control structures, and property protection.

An additional concern is the migration of people. Florida could attract people migrating from the Caribbean and elsewhere as a result of climate change impacts. In addition, it is possible that some Floridians will migrate inland from the coast.

### Existing Actions

To be drafted out by DEP staff.

### ADP-11.1 Social Justice Issues

**Goal 1:** Promote social and economic equity, improve environmental management, reduce poverty, decrease the discharges of wastes, increase consumption efficiencies, and increase the quality of life for the vulnerable.

**Strategy:**

**Goal 2:** Assess potential social impacts of climate change on incomes, and other measures of well-being in vulnerable communities.

**Strategy:**

### ADP-11.2 Food and Water Security

**Goal 1:** Ensure that access to safe food supply and water considers variations in risks from climate change such as SLR, increased hurricane intensity, inland flooding, wildfire, drought, changes in water quality, and other potential impacts

**Strategy:**

### ADP-11.3 Housing Security

**Goal 1:** Consider potential impacts of climate change on housing. In particular, plan for SLR to threaten homes and apartment buildings located on the coast. Also consider other impacts of climate change and their risks to housing, such as more severe hurricanes, flooding, and wildfire.

**Strategy:**

## **ADP-11.4 Intersection of Climate Change and Human Behavior**

**Goal 1:** Create incentives for the general public and businesses to use the latest technologies to adapt to climate change

**Goal 2:** Improve tracking of national and global trends on modifying human behavior and adopt the best management practices applicable to the State of Florida.

**Goal 3:** Convey information on the risks from changes in extreme events, including worst-case scenarios, to the public through education and outreach programs.

## ADP-12. Organizing State Government for the Long Haul

### Description of Issues

The range of adaptation planning issues outlined in this document is a testament to the number of issue areas and concerns that need to be adequately addressed to ensure that Florida successfully adapts to impacts caused by global climate change over the next century. In developing and implementing such a wide-ranging adaptation plan for the state, Florida will require a single point of focus within state government.

During the 2008 regular session of the Florida Legislature, HB 7135 (Ch. 2008-227, Laws of Florida) created the FECC and imbued the commission with a broad range of duties and powers, including responsibility for coordinating adaptation planning development and implementation within state government. The FECC is appropriately housed within the Executive Office of the Governor, thus elevating the climate change issue and enabling cross-agency coordination of efforts.

### Objectives

The principal objective is to ensure the creation of a single point of focus within state government that can continue assessing the risks posed to Florida by global climate change, develop increasingly informed adaptation planning over many decades, and learn from prior implementation to adjust adaptation planning in Florida as events on the ground change.

### Assets at Risk

Florida is a state with more than 1,300 miles of coastline and mostly low elevations. It is within the historic pathway of destructive weather events and particularly vulnerable to SLR, tidal surge, saltwater intrusion, and flooding. Coastal infrastructure (e.g., roads, bridges, and utilities) and towns and cities are also at risk. Florida has already felt the effects of mass human migrations for storm events alone. These conditions are expected to worsen in the future and be less temporary in nature. Freshwater resources are increasingly precious in the state and already pressured by Florida's growing population. Climate change poses risks to terrestrial and aquatic ecosystems, agriculture, forestry, and fisheries. All of these can add to existing stresses, such as population growth, land-use change, and pollution. The state of Florida will be affected by climate change through impacts on its physical assets, changes in revenues and expenditures, and changes in the activities it regulates.

### Existing Actions

The legislature created the FECC, which appears at present to have the sufficient scope, powers, and resources to accomplish the intent of this element of adaptation planning. However, it will be important to assess the effectiveness of the commission in addressing adaptation.

## Goals and Strategies

**Goal 1:** It may no longer make sense to allow land, transportation, habitat, fish and wildlife protection, and water planning and management to be considered separately at all levels of government. To manage these elements effectively, planning and implementation efforts will need to be better integrated.

**Goal 2:** The FECC should create a State Climate Change Adaptation Plan Advisory Team to draft a State Climate Change Adaptation Plan. The plan should include identifying management, engineering, and technical solutions; developing design concepts for preferred solutions; and conducting initial feasibility studies relative to the scope, budgets, regulatory compliance, and timelines for the implementation of specific proposed adaptation solutions on regional scales.

**Goal 3:** determine whether Florida should create a Coastal Commission to provide for more centralized authority and management of the state’s coastal resources in view of future climate change impacts. The study should review existing Florida institutions, such as the Florida Ocean and Coastal Resources Council and similar institutions in other coastal states.

## ADP-13. State Funding and Financing

### Description of Issues

Adequate adaptation funding for Florida would include funds made available to address the impacts of climate change. Many programs are already in place and are intended to deal with some of these impacts. Some of these programs are already funded and may even have dedicated financing streams, but most existing programs are subject to political and economic cycles and disruption. Climate change impacts can be expected to intensify in the future and might also occur simultaneously, on all fronts, as opposed to the isolated incidences that are customary to Floridians and program resources. If and when this happens, it can be expected to greatly increase the pressure on the funding and financing infrastructure.

### Objectives

Florida should be prepared to fund the protection of human health and critical infrastructure, as well as address other impacts of climate change, where feasible, within a framework of protection, accommodation and, in some cases, retreat.

### Assets at Risk

Florida is a state with more than 1,300 miles of coastline and mostly low elevations. It is within the historic pathway of destructive weather events and particularly vulnerable to SLR, tidal surge, saltwater intrusion, and flooding. Coastal infrastructure (e.g., roads, bridges, and utilities) and towns and cities are also at risk. Florida has already felt the effects of mass human migrations for storm events alone, and these conditions are expected to worsen in the future and be less temporary. Freshwater resources are increasingly precious in the state and already pressured by Florida's growing population. Climate change poses risks to terrestrial and aquatic ecosystems, agriculture, forestry, and fisheries. All of these stresses can add to existing stresses, such as population growth, land-use change, and pollution, further straining any existing funding and financial resources intended to address these impacts.

### Existing Actions

HB 7135, passed by the 2008 Florida Legislature, provided for the FECC, which is already preparing to explore funding and financing options with regard to adaptation issues in its deliberations.

Many of the expected impacts that climate change might bring are already familiar to Floridians. Consequently, programs to address such things as hurricanes and major storm events, storm surge and erosion, saltwater intrusion, and the availability of potable drinking water supplies are already up and running. Additionally, Florida's excellent emergency response infrastructure has proven itself under many scenarios and the planning mechanisms that are part of that infrastructure are in place to deal with a large variety of catastrophic events. However, it is not known to what extent these programs and infrastructure will be pressured by

future climate change–associated impacts or to what extent the funding will continue to be adequate under those future conditions.

## Goals and Strategies

Many of the goals and strategies in other ADPs will require financial and staff resources. Florida will need to consider the financial implications of the adaptation goals and strategies.

**Goal 1:** Examine existing funding and financing infrastructure to determine adequacy for meeting increased demands of climate change impacts.

**Goal 2:** Examine alternative financing methods to meet climate change demands and consider protecting them from short-term economic and political cycles by dedicating funding.

**Goal 3:** Consider strategies for emergency funding or financing mechanisms for unforeseen and unplanned consequences of climate change.

**Goal 4:** Consider carbon credit revenues as an adaptation financing resource.

**Goal 5:** Examine opportunities for other sources of funding such as federal funds from emerging federal climate change legislation. In addition, opportunities to coordinate with private financing, including foundation resources, should be examined.

## ADP-14. Coordinating with Other Regulatory and Standards Entities

### Description of Issues

The federal government is participating in a wide range of climate activities nationwide. They also fund state and regional entities that provide climate services. Activities include data collection and interpretation and product dissemination. Primary agencies involved include NOAA, U.S. Geological Survey (USGS), U.S. Environmental Protection Agency (EPA), Natural Resources Conservation Service (NRCS), and U.S. Department of Agriculture (USDA). Several products developed by federal agencies (e.g., drought severity categories and river flood forecasts) trigger a variety of Florida emergency and economic relief activities. Additional federal entities to be considered include the U.S. Energy Information Administration (EIA), U.S. Department of Energy (US DOE) (including the ENERGY STAR Program), National Science Foundation (NSF), and others.

In addition, a number of professional societies and other organizations are actively involved in activities to better understand the potential impacts of climate change on the members they serve. These societies often represent fundamental public service providers (e.g., water utilities [American Water Works Association] and coastal states [Coastal States Organization]) or are organizations such as the Heinz Center that have examined climate change risks and adaptation. These organizations need early involvement in decision making and will require sufficient data to make informed decisions regarding risk and reliability, public health and safety, and financial management. Collectively, they represent a broad base of the population, possess unmatched knowledge of the industry they represent, and offer tremendous opportunities for technology transfer, public education, and widespread reach.

### Objectives

Develop functional collaborative relationships between the State of Florida and selected federal government agencies, departments, and entities, as well as other states and, as appropriate, other countries and key professional societies to collaborate on climate change issues of mutual interest.

- Develop a research agenda to address shared interests and priorities.
- Identify and align with funding sources and allocation decisions essential to Florida's future as it relates to climate change.

### Assets at Risk

The federal government has the lead and is central to most of the significant climate change and related programs, research, funding, and information dissemination. Failing to actively engage with the various agencies will result in missed opportunities to ensure that Florida's needs are expressed, understood, and addressed. Additionally, working in a vacuum will result in waste

and inefficient use of the limited financial, intellectual, and physical resources and will not properly leverage the vast pool of people who have been working on climate change and related issues for years. Lastly, Florida must actively engage with the federal process and work as a cohesive unit (a state with numerous needs, challenges, and sometimes competing objectives) to ensure that the concerned parties are not competing with each other for limited dollars and research priorities.

### Existing Actions

HB 7135, passed during the 2008 Legislative Session, requires the DEP and the Florida Department of Education (DOE), in coordination with the business, environmental, and energy communities, to develop an awards program to recognize efforts or achievements in conservation, energy and water use reduction, green cleaning solutions, green pest management, recycling efforts, and curriculum development that enhance the quality of education while preserving the environment. The legislature encourages the Florida DOE and DEP to form partnerships with the private sector to help fund the program. The provision would implement an environmental and educational award/recognition program that encourages district school boards, teachers, classes, and students to actively participate in strategies leading to environmental preservation.

## 14.1 Federal Government

### Goals and Strategies

**Goal 1:** Develop a clear understanding of the functions and information available (needed) from key federal agencies.

**Goal 2:** Identify data gaps and prioritize research needs to establish an agreed-upon research agenda representing Florida’s collective needs.

**Goal 3:** Prioritize funding needs and develop a strategy to secure federal and federal flow-down funding to meet strategic needs in Florida.

**Goal 4:** Request and engage the support of federal agencies, such as NOAA, USGS, Federal Emergency Management Agency (FEMA), and the U.S. Army Corps of Engineers (USACE), that can provide technological and logistical support and work with RPCs and other state, county, and local planning bodies to develop regional scenarios of climate change and analyze potential changes in vulnerability.

The attachment **[to be added]** includes the name and summarizes the function of key federal agencies (by category) involved with, or who have a stake in climate change.

## 14.2 Professional Societies

### Goals and Strategies

**Goal 1:** Engage professional societies and other organizations in establishing industry priorities for research and funding and work with state and federal officials to promote priorities.

**Goal 2:** Develop training and technology transfer tools and engage professional societies in reaching their members.

**Goal 3:** Establish a cross-functional task force of members of professional societies and other appropriate organizations who will be responsible for coordinating climate change issues within their respective industries.

The attachment includes the names of and summarizes the function of key professional societies involved with or who have a stake in climate change.

## ADP-15. Public Education and Outreach

### Description of Issues

Public education and outreach about climate change in Florida is needed to support necessary mitigation and adaptation actions. Florida is “ground zero” for climate change impacts in the United States with its low lying and densely populated coastal zones, susceptibility to hurricanes, and vulnerable natural resources. It seems that few people realize Florida’s vulnerability, but these few are calling for detailed and accurate information and solutions. A focused and comprehensive stakeholder education and outreach program is a key component in building support for the mitigation and adaptation policy changes that will become critical issues in Florida.

### Objectives

Florida can become a national and international leader in the dissemination of climate change information in the process of educating a broad diversity of constituents with a cutting-edge and successful public education program. The success of any climate change adaptation demands full participation of the stakeholders (i.e., the citizens of Florida). The objectives of a successful public education outreach program would be fourfold:

1. To educate all of the stakeholders, including state leadership and state and regional government officials who implement adaptations, citizens of Florida (including retirees, families, the work force, and K-16 students), the broader business community, and faith-based and community organizations within and outside of Florida who are important stakeholders in Florida’s adaptation actions. Create incentives to encourage involvement of the public and key stakeholders Share not only current knowledge of the impacts already occurring and expected in Florida, but also short- and long-term solutions.
2. To design an overarching program that could be quickly and effectively disseminated to the stakeholders listed above, in clear, concise, and simple terms so all Floridians can embrace the knowledge. Use media such as the Internet that are widely and easily accessible.
3. Train, engage, and coordinate practitioners of climate change adaptation and needed technical support to help Florida plan for climate change. Climate change adaptation science and related policy improvements are developing fields requiring specific conceptual and technical skills, which exist independently in the expert community but require facilitation and training to bring together in a support group of adaptation experts.

4. Link outreach programs in public education to the best climate change science so that issues relating to adaptation and risk management create positive solutions to the environmental challenges of the future.

### Assets at Risk

Principal risks include misunderstood and failed policy actions resulting in political stalemate and inaction. The best climate change adaptation programs will be at risk if not embraced by the stakeholders. The best policies might be approved in Tallahassee, but the full understanding and education of citizens will ensure their timely implementation and endorsement. A good example is Sarasota County, which has excellent sustainability policies in force with local leadership, but very little comprehension of the issues or constituent “buy-in,” as witnessed by the fact that Sarasota County was recently “awarded” last place in a statewide carbon-footprint audit.

Additionally, adaptation only “buys time.” Rapid and significant GHG mitigation is the only long-term solution. Understanding that the two must go hand-in-hand is crucial.

### Existing Actions

HB 7135, passed during the 2008 Florida Legislative Session, addressed public outreach and education by requiring the DEP and the DOE, in coordination with the business, environmental, and energy communities, to develop an awards program to recognize efforts or achievements in conservation, energy and water use reduction, green cleaning solutions, green pest management, recycling efforts, and curriculum development that enhances the quality of education while preserving the environment. The legislature encourages DOE and DEP to form partnerships with the private sector to help fund the program. The provision would implement an environmental and educational award/recognition program that encourages district school boards, teachers, classes, and students to actively participate in strategies leading to environmental preservation.

### Goals and Strategies

**Goal 1:** Provide immediate training on climate change adaptation.

**\*Strategy A:** Conduct short (2-day) executive seminars for Chief Executive Officers (CEOs) and state legislators that have been designed for policy makers and that are conducted by scientists trained in public education outreach.

**\*Strategy B:** Conduct a follow-up series of comprehensive workshops (4–6 days) that mixes business and civic leaders from public and private sectors. Local teachers should be included in all sessions.

**Goal 2:** Educate the public.

**Strategy:** Initiate a major public education campaign. Use high profile media and other appropriate outlets to raise general awareness on climate change in Florida. Make connections between mitigation and adaptation solutions and policy changes. Educate the public about the expected costs of inaction and delayed action compared with the costs of acting proactively. Focal topics could include heat waves and associated health risks, SLR and associated infrastructure and property risks, wildfire risks, species disturbances and habitat loss or change and associated ecosystem services losses (impacts to valuable and highly visible resources such as coral bleaching), and risks to water supplies. Focus groups could include the public; policy makers; media; business leaders; developers; and land owners, buyers, and sellers.

**Goal 3:** Create adaptation training and collaboration opportunities.

**Strategy:** Create opportunities for government agencies to work together and with experts in climate change adaptation to develop needed skills in applying adaptation concepts to their daily management and planning efforts. Adaptation focus areas would be natural resources and ecosystem services, infrastructure and development, financial markets, job markets, and human health and welfare. Technical expert focus groups would include Florida's policy makers, research institutions, NGOs, water boards, state agencies, and the media.

**Goal 4:** Develop education programs on climate change adaptation for primary and secondary schools.

**Strategy:** Revise the state Sunshine Standards for K-12 education so that vulnerability to climate change and the practice of adaptation become required subject matter in the curricula of public schools in Florida. In conjunction with the state standards, a team of professional educators and scientists should be funded to develop effective units of learning for all grade levels to ensure that all students are educated about climate change adaptation and, most importantly, on mechanisms for families to conserve energy and live more sustainably.

**Goal 5:** Encourage research and training on adaptation in Florida's public universities and research centers. Encourage public universities and research centers in Florida to develop educational programs in disciplines and professions affected by climate change to focus on developing adaptation methodologies.

## Abbreviations and Acronyms

ABM	agent based model
AOR	areas of responsibility
BMP	best management practice
CAMA	[Florida Office of] Coastal and Aquatic Managed Areas
CCCL	Coastal Construction Control Line [Program]
CEO	Chief Executive Officer
CERP	Comprehensive Everglades Restoration Plan
CLIP	Critical Lands & Waters Identification Project [v1.0 database]
CPIC	[Florida] Citizens Property Insurance Corporation
DBPR	[Florida] Department of Business and Professional Regulation
DCA	[Florida] Department of Community Affairs
DEM	[Florida] Division of Emergency Management
DEP	[Florida] Department of Environmental Protection
DOE	[Florida] Department of Education
DOF	[Florida] Division of Forestry
EAR	Evaluation and Appraisal Process
EIA	[U.S.] Energy Information Administration
EPA	[U.S.] Environmental Protection Agency
ERP	Environmental Resource Permits
ET	evapotranspiration
FBC	Florida Building Commission
FDACS	Florida Department of Agriculture and Consumer Services
FECC	Florida Energy and Climate Commission
FEMA	[U.S.] Federal Emergency Management Agency
FESC	Florida Energy Systems Consortium
FLCOOS	Florida Coastal Ocean Observing System
FSG	Florida Sea Grant [College Program]
FWC	[Florida] Fish and Wildlife Conservation Commission
GHG	greenhouse gas
GIS	geographic information system
GP	Government Policy [TWG]
HB	House Bill
LEED	Leadership in Energy and Environmental Design™
LIDAR	Light Detection and Ranging
MPO	metropolitan planning organization
NFIP	National Flood Insurance Program
NGO	nongovernmental organization
NOAA	National Oceanic and Atmospheric Administration

NOEP	National Ocean Economics Program
NRCS	Natural Resources Conservation Service
NSF	National Science Foundation
OIR	[Florida] Office of Insurance Regulation
OTTED	[Florida] Office of Tourism, Trade, and Economic Development
R&D	research and development
RFP	Request for Proposal
RPC	Regional Planning Council
SCP	[Florida] State Comprehensive Plan
SLR	sea level rise
SRPP	Strategic Regional Policy Plans
STA	storage treatment area
SUS	State University System
TLU	Transportation and Land Use [TWG]
TMDL	total maximum daily load
TWG	Technical Work Group
US DOE	U.S. Department of Energy
US FWS	U.S. Fish and Wildlife Service
USACE	U.S. Army Corp of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey