C&SF Section 216 Flood Resiliency Study Modeling Approach

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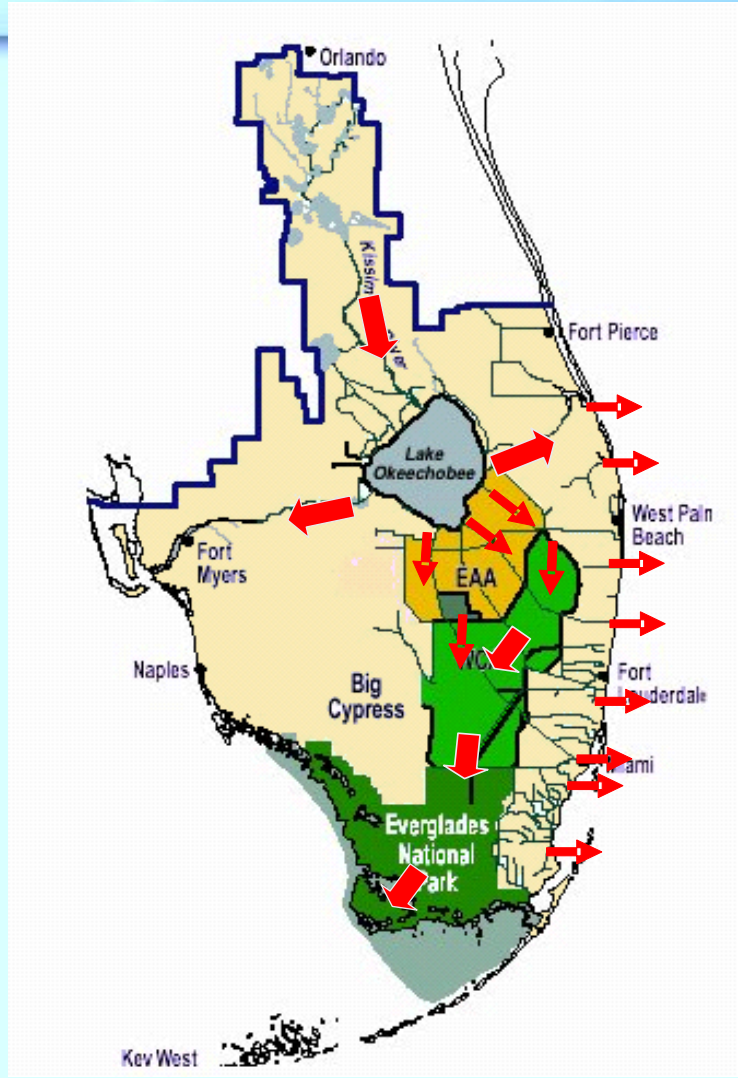
Central and Southern Florida Project for Flood Control and Other Purposes

- Designed for multiple purposes
  - Flood Control
  - Water Supply
  - Navigation
  - Prevention of Saltwater Intrusion
  - Protection of Fish & Wildlife
- Constructed by the U.S. Army Corps of Engineers between 1949 and 1970
- Operated and maintained by the South Florida Water Management District



C&SF Project/ Water Management System

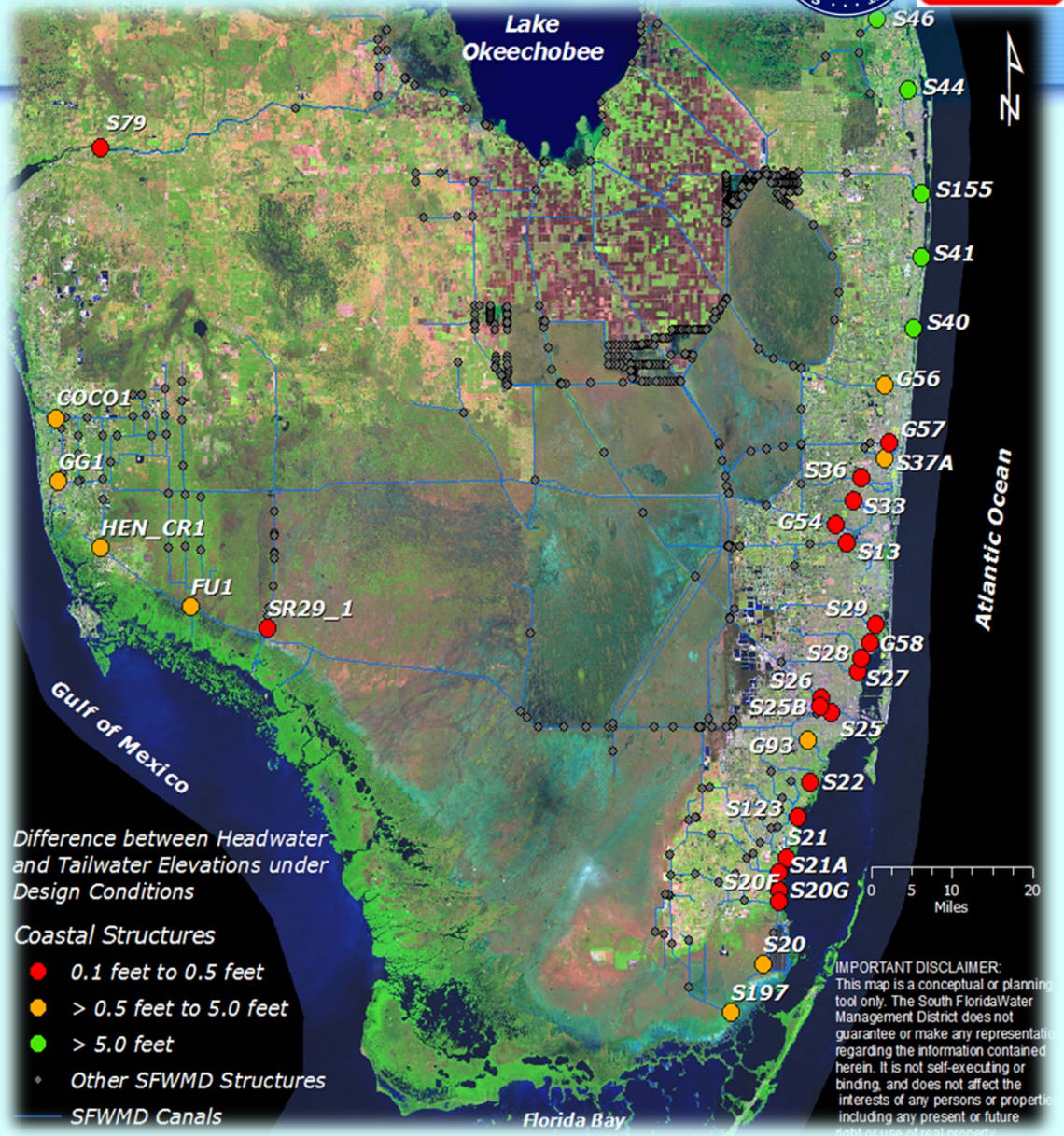
- 2,060 miles of canals
- 2,028 miles of levees
- 160 major drainage basins
- 1,413 water control structures
- 71 pumping stations
- 62,000 acres of regional wetland Stormwater Treatment Areas
- Lake Okeechobee
  - 450,000 acre water storage area
- Water Conservation Areas
  - 959,000 acre water storage

Some Changes over the years to Design Considerations

- C&SF Project designed and built 60+ years ago
  - Approaching end of design life
- Original design for an expected population of 2 million people/ now 6 million +
- Original projections were for less urban development than has occurred over the years
- Original design did not take into account the occurrence of sea level rise (SLR)
- Many low-lying structures are vulnerable to SLR

The Miami River, 1913

The Miami River, 1997



C&SF FLOOD RESILIENCY (SECTION 216) STUDY OVERVIEW

Authority

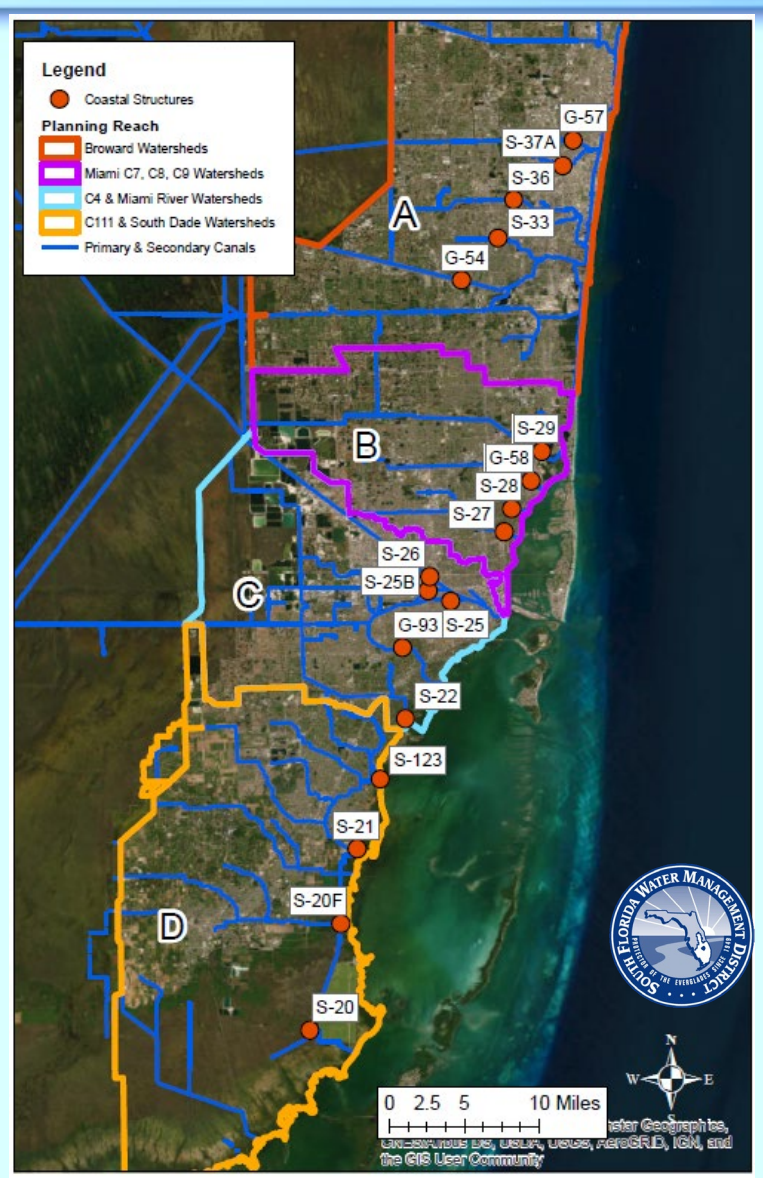
- Section 216 of the Flood Control Act of 1970 (33 U.S.C. 549a).

Purpose

- The Study will identify flood risk management (FRM) recommendations to build flood resiliency, now and into the future, and reduce flood risks within the lower southeast coast of Florida in southern Palm Beach, Broward and Miami-Dade Counties.

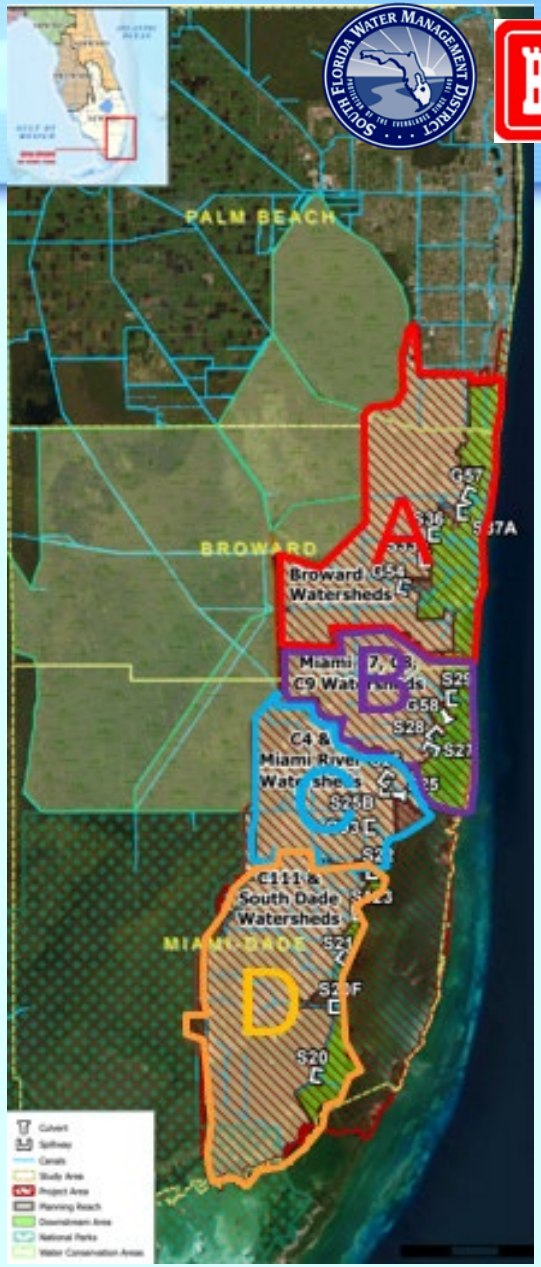
Focus

- Increasing the resilience and function of vulnerable coastal structures and the conveyance of the primary inflow canals



C&SF Section 216 Hydrologic & Hydraulic Modeling

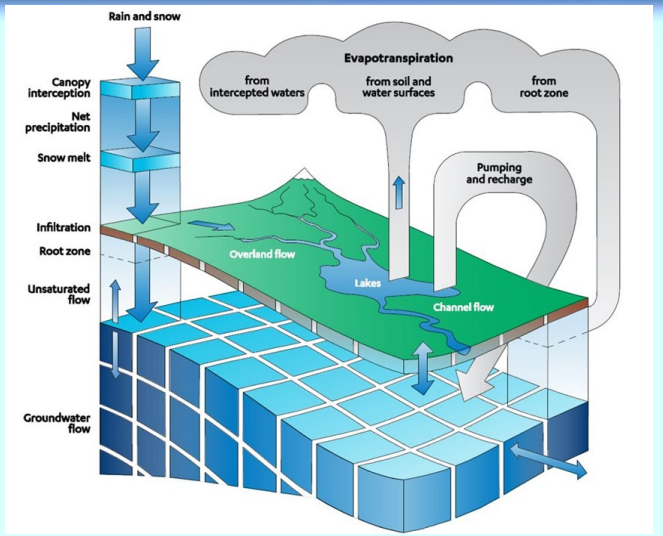
- Four Focus Areas for the Modeling
  - Reach A: Broward and Hillsboro Basins
  - Reach B: Little River and Nearby Basins
  - Reach C: Miami River and Nearby Basins
  - Reach D: South Miami Basins

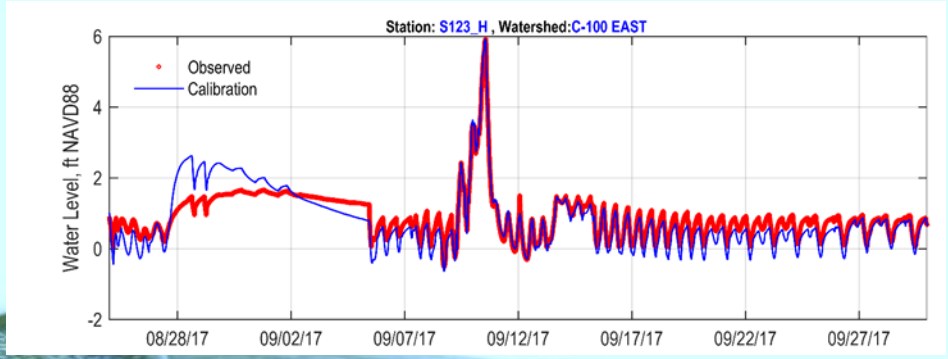


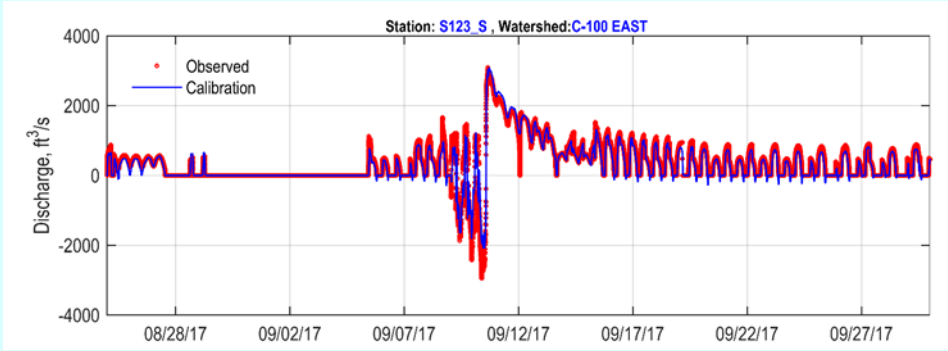
HYDROLOGIC AND HYDRAULIC MODELING TOOL

The integrated/coupled surface-groundwater model MIKE SHE/MIKE Hydro (2022) will be used to simulate the hydraulics and hydrology for the project area.

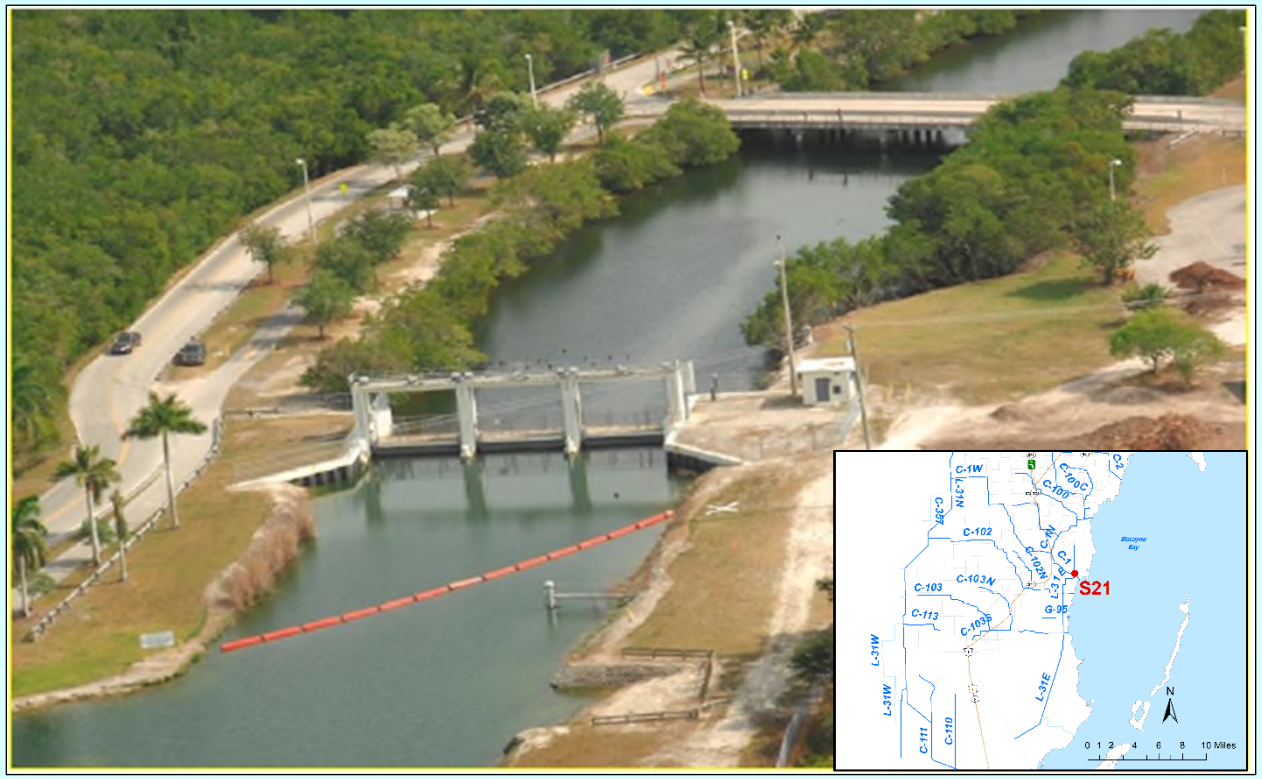
- Capability of conducting sub-regional scale simulations
- Simulate surface water and groundwater interactions
  - Allows for the accounting of rising water tables and reduced soil storage
- Able to simulate the effects of different boundary conditions such as tidal and storm surge-influenced tailwater conditions with current and future sea-level rise scenarios
- Comprehensive operational flexibility, can simulate structure gate operating rules and can use calibrated flow parameters for canal structures



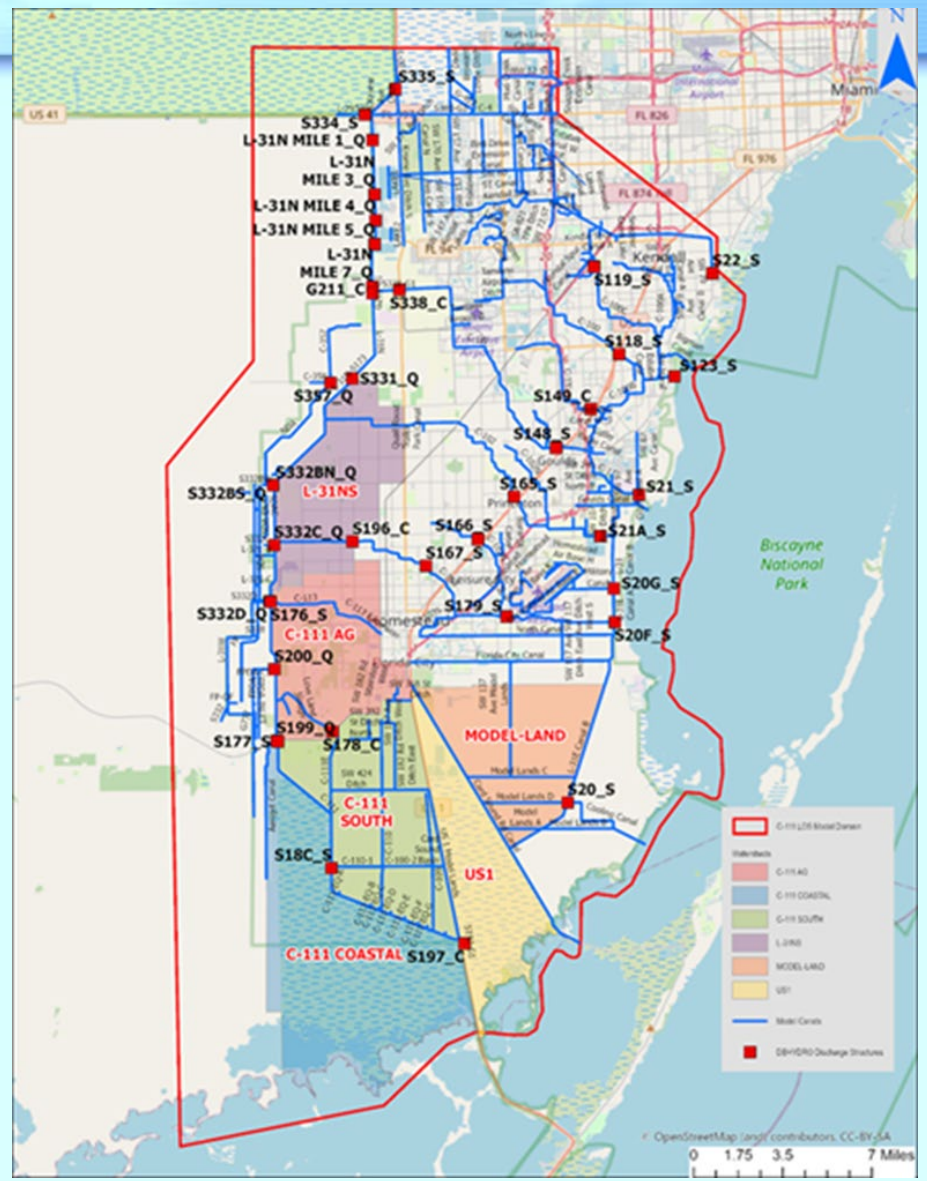




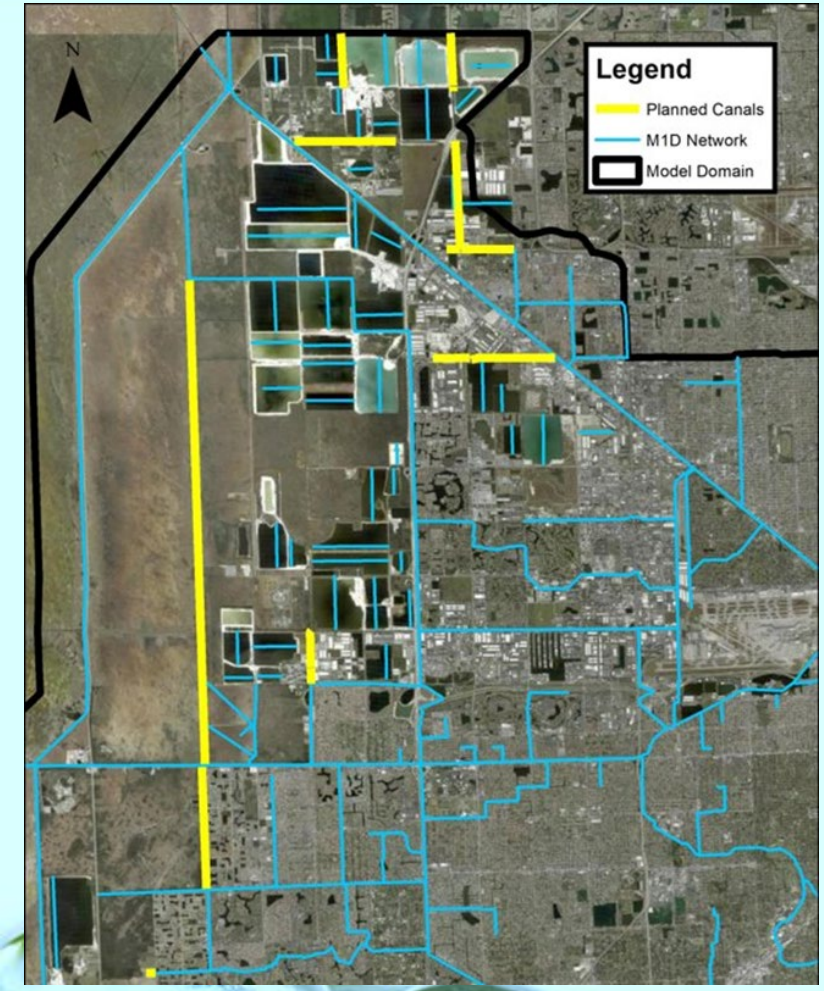
HYDROLOGIC & HYDRAULIC MODELING TOOL



S21 Tidal Structure



HYDROLOGIC & HYDRAULIC MODEL ADAPTATION



- MIKE SHE/HYDRO models have been extended to the downstream bay or estuaries
- Future land use and land cover has been updated
- The focus of this study is on the primary system; however, the model includes a high level of detail within the secondary/tertiary canal systems
  - New canals and proposed extensions from Miami Dade County and Broward County Resiliency will be included

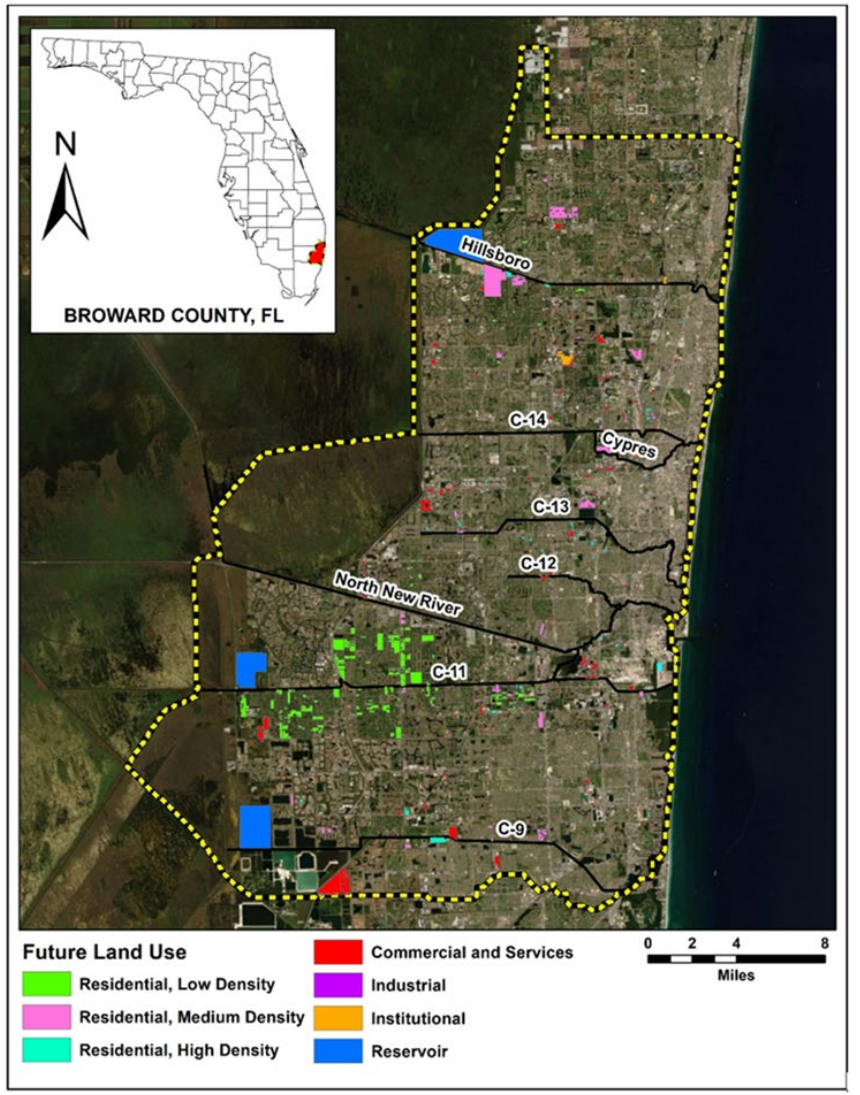
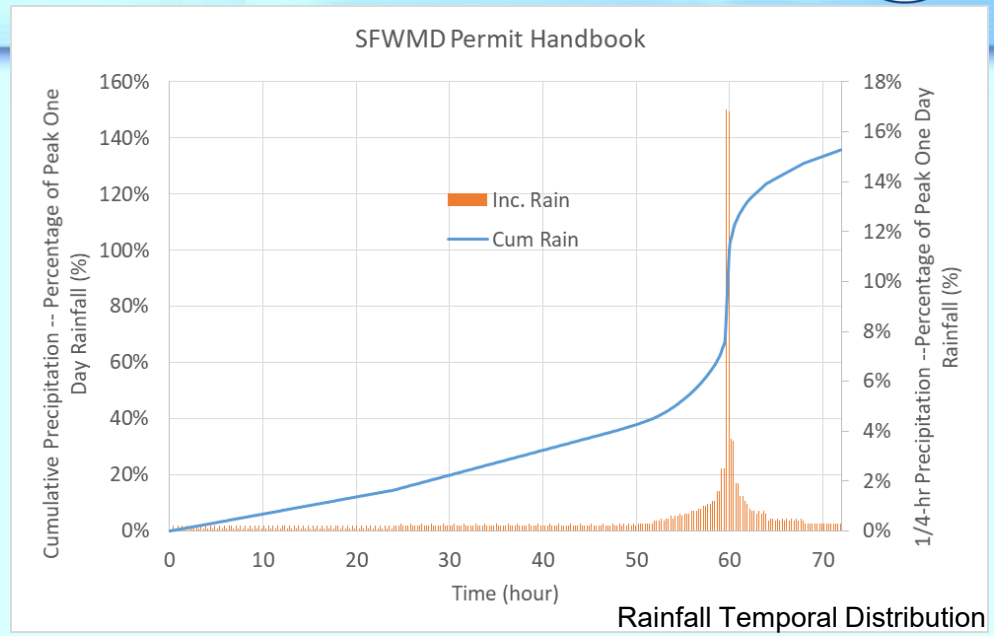


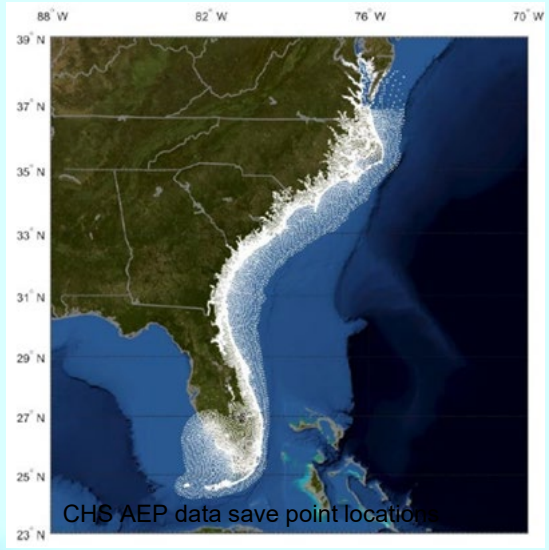
Figure 2.2-1: Areas of Future Land Use Change

MODEL INPUT DATA

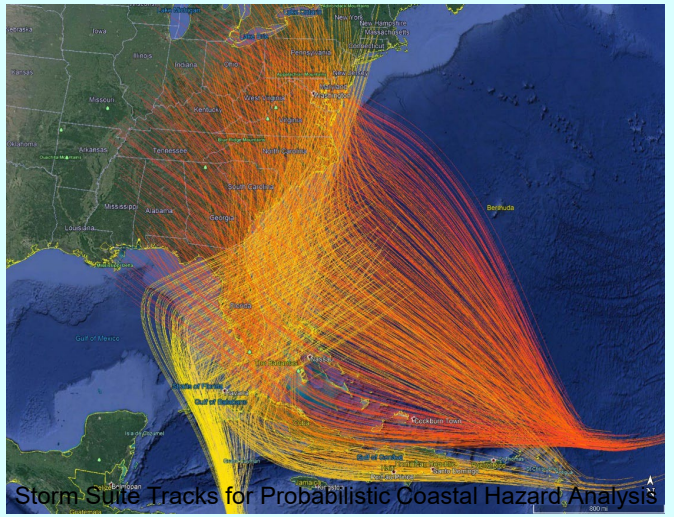
- **Rainfall**
  - spatially distributed gridded input derived from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 rainfall depths
  - Temporally distributed based on SFWMD 72-hour distribution
- **Coastal Boundary**
  - The South Atlantic Coastal Study (SACS) Coastal Hazard System (CHS) provides numerical and probabilistic modeling results for coastal forcings, including storm surge.
  - The CHS stage-hydrographs will be applied as a downstream boundary condition



Rainfall Temporal Distribution



CHS AEP data save point locations


Storm Suite Tracks for Probabilistic Coastal Hazard Analysis

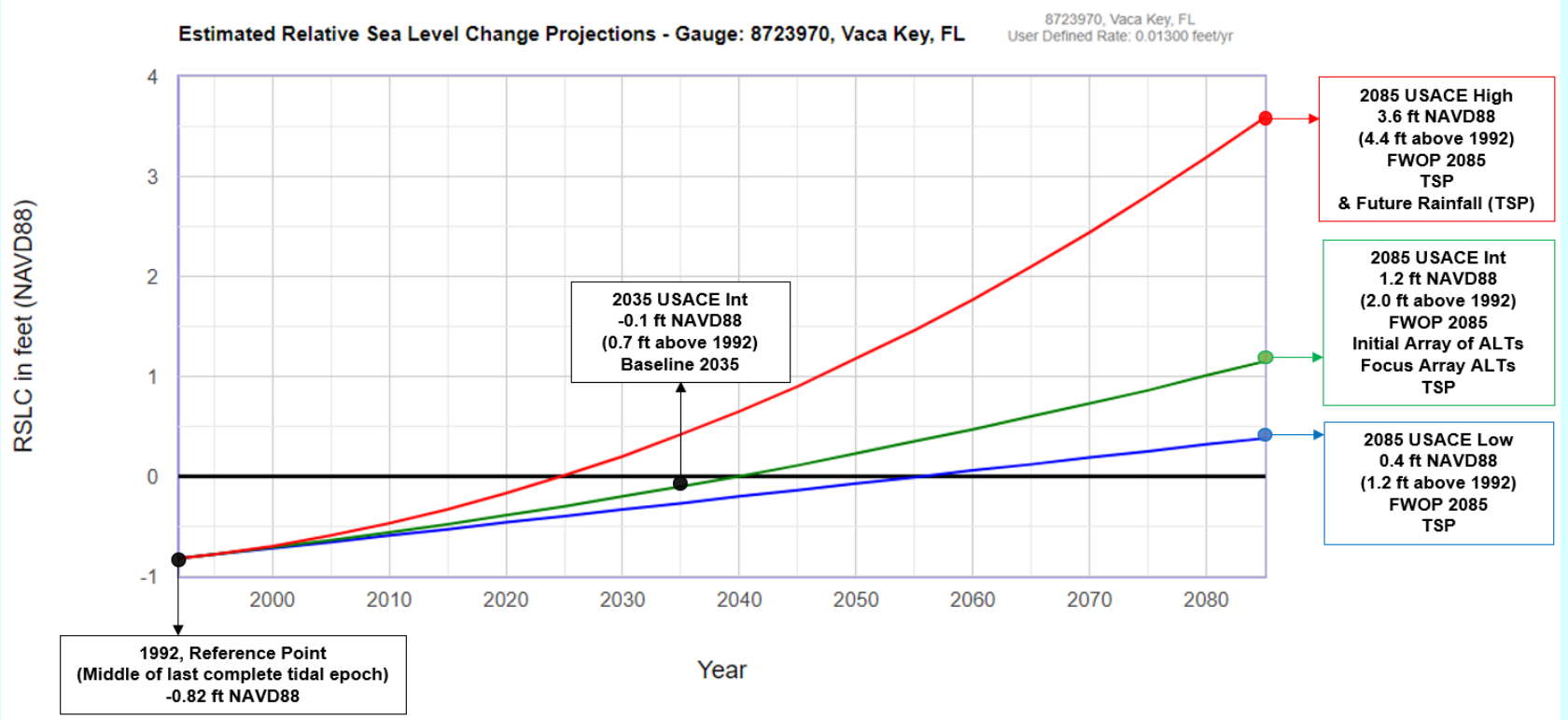
CLIMATE CHANGE STRATEGY

Inland Hydrology

- Future Extreme Rainfall: Future extreme rainfall change factors, as estimated by the 2022 USGS/SFWMD Study, will be incorporated as a sensitivity run for the tentatively selected plan

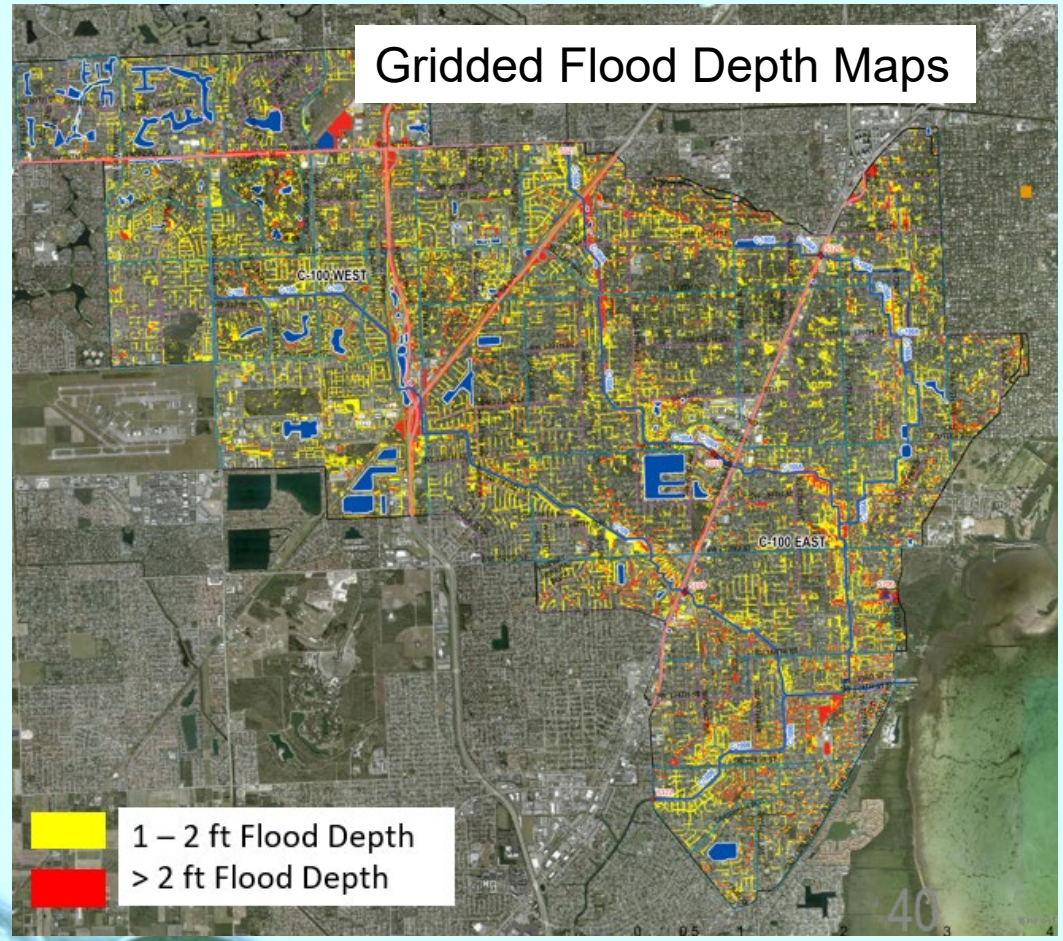
Sea Level Change (SLC)

- Vaca Key gauge
- SLC will be incorporated into the modeling as a boundary condition.
- The Future conditions will assess project performance for the Low, Int., and High curves for 2085



Adaptation and mitigation strategies will be developed for both potential vulnerabilities

Modeling Status and Assessment



- H&H Modeling
  - ECB (Current Condition 2035)
  - FWOP (Future Without Project 2085)
  - FWP (Future With Project) alternatives per USACE Comprehensive Benefits Guidance
- H&H Modeling Status: 80% complete for ECB, FWOP simulations
- Evaluation Criteria workshops with public currently underway to define performance metrics

(Sample output format- not Section 216 data)

Questions