Role of Sea Level Rise Projections in the Flood Protection Level of Service Program

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Applying the 2019 Southeast Florida Unified Sea Level Projection:
Best Practices & Successful Implementation
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Who we are and what we do

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

• Oldest and largest of the state’s five regional water management districts
• Protecting water resources in the southern half of the state since 1949
• Our mission: To safeguard and restore South Florida's water resources and ecosystems, protect our communities from flooding, and meet the region's water needs while connecting with the public and stakeholders
Water Management System

- 2,060 miles of canals
- 2,028 miles of levees
- 160 major drainage basins
- 1,413 water control structures
- 71 pumping stations
- 60,000 acres of regional wetland Stormwater Treatment Areas
- Lake Okeechobee
  - 450,000 acre water storage area
- Water Conservation Areas
  - 959,000 acre water storage
Coastal Structures and Flood Protection

- Gravity Coastal structures on primary canals (also known as Salinity Barriers”) showing inefficiency during high tide
  - Designed and built in the 1950s
  - Finding from initial screening: Miami-Dade County most potential to be impacted

- Future potential rise in water table due to sea level rise will further impact flood protection

- Future potential increase in extreme rainfall and the projected increase in intensity and frequency of hurricanes will exacerbate sea level rise impacts
Exposure Screening and Vulnerability Assessment

- Vulnerability to higher tides, storm surge and sea level rise
- Loss in efficiency measured by structure closure resulting from high tailwater
- Screened all district structured based on original designs
- Most vulnerable structures are in Miami-Dade / Broward counties
- Reassessing in vulnerability using current data and operations
Flood Protection Level of Service Program

- Identify and prioritize long-term District infrastructure needs.
- Assess level flood protection throughout the 16-counties of the SFWMD – relative to design
- Identify at-risk structures and needed improvements to operations, canal conveyance or structures
- Provide a formal process to initiate retrofit and adaptation efforts for future infrastructure improvements and/or modification of regulatory criteria
- Incorporate resilient design standards and construction
- Coordinated with SFWMD Operations, local government entities, drainage districts and other agencies with flood control or related responsibility
Three Roles

- FPLOS Assessment:
  - Lends itself to nontraditional approach
  - Framing the problem
  - Assessment of the problem, and
  - Defining timeframe for action

- FPLOS Resilience Study and Adaptation Design
  - More traditional approach

- Resilient Infrastructure Implementation
  - More traditional approach
Application of Unified Sea Level Rise Projection in FPLOS Program

Traditional Approach
- Pick a planning horizon
- Establish a sea level to plan and design for
- Plan, design, implement projects
- Subject to uncertainties in projections

FPLOS Approach
- Find the limiting or threshold conditions for the flood controls assets
- Use the curve to establish timeframes for action
- Helps overcome analysis paralyses and inertia that often accompanies high cost projects with uncertainty in input

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<thead>
<tr>
<th>Year</th>
<th>IPCC Median (Inches)</th>
<th>NOAA Intermediate High (Inches)</th>
<th>NOAA High (Inches)</th>
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![Graph showing sea level rise projections](image)
- Establish sea level at which existing infrastructure can no longer provide flood protection
- Based on the time to build replacement, establish the conditions that trigger initiation of replacement infrastructure
- Monitor conditions and initiate adaptation strategy once conditions are realized
- Flood Protection Level of Service program provides the framework to realize this concept for SFWMD assets.
Adaptation Resilience Planning

**KEY**
- *Initiate Recommendations*
- Time period required for design and construction

- System Failure
  - Structural Upgrade, Retrofitting and/or Replacement

- Future Projected Sea Level

- Operational, Regulatory and Some Structural Solutions
  - LOS 1-in-5

- Operational Solutions
  - LOS 1-in-10

<table>
<thead>
<tr>
<th>Sea Level (Feet NGVD) Relative to Present (2015)</th>
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<tbody>
<tr>
<td>SLR3</td>
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<tr>
<td>SLR2</td>
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<table>
<thead>
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<tr>
<td>1963</td>
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Future Projected Sea Level
Questions