

Draft Policy Framing Template Adaptation TWG

Section: ADP-4 Water Resource Management

Description of Issue: There are a wide variety of scientific opinions regarding how climate changes will manifest in Florida over the next 100 years. Water managers must nonetheless plan for potential increased variability in precipitation regimes, storm events, and rising sea levels. Significant changes in these phenomena from historical patterns are likely to result in changes to the amount of fresh water resources and land available to sustain life and maintain healthy water dependent natural systems. While Florida's extensive coast line 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 ground and surface water quality. 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 costs relative to deferring action until later.

Objectives: Florida recognizes four major water resource management areas of responsibility (AORs) as expressed in Chapter 373, F.S.:

- (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 ground and surface water quality.
- (3) Flood Protection – Identifying and protecting floodprone 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.

What is at Risk: A Tufts University Report, Florida and Climate Change: The Costs of Inaction (Stanton and Ackerman, 2007) describes the possibility of lower annual average precipitation, increased sea level rise - as much as 45 inches by 2100, and fewer, but more intense storms. These three currently predicted impacts alone could have serious implications for Florida's major areas of water resource responsibility.

Less Precipitation:

- Increased population pressures and dwindling fresh water supplies will present unprecedented challenges to ensuring that Floridians have adequate fresh water available to meet basic reasonable and beneficial needs. It is already clear that traditional groundwater sources will not support continued growth and this may be exacerbated by the potential loss of wetlands and recharge areas. Intensive conservation of all water uses will be essential and alternative water sources will need to play a larger role in meeting Florida's future water needs.
- Diminished surface water resources will require greater care to protect the quality and quantity of existing resources. In particular estuarine health, the source of Florida's commercial and recreational fisheries, may be at risk.
- Longer dry periods may change average annual rainfall requiring a change in how drought and other extreme events are defined. This would require changes in monitoring

compliance with Minimum Flows and Levels and Water/Consumptive Use Permits, how structures are operated and when alternative supplies sources are needed.

Sea Level Rise:

- Sea levels are known to be rising at present. According to Stanton and Ackerman the 27 inches in sea level rise predicted for 2060 will place some 4,700 square miles and one-tenth of Florida's current population or 1.5 million people at risk. This currently includes nuclear reactors and other power generation plants, a huge proportion of the State's tourism industry, superfund sites, wastewater treatment facilities and other vulnerable infrastructure.
- Sea level rise will increase saltwater intrusion into the Floridan aquifer further threatening drinking water supplies.
- Ecosystems are dynamic and evolve and transition even without rapid changes in climate. Management paradigms will need to focus on ensuring healthy ecosystems, rather than preserving familiar ones. In the course of changing rainfall and heat regimes, flora, fauna and soil types will change and migrate to fill more hospitable niches. Coastal ecosystems will likely migrate farther inland. Therefore, along with the need for human flexibility through adaptive management, we will also need to allow ecosystems to be flexible and adaptive.
- Many projects underway and in the planning stages may need to be reconsidered. Coastal recovery strategies that attempt to hold back saltwater intrusion, coastal restoration projects, coastal land acquisition and others may require redesign to allow for natural adaptations and movement inland.
- It may no longer make sense to allow land, transportation 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. Primarily, land uses and infrastructure placement cannot take place in the absence of water resource considerations.

More Intense Storms:

- If large, intense storm events become the norm Floridians will face greater challenges in planning for human safety and infrastructure protection during and after these events.
- Historic structural and non-structural solutions to minimize flooding risks may need to be reconsidered.
- More intense rainfall events will lead to greater scouring of natural watercourses and surface soils, less infiltration to replenish aquifers, and decreased water quality caused by more overland flow of stormwater carryings nutrients and other pollutants to lakes, rivers, estuaries and other waterbodies.
- These changes will necessitate changes in the basis for current Environmental Resource Permits, watershed and water quality modeling, structural operations and other flood management methodologies.

Goals and Strategies:

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Goal 1: To ensure that Floridians have adequate fresh water supplies available to meet basic reasonable and beneficial needs.

Goal 2: To optimize water available for use by humans and the environment under changing conditions of a drier and warmer climate, changes in salt and freshwater regimes and more erratic rainfall events.

Goal 3: To address water quality changes that may occur due to less frequent but heavier rainfall events, higher surface water temperatures, and rising sea levels on coastal aquifers.

Goal 4: To ensure the development of adequate plans and designs to address larger than historic storm events.

Goal 5: To minimize impacts of more intense storms and sea level rise on flooding of coastal and tidally influenced waterbodies.

Goal 6: To 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 7: To allow coastal estuaries, riverine and other water dependent ecosystems to migrate or adapt to maintain healthy wildlife and fish populations consistent with new weather regimes.

Goal 8: To ensure a sound economic structure that allows for innovative project development, infrastructure retrofits and repairs, adequate data collection and modeling and necessary additional staff resources.

[Strategies section left blank per instructions]

Priorities for Further Research and Analysis:

Water Supply:

- Continued innovation in the administration of District rules authorized under Chapter 373, F.S.
- Develop evolving technologies to improve the quality and reliability of data collection.
- Research to improve water use efficiency in various water use sectors.
- Identification of new storage areas and technologies.
- Continued development of alternative water sources.
- Partnerships with other public and private sector entities to leverage resources to extend existing water supplies and develop prospective supplies.
- Research to determine the effects that predicted climate changes will have on the production and cultivation of agricultural commodities.
- Focused research on how change will affect specific regions in FL. Most current research covers large areas such as the southeast U.S.
- Research to identify and determine changes to the rainy season.
- Research to forecast quantities needed to fill and retain adequate water in reservoirs and other storage facilities, needed water conservation education activities, appropriate quantities for water use permits, etc.

- Research to determine quantity effects of sea level rise on groundwater resources.

Water Quality:

- Continued aggressive establishment of Minimum Flows and Levels and development of innovative and evolving methods to respond to future adaptations.
- Continued innovation in District rules authorized under Chapter 373, F.S.
- Continued coordination with EPA, the Army Corps of Engineers, and other federal, state and local environmental agencies with shared jurisdiction to ensure that project activities will not degrade water resources.
- Continued land acquisition and management programs that preserve and protect land resources (including uplands and likely transitional areas).
- Land acquisitions that provide adequate buffer zones from activities that can adversely impact water quality.
- Research to determine quality effects of sea level rise on groundwater resources.
- Continue to work with local governments and others to ensure water quality goals are being met.
- Continue to work with the university community, Florida Yards & Neighborhoods, Adopt-A-Pond and other educational efforts to educate the public.
- Continue to implement innovative stormwater retention designs that maximize water quality benefits.
- Continued implementation of the TMDL program.

Flood Protection:

- Continue assistance to update FEMA maps and maintain data as development occurs and floodprone areas change.
- Continued innovation in the administration of District rules authorized under Chapter 373, F.S.
- Assist local governments with techniques to minimize development and infrastructure in potentially hazardous coastal areas.
- Research to determine effects of sea level rise on floodprone and historically non-floodprone areas.
- Develop stormwater retention designs and identify additional retention/storage areas to manage larger storm events.
- Continued coordination with federal, state, and local emergency response agencies to develop adequate preparedness plans for potential flooding events.
- Investigate and implement coastal and shoreline "rolling easements" to minimize potential structural damage and to maintain access and recreational benefits (tourism).

Natural Systems:

- Continued aggressive establishment of Minimum Flows and Levels and development of innovative and evolving methods to respond to future adaptations.
- Continued innovation in the administration of District rules authorized under Chapter 373, F.S.
- Develop processes to ensure environmental restoration work is done where long-term benefit is ensured.
- Emphasize partnerships with other resource protection organizations to better facilitate acquisition and preservation of additional lands critical to preserving Florida's natural water resources.

- Develop a long-term and dense monitoring network for natural system health to ensure these resources are not endangered.
- Investigate strategies such as "rolling easements" (similar to strategies used in Texas, South Carolina and Maine) to allow long-term coastal migration, ecosystem adaptation and public access.
- Research to determine quality and quantity effects of sea level rise on ecosystems in transition.

Other Remaining Issues:

It is critical to ensure that the science needed to address these future unknowns is increasingly robust. Much of the current research is focused on large regional areas. The ability to better project the effects of sea level rise, increasingly intense storms and precipitation and temperature changes in different areas of Florida will be essential to adapt to an uncertain future.

Increases in prolonged droughts may increase Florida's wildfire and ecosystem migration potential. Refocusing land acquisition priorities on those lands upland of wetlands to enhance protection and allow for migration may be warranted.

As the State endeavors to address the complex challenges of potential climate changes over the next 100 years, the need for additional staff resources to handle the many new responsibilities that may be engendered should be anticipated. New personnel with skills in the emerging areas of concern may be necessary to ensure success in meeting the many new challenging opportunities that lie ahead.