CENTRAL AND SOUTHERN FLORIDA (C&SF) FLOOD RESILIENCY STUDY

EVALUATION CRITERIA WORKSHOP

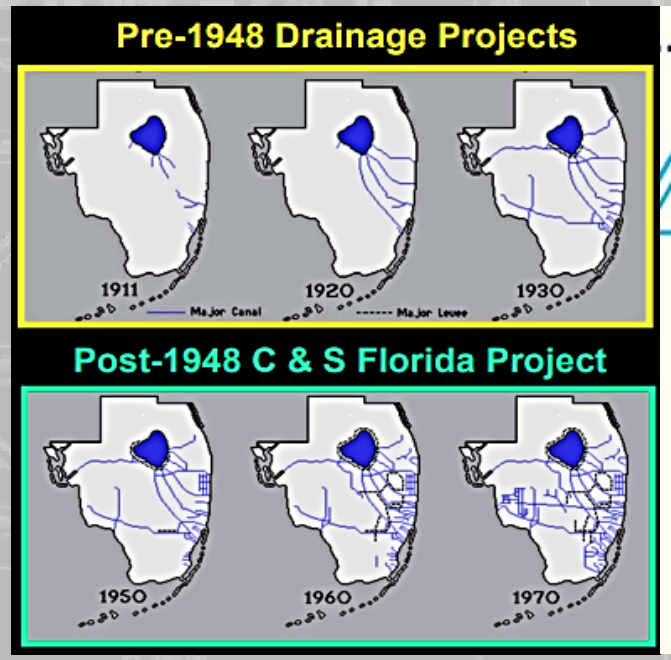
Public Meeting

24 October 2023

In-Person and Virtual Meeting

Working Today to Build a Better Tomorrow

US Army Corps of Engineers®



WORKSHOP GOAL AND AGENDA

Presenter: Gustavo Suarez, USACE Planning Technical Lead

WORKSHOP GOAL

Determine Metrics for the Evaluation Criteria of the Alternatives

AGENDA

1) Welcome/Purpose of the meeting – 20 minutes
    a) Project Overview
        - Multiple Hazards for the three counties
        - What hazards will this study address?
        - Where are we in the study process?
            1. Recommended Scope
            2. Recommended Schedule
            3. Recommended Modeling

2) Overview of 4 accounts – 35 minutes
    a) National Economic Development (NED)
        - Overview – 10 minutes
        - Discussion – 15 minutes
    b) Regional Economic Development (RED), Other Social Effects(OSE) and Environmental Quality (EQ) Overview – 10 Minutes

3) Breakout session Instructions and Goals – 5 minutes

4) Breakout session – 90 minutes
    a) Regional Economic Development (RED), discussion (25 minutes)
        - Reporting (5 minutes)
    b) Other Social Effects(OSE) Discussion (25 minutes)
        - Reporting (5 minutes)
    c) Environmental Quality (EQ) discussion (25 minutes)
        - Reporting (5 minutes)

5) RECAP/Next Steps – 30 minutes

1. WELCOME

Presenter: Marci Jackson – USACE , Chief of Plan Formulation Branch
Eva Velez – USACE, Chief of Ecosystems Branch
Carolina Maran – SFWMD, Chief of District Resiliency

PROJECT OVERVIEW

Presenter: Tim Gysan – USACE, Project Manager

STUDY OBJECTIVE

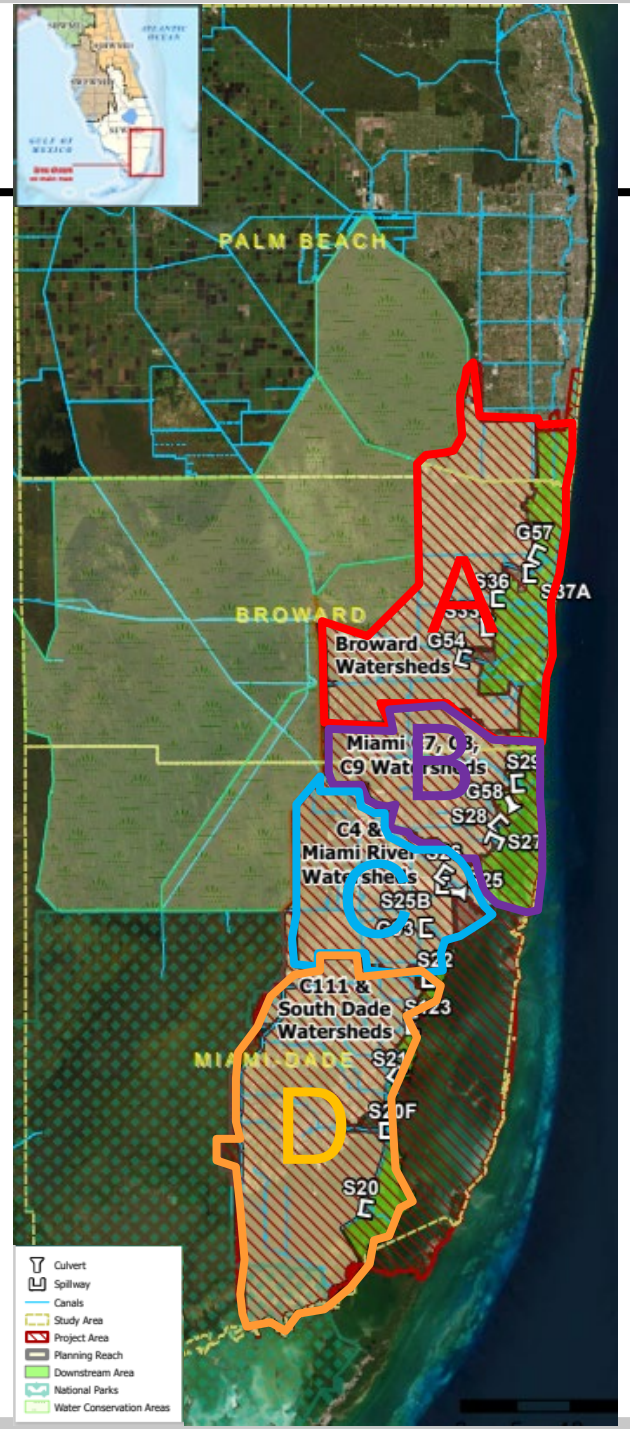
The study objective is to:

"Enhance existing C&SF water control system and salinity control structure's functionality and capacity to ***improve flood risk management*** and ***resiliency*** which has been degraded by inland inundation and changed conditions within southern Palm Beach, Broward and Miami Dade Counties over the **50-year period of analysis from 2035-2085**."

PLANNING FOCUS AREAS

There are currently 4 planning focus areas identified for the study:

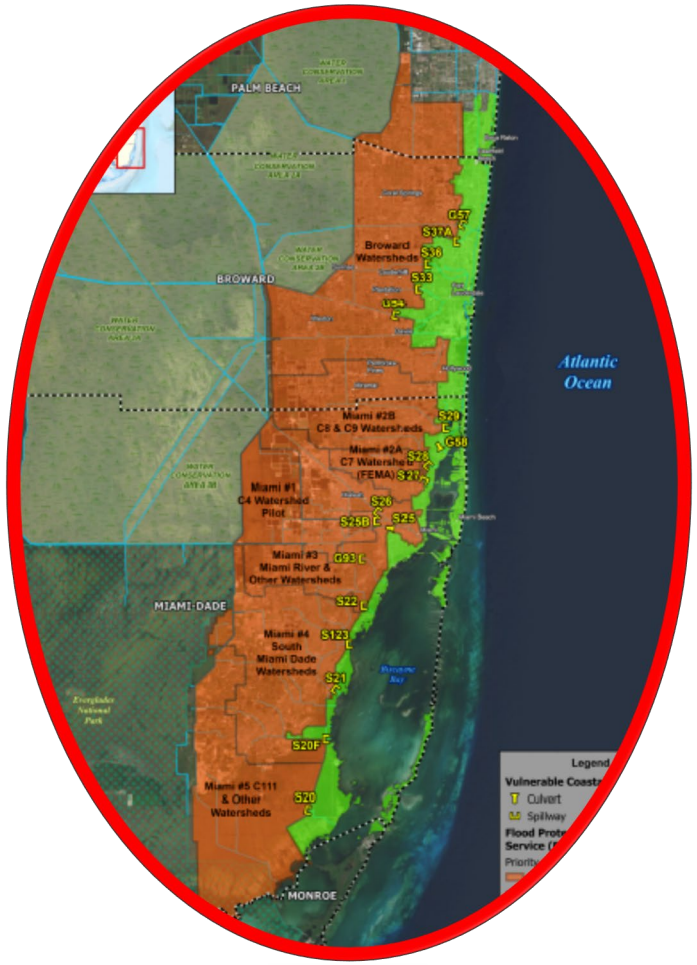
- Reach A: Broward and Hillsboro Basins
- Reach B: Little River and Nearby Basins
- Reach C: Miami River and Nearby Basins
- Reach D: South Miami Basins

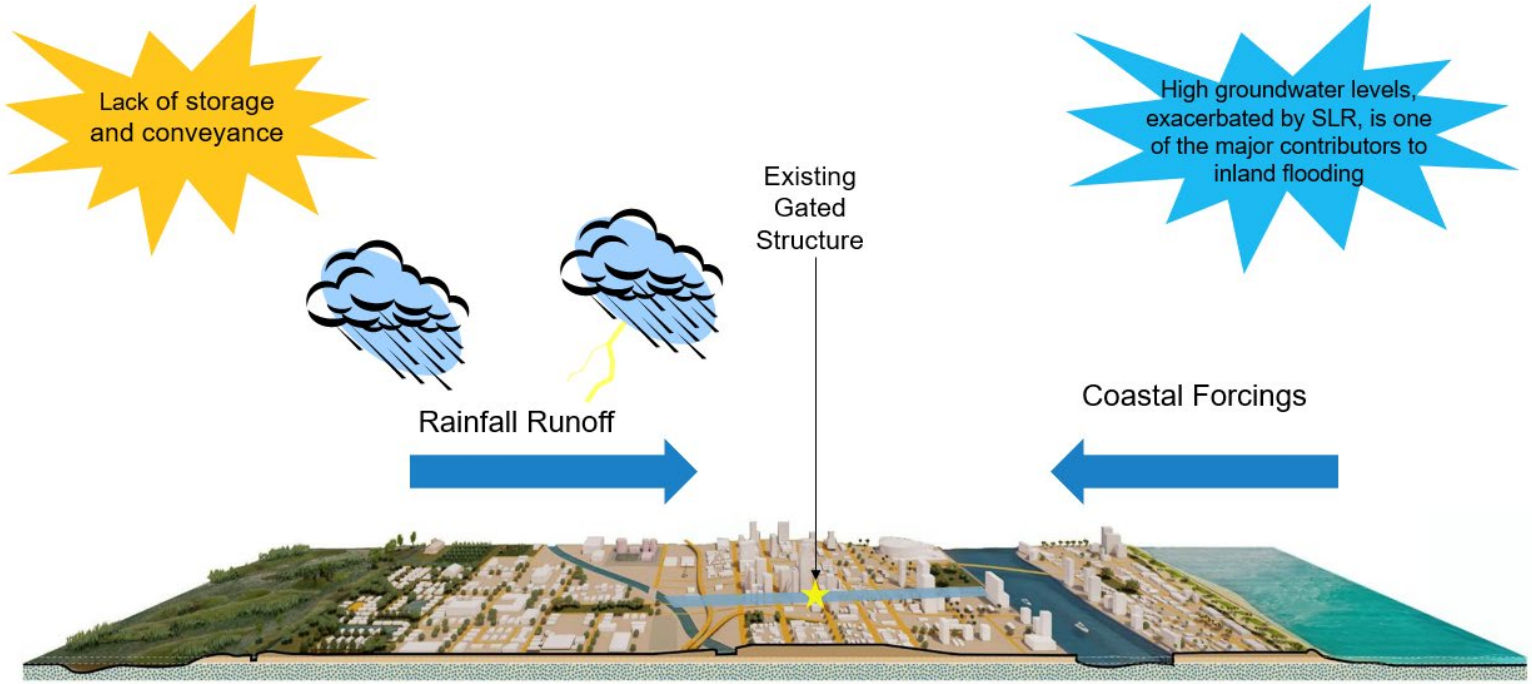


C&SF FLOOD RESILIENCY STUDY
FOCUSED SCOPE

Project Area

- Focus on the **highly vulnerable infrastructure including salinity control structures and associated primary canals** that can reduce the most immediate flood risks
- Lower East Coast – Southern Palm Beach, Broward and Miami-Dade counties.



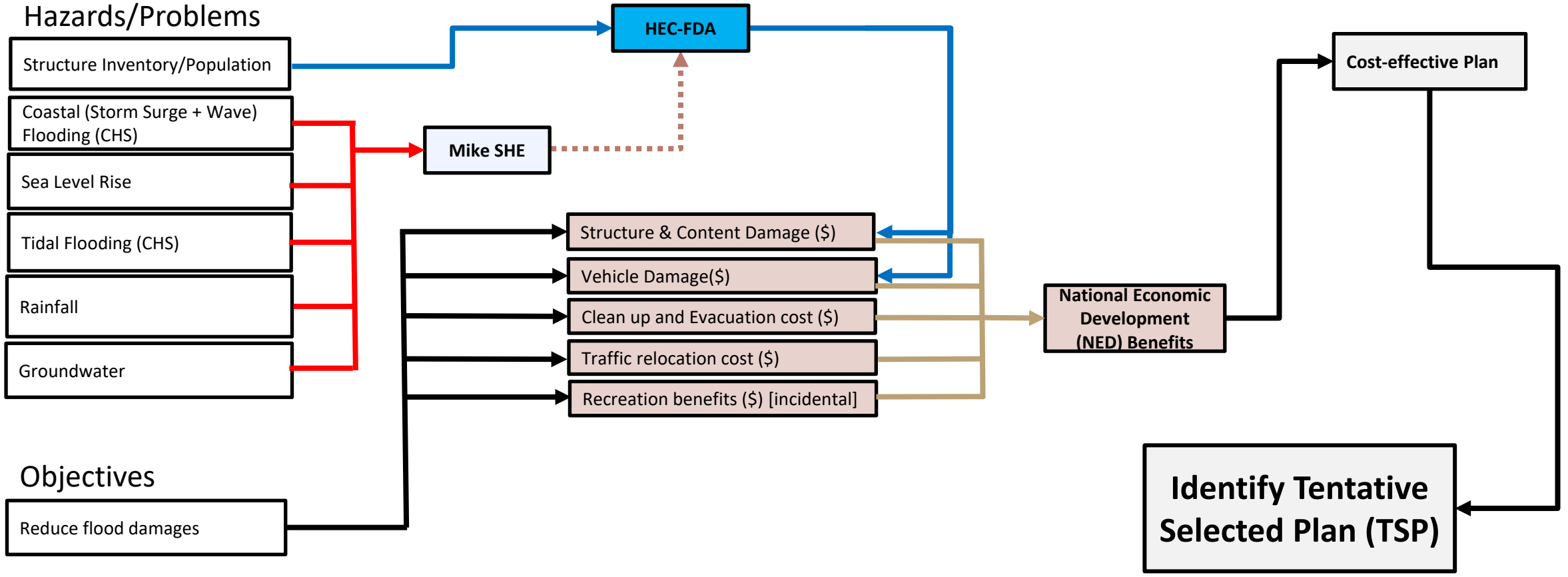


TYPICAL SOUTH FLORIDA CROSS-SECTION

Green = area downstream of coastal C&SF structures

Orange = area upstream of coastal C&SF structures

PATH FORWARD: EVALUATION STRATEGY



- ✓ **Total Benefits (Quantitative/Qualitative)**
- ✓ **Sponsor & Local Input through the process**
- ✓ **Iterative process through multiple rounds of evaluation**

C&SF FLOOD RESILIENCY STUDY

SCHEDULE AND NEXT STEPS

September 2022

WE ARE HERE

September 2026

MILESTONE	DATE
Scoping Meetings	✓ January 2023
Alternatives Milestone Meeting (AMM)	✓ June 2023
Tentatively Selected Plan (TSP)	April 2025
Draft Integrated Report Release	June 2025
Agency Decision Milestone (ADM)	
Final Integrated Report Release	July 2026
Chief's Report	September 2026

90 DAY LOOK AHEAD

OCTOBER 2023

- Evaluation Workshop

NOVEMBER 2023

- Model Development completed
- Base condition and Future Without Project (FWOP) modeling begins
- Continue compilation of Performance Evaluation tools

DECEMBER 2023

- Base Condition and Future Without Project (FWOP) modeling continued
- Finalize Performance Evaluation tools

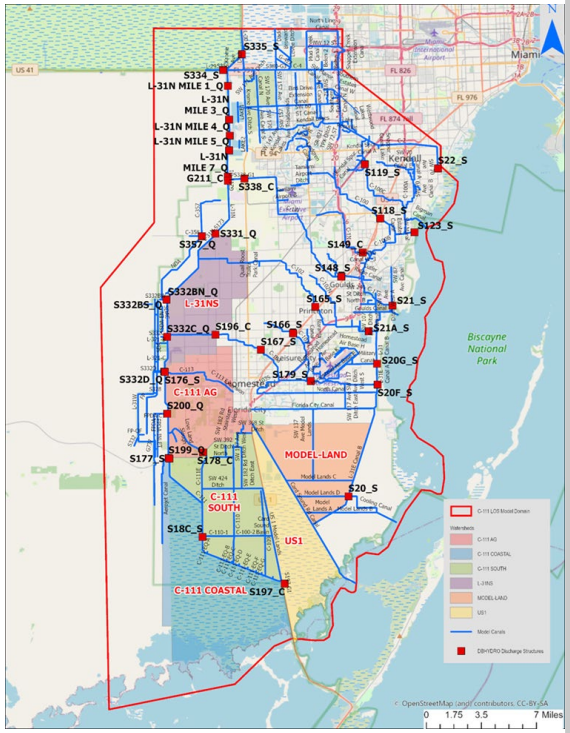
MODELING

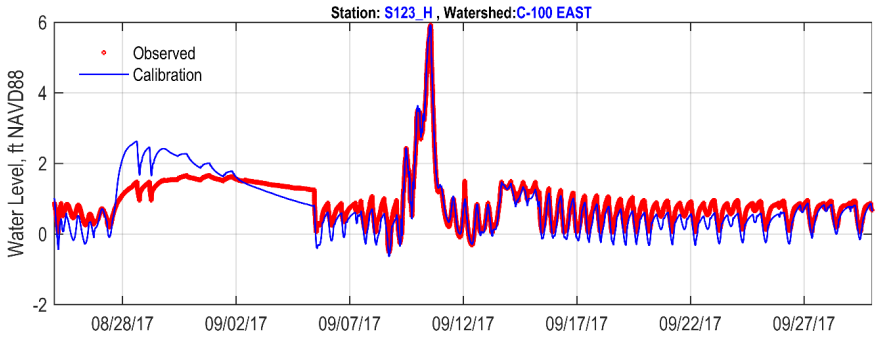
Presenter: Amanda Bredesen – USACE, Water Resources Lead

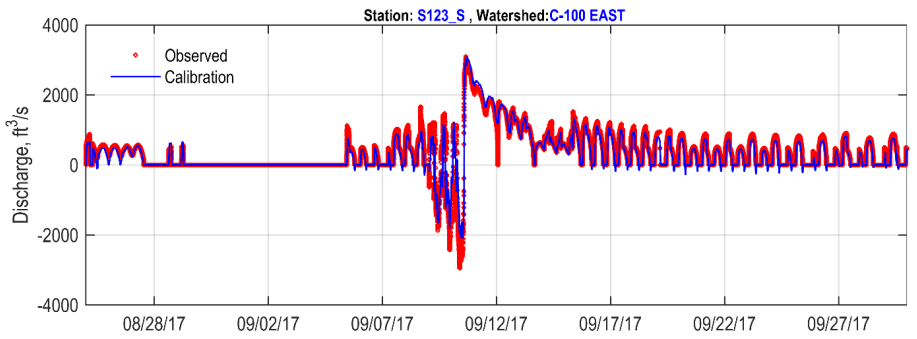
HYDROLOGIC & HYDRAULIC MODELING TOOL

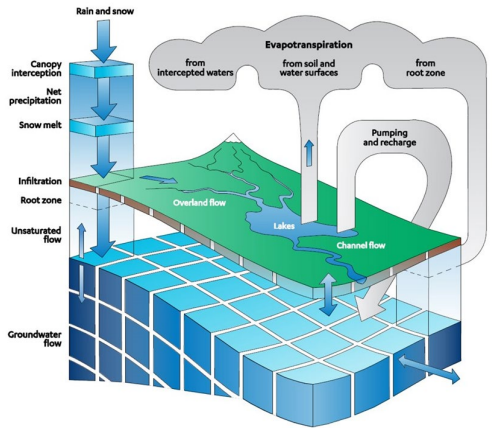
The integrated/coupled surface-groundwater model MIKE SHE/MIKE Hydro (2022) will be used to simulate the hydraulics and hydrology for the project area.

- 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

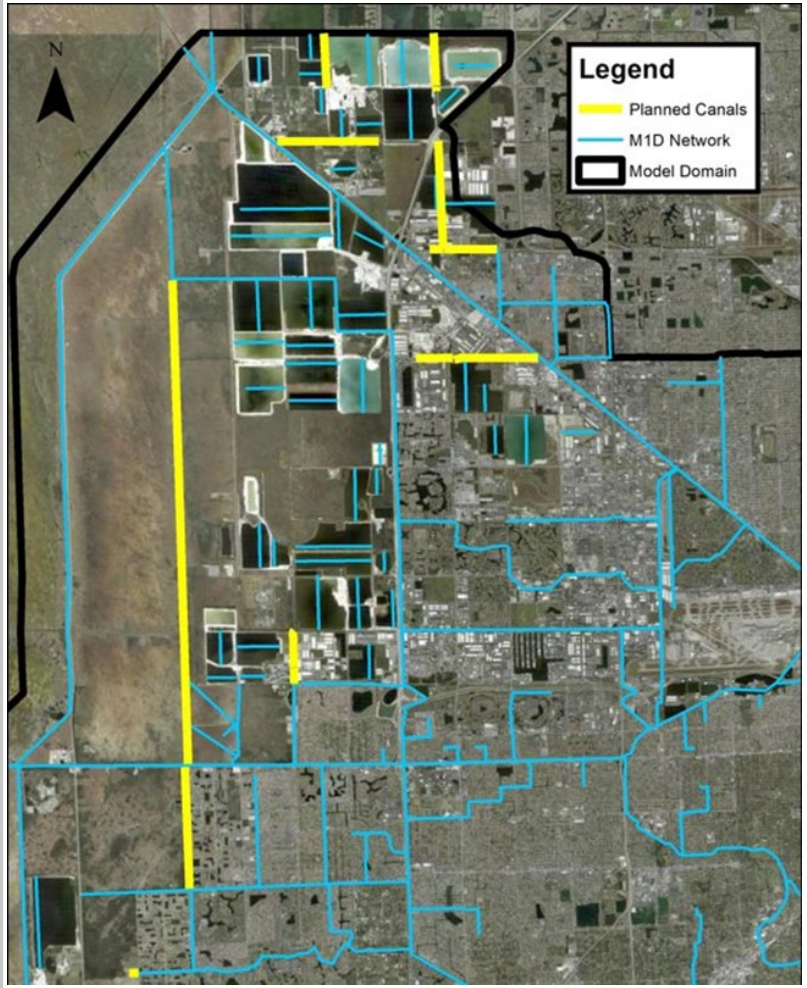








HYDROLOGIC & HYDRAULIC MODEL ADAPTATION



- MIKE SHE/HYDRO models will extend to the downstream bay or estuaries
- Future land use and land cover will be 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

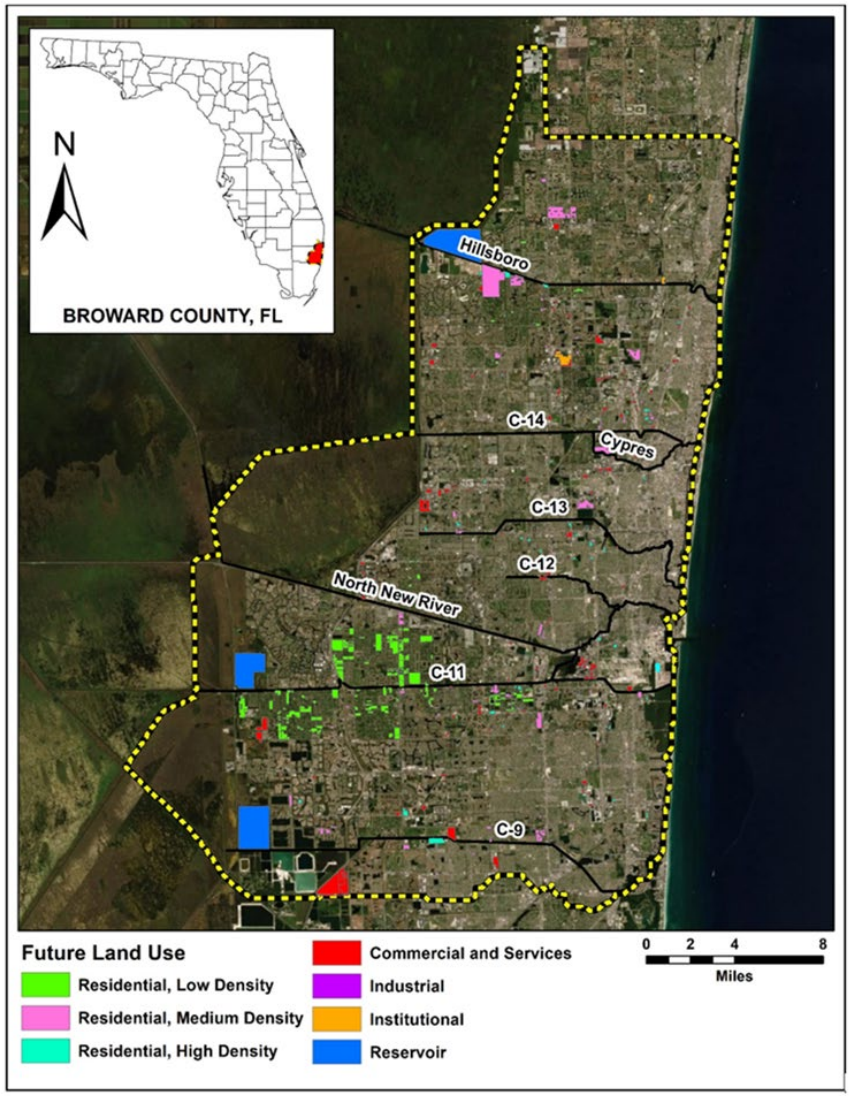
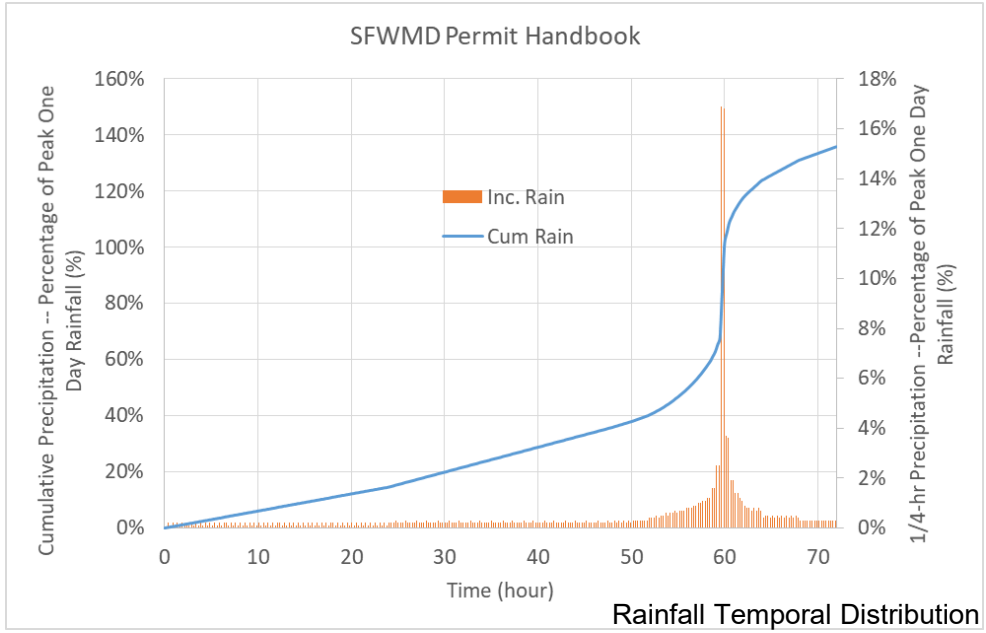


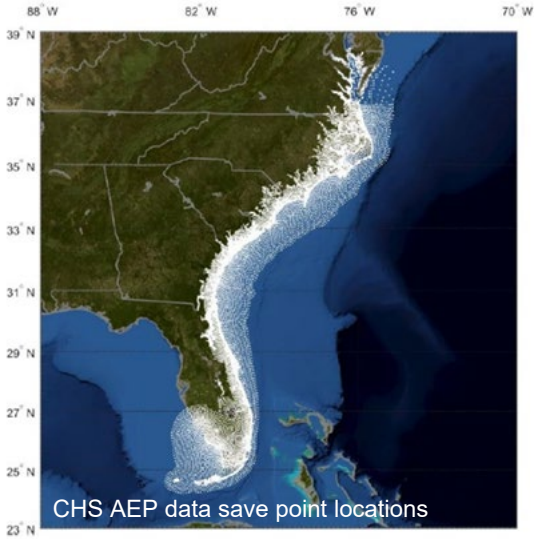
Figure 2.2-1: Areas of Future Land Use Change

MODEL INPUT DATA

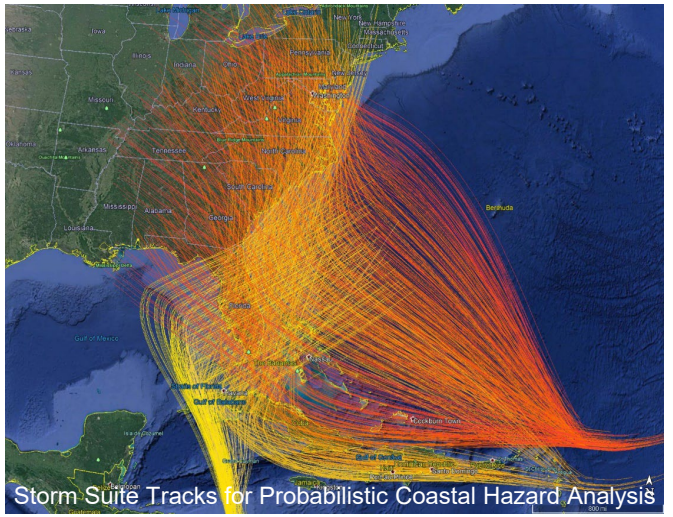
- **Rainfall:** The design storm will use spatially distributed gridded input derived from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 rainfall depths that are temporally distributed based on the South Florida Water Management District (SFWMD) 3-day distribution.
    - The 72-hour rainfall distribution is found in the District's Surface Water Environmental Resource Permit Manual (SFWMD, Environmental Resource Permit Applicant's Handbook Volume II (2016).
- **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 within the MIKE model.



Rainfall Temporal Distribution



CHS AEP data save point locations


Storm Suite Tracks for Probabilistic Coastal Hazard Analysis

COMPOUND FLOODING

- The total water level (i.e., compound flooding) due to multiple flood sources, including rainfall runoff, groundwater and coastal forcings will be simulated.

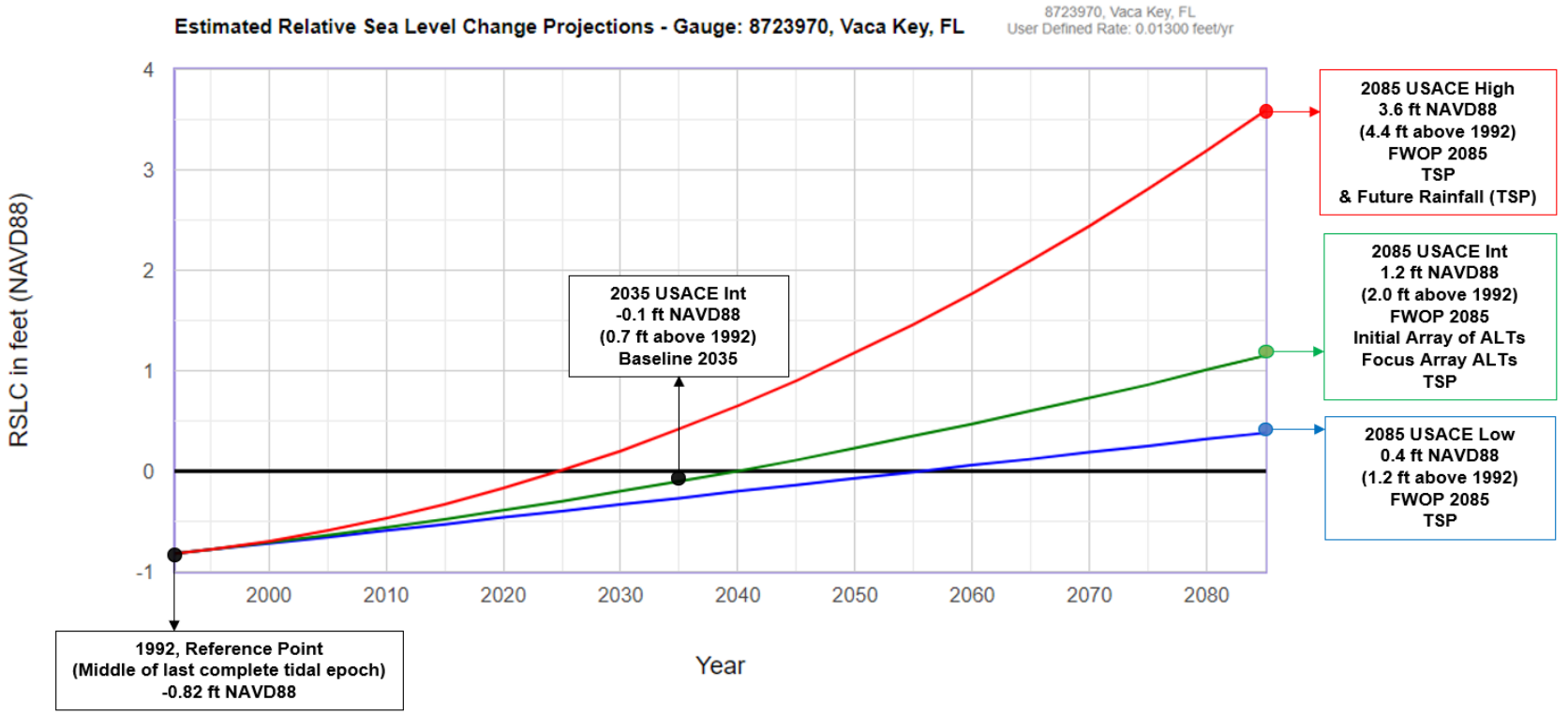
- Hydrologic & Hydraulic model simulations will include an array of rainfall and coastal return frequency events ranging from the 0.5 Annual Exceedance Probability (AEP) event to 0.002 AEP (2-year through 500-year recurrence interval).

- No formulation of risk reduction features will be performed for coastal surge propagation inland; however, it is important to identify and understand the risk of surge events that limits primary system design and operation.

- Hydrologic & Hydraulic simulations will align the peak of coastal event with the peak of rainfall.

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

2. USACE ACCOUNTS OVERVIEW

Presenters: Erik Adamiec – USACE, Economics
Del Cabeche - USACE, Economics
Nicole Cortez – SFWMD, District Resiliency Coordinator

TOTAL BENEFITS GUIDANCE

Comprehensive Documentation of Benefits Policy Directive: January 2021. Two Key changes to our approach:

- **More comprehensive evaluation of all four P&G accounts:**

NED: National Economic Development
RED: Regional Economic Development
OSE: Other Social Effects
EQ: Environmental Quality

- **Mandatory Alternatives carried forward to the final array:**

g. Each study must include, at a minimum, the following plans in the final array of alternatives for evaluation:

(1) The "No Action" alternative.

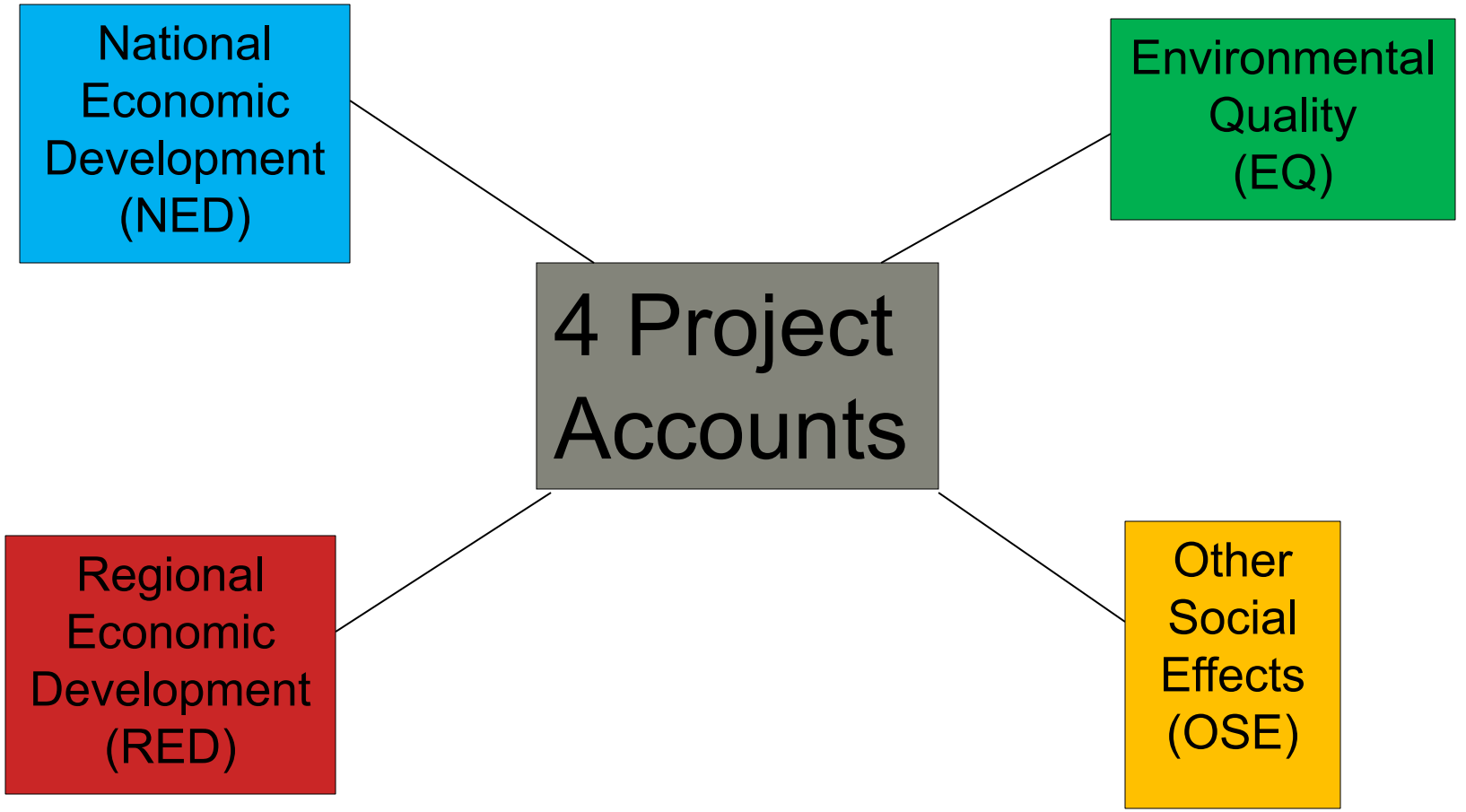
(2) A plan that maximizes net total benefits across all benefit categories.

(3) A plan that maximizes net benefits consistent with the study purpose.

(4) For flood-risk management studies, a nonstructural plan, which includes modified floodplain management practices, elevation, relocation, buyout/acquisition, dry flood proofing and wet flood proofing.

(5) A locally preferred plan, if requested by a non-federal partner, if not one of the aforementioned plans.

EVALUATION OF AN ALTERNATIVE



EXAMPLES FROM EACH ACCOUNT

NED

- Damages Prevented
- Transportation Cost Savings
- Emergency Cleanup cost reduction
- Incidental Recreation Benefits

RED

- Job Created/wages supported
- Local economic impact from wages supported
- Local Tax Revenue
- Local Business Revenue

OSE

- Life Safety/ Population at Risk
- Cost of Living
- Quality of Life
- Community Cohesion
- Voter Participation
- Civic Participation
- Community Resiliency

EQ

- Habitat Units
- Acres Restored
- Species Risk or Loss
- Cultural Resource Risk or Loss
- Critical Habitat created

*These are examples and not all are possible to measure within every study scope

BENEFITS IN THE OTHER ACCOUNTS

Monetized ($)
Quantified but not Monetized
Measured but not fully quantified
Evaluated using Directional Impacts
Discussed qualitatively

Fully Quantitative	Semi-Quantitative	Categorical	Fully Qualitative
Precise numbers (dollars and cents, etc.)	Orders of Magnitude (Thousands, millions, billions, etc.)	Categories (Major positive effects, minor positive effects, major adverse effects, etc.)	Narrative discussion of effects only
Hypothetical Example: Alternative 1 will reduce expected average annual flood damages by $2,445,980 per year throughout the system	**Hypothetical Example**: Alternative 1 will reduce expected average annual flood damages by between $1 and $ 10 million per year	**Hypothetical Example**: Alternative 1 will have a minor positive effect on flood risk in Area A, a significant effect in Area B, and no effects in Area C	**Hypothetical Example**: Alternative 1 will likely reduce flood risk throughout the system

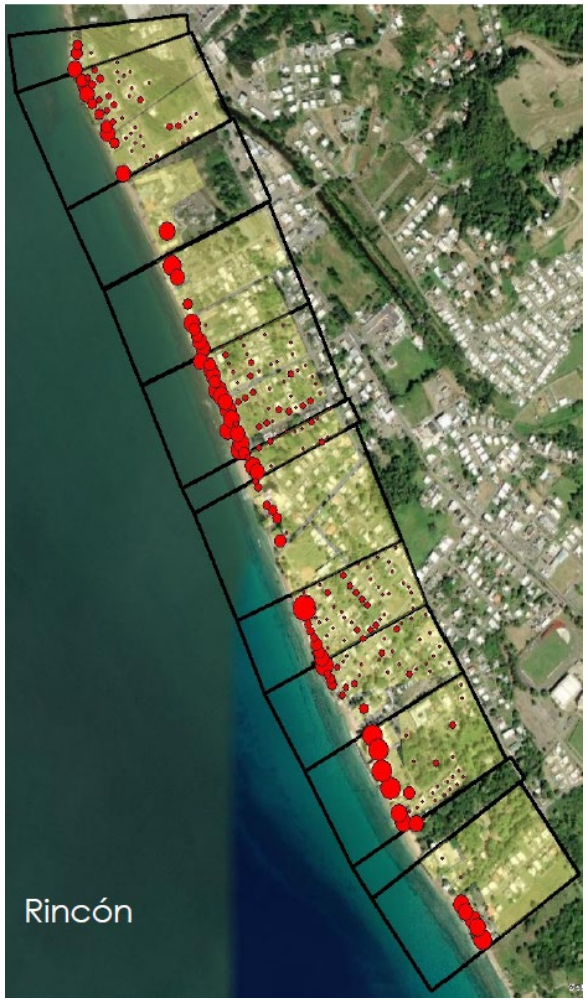
CURRENT USACE EXAMPLES

INDIAN RIVER LAGOON (IRL) SOUTH

Additional information was added about benefits to tourism, recreation, water supply, and economic viability of the affected counties.

CURRENT USACE EXAMPLES

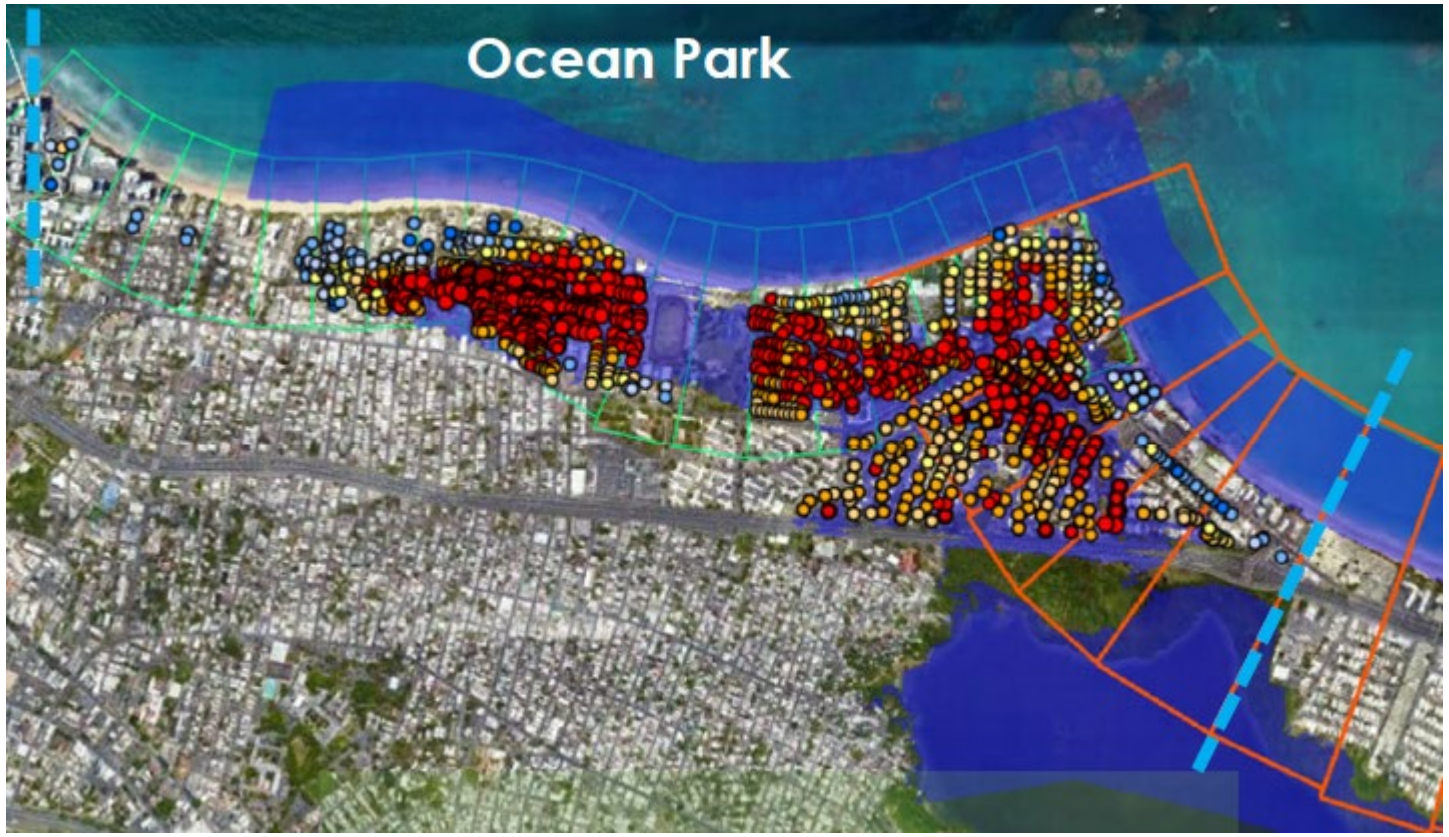
PUERTO RICO COASTAL FEASIBILITY REPORT



- Rincon Planning Reach does **not** have any economically justified alternatives (i.e., Benefit-Cost Ratio (BCR) < 1.0).
- Other four Accounts being used to evaluate alternatives.
- Though net National Economic Development (NED) benefits are negative, the expected annual damages have a significant impact on local economy and the population of the community (~40 structures are condemned in the Future Without Project (FWOP) condition, for example).
- A Recommended Plan would require an NED waiver based on evaluation of all four accounts.

CURRENT USACE EXAMPLES

PUERTO RICO COASTAL FEASIBILITY REPORT



Ocean Park Planning Reach has economically justified alternatives (i.e., Benefit-Cost Ratio (BCR) > 1.0).

Other four Accounts still being used to evaluate alternatives (i.e. Habitat units, business disruptions, benefits to socially vulnerable)

MULTI-CRITERIA DECISION ANALYSIS (MCDA)

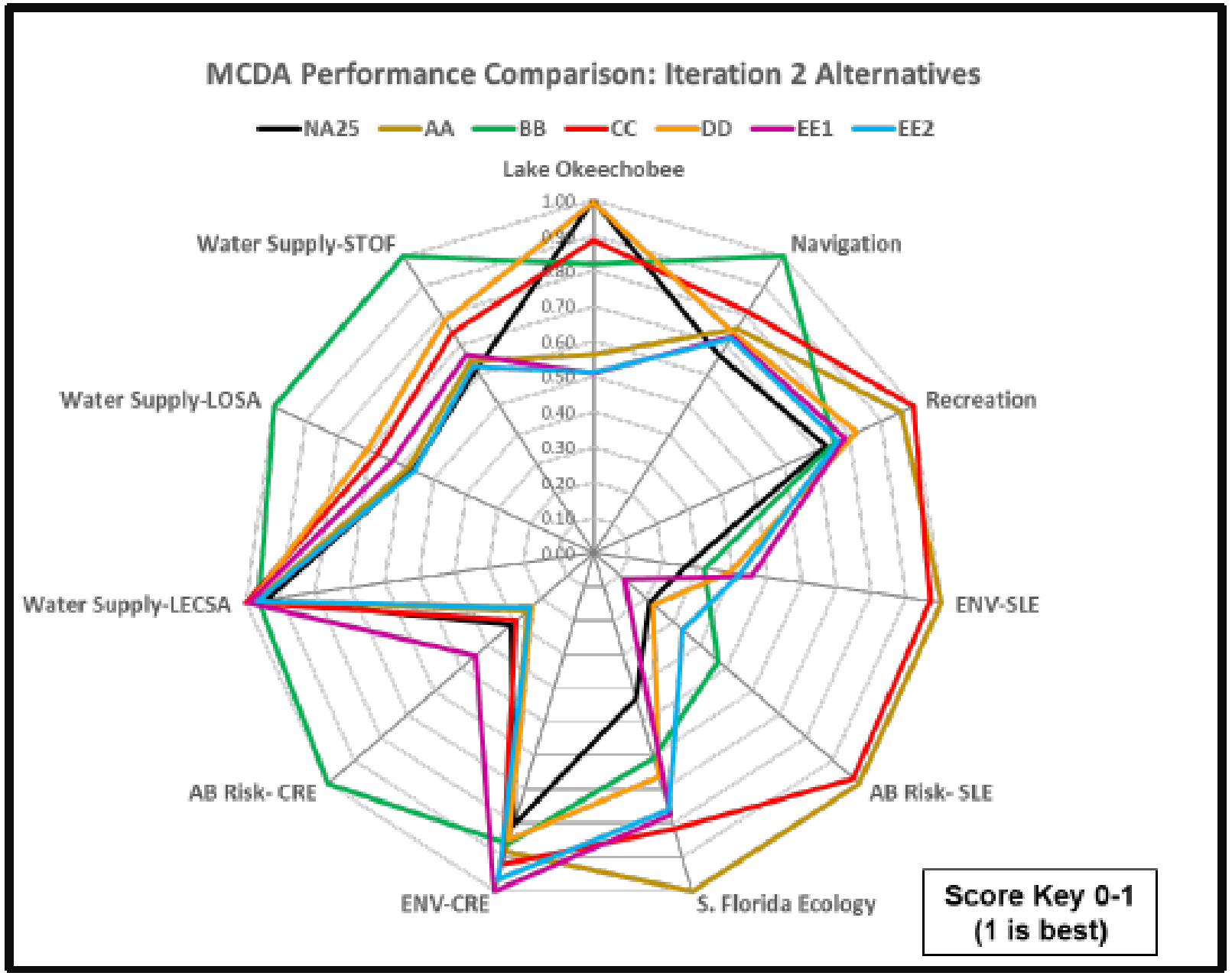
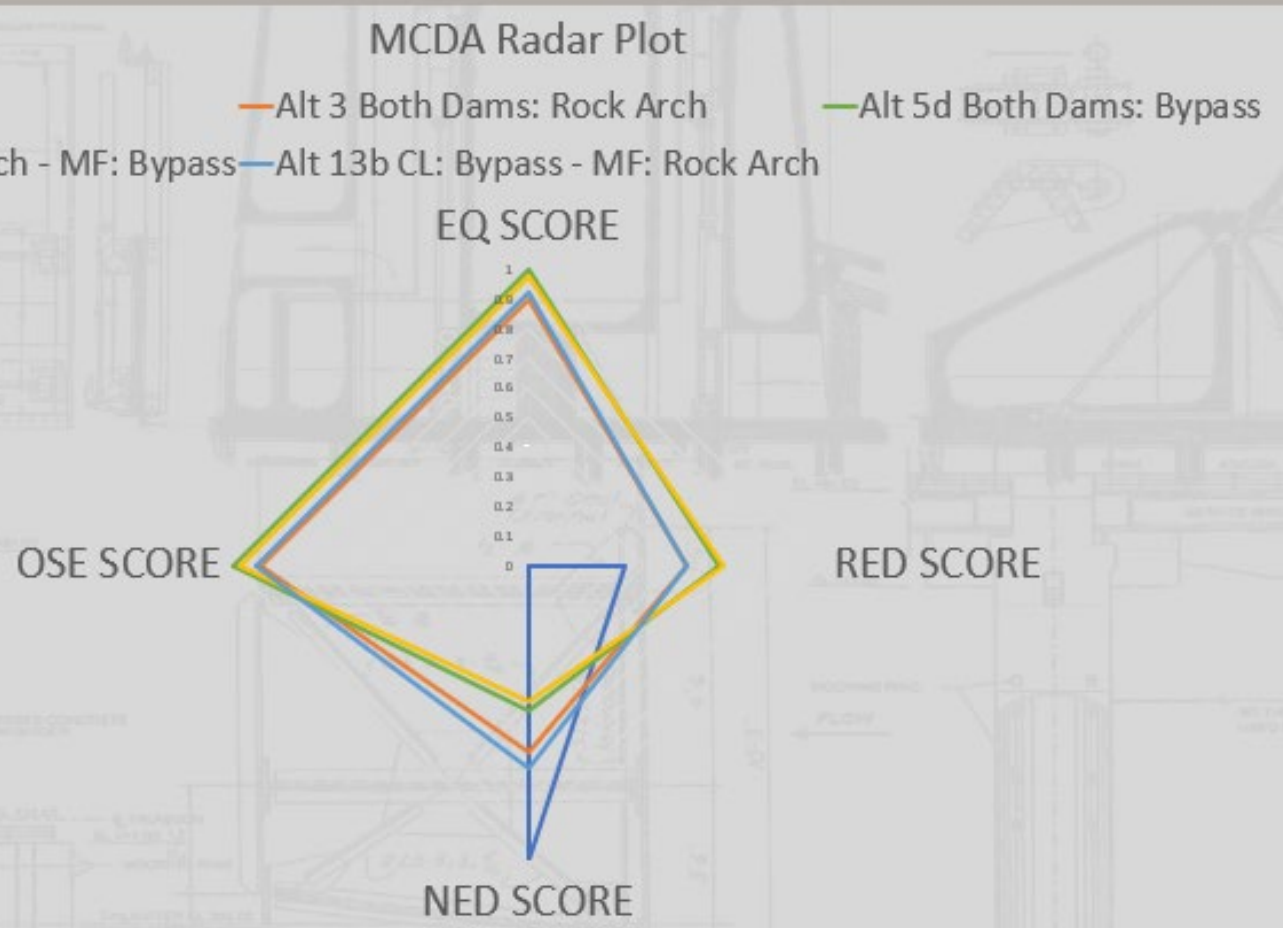


Figure 4-1. MCDA Radar Plot.

MULTI-CRITERIA DECISION ANALYSIS
OF FOUR ACCOUNTS' SCORES



MULTI-CRITERIA DECISION ANALYSIS

SCORES FROM SEPARATE MCDA FOR EACH ACCOUNT

	Comprehensive Score	Radar Plot Benefit Area
Alt. 1: No Action Alternative	1.333	0.1665
Alt. 3: Fixed Weir Rock Arch – Both Dams	2.976	1.106
Alt. 5d: Natural Bypass Channel – Both Dams (CL right bank, MF right bank)	3.147	1.235
Alt. 12b: CL - Fixed Wier Rock Arch and MF - Natural Bypass Channel (right bank)	3.089	1.188
Alt. 13b: CL - Natural Bypass Channel (right bank) and MF - Fixed Wier Rock Arch	3.072	1.177

US Army Corps of Engineers

The Nature Conservancy

DEEP DIVE: KEY TAKEAWAYS

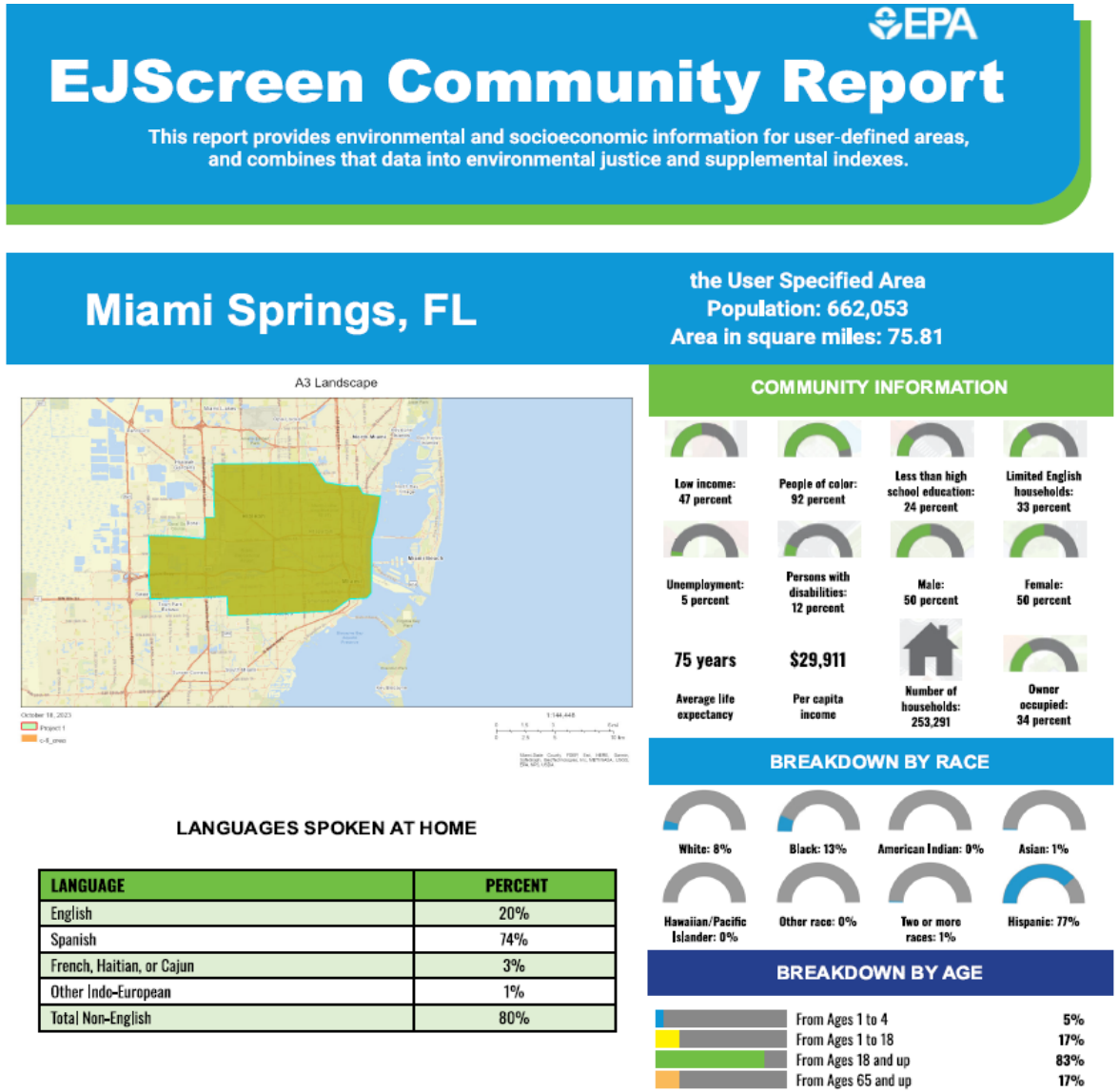
- Application of the Comprehensive Benefits Directive is required for all USACE Planning studies.
- Project Delivery Team (PDT) economists are well prepared (with certified tools and methods) for National Economic Development (NED) evaluations.
- Capabilities with respect to the other accounts are more limited. **Creativity, innovation, and use of existing data is required.**
- Close coordination with the vertical team and the relevant Planning Center of Expertise (PCX) (early and often)is even more important than ever.
- Successful implementation also requires close coordination with the Non-Federal Sponsor and affected communities.

ENVIRONMENTAL JUSTICE (EJ)

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income regarding the development, implementation and enforcement of environmental laws, regulations, and policies, with no group bearing a disproportionate burden of environmental harms and risks.

USACE considers environmental justice impacts as required by Executive Order 128981(1994) and Executive Order 13985(2021)

EPA ENVIRONMENTAL JUSTICE (EJ) SCREEN TOOL



EPA

EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Miami Springs, FL

the User Specified Area
Population: 662,053
Area in square miles: 75.81

A3 Landscape

COMMUNITY INFORMATION

BREAKDOWN BY RACE

BREAKDOWN BY AGE

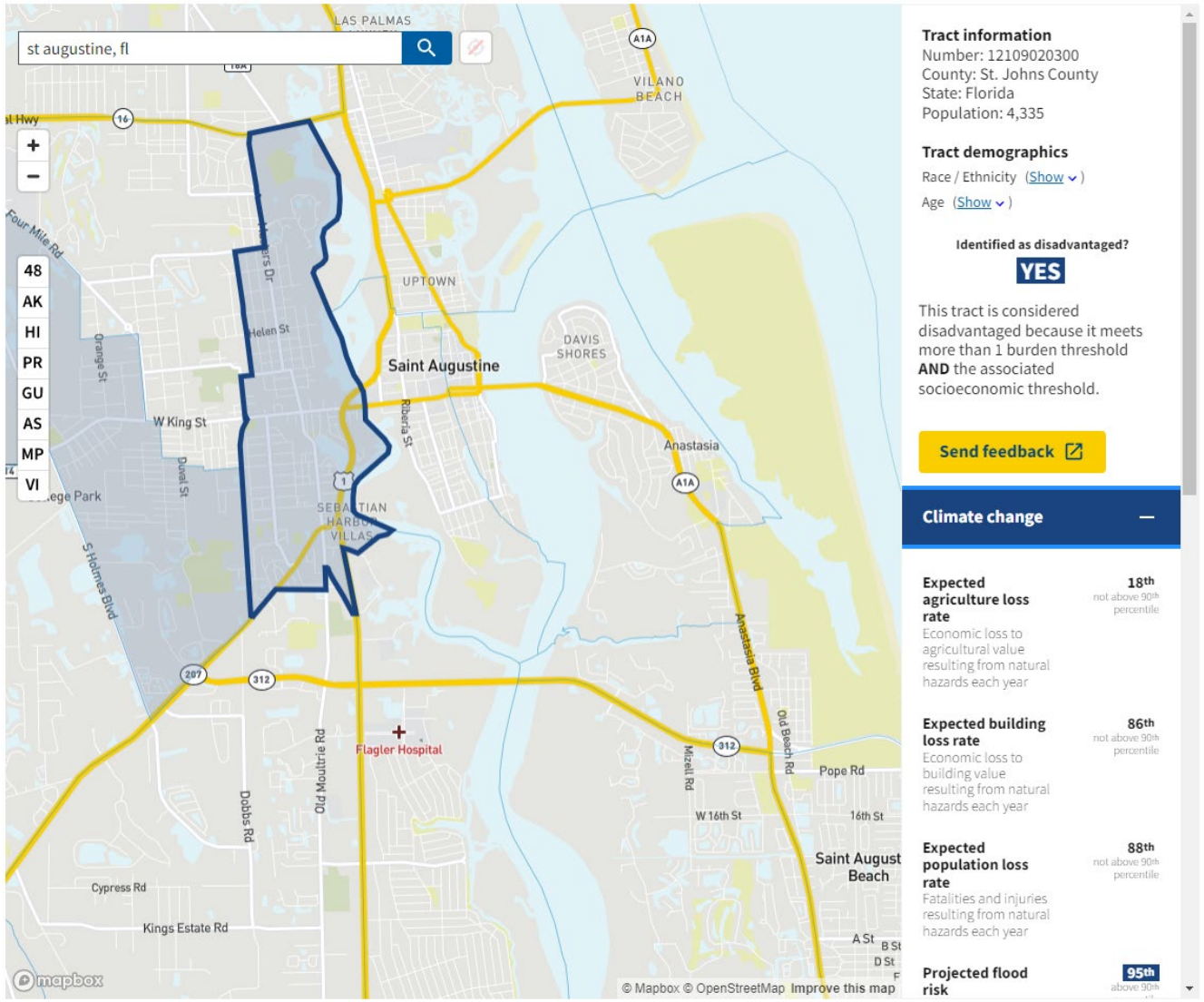
LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	20%
Spanish	74%
French, Haitian, or Cajun	3%
Other Indo-European	1%
Total Non-English	80%

Using the EPA's EJ Screening tool, we can identify relevant EJ neighborhoods based on socioeconomic indicators such as race, income, and unemployment

Example from our study area – Miami Springs

EXPLORE THE MAP SCREENING TOOL

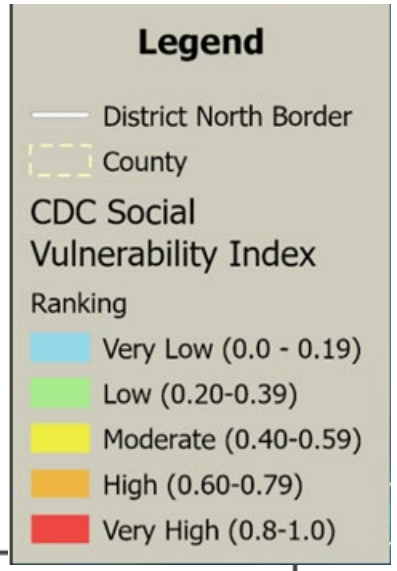


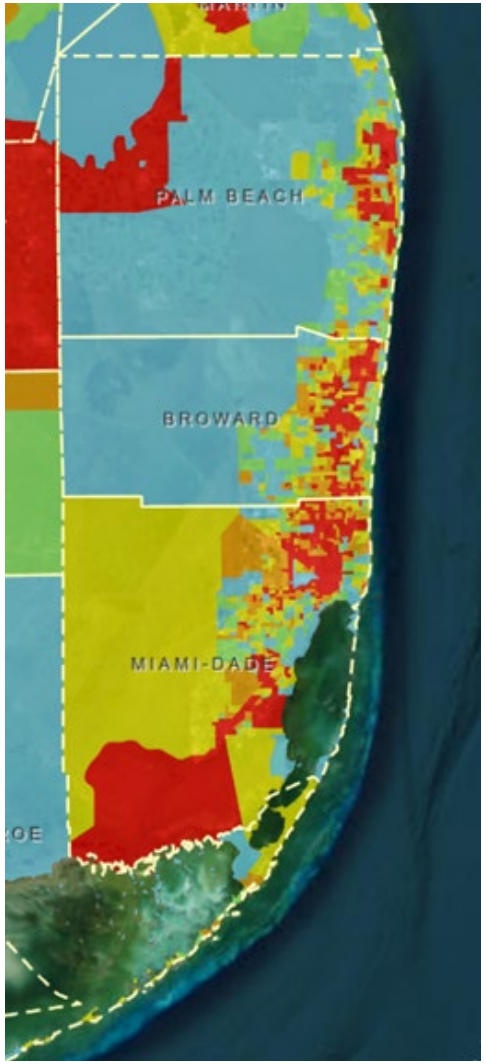
The Explore the Map tool allows USACE to identify Environmental Justice communities via census tracts using various climate change metrics along with socio-economic indicators

CENTER FOR DISEASE CONTROL (CDC) VULNERABILITY INDEX (SVI)

Center for Disease Control (CDC) Agency for Toxic Substances and Disease Registry (ATSDR) Social Vulnerability Index (SVI)

- **Basis:** Demographic and economic (socioeconomic) data
- **Application:** Rank vulnerability





CDC Social Vulnerability Index Regional Ranking

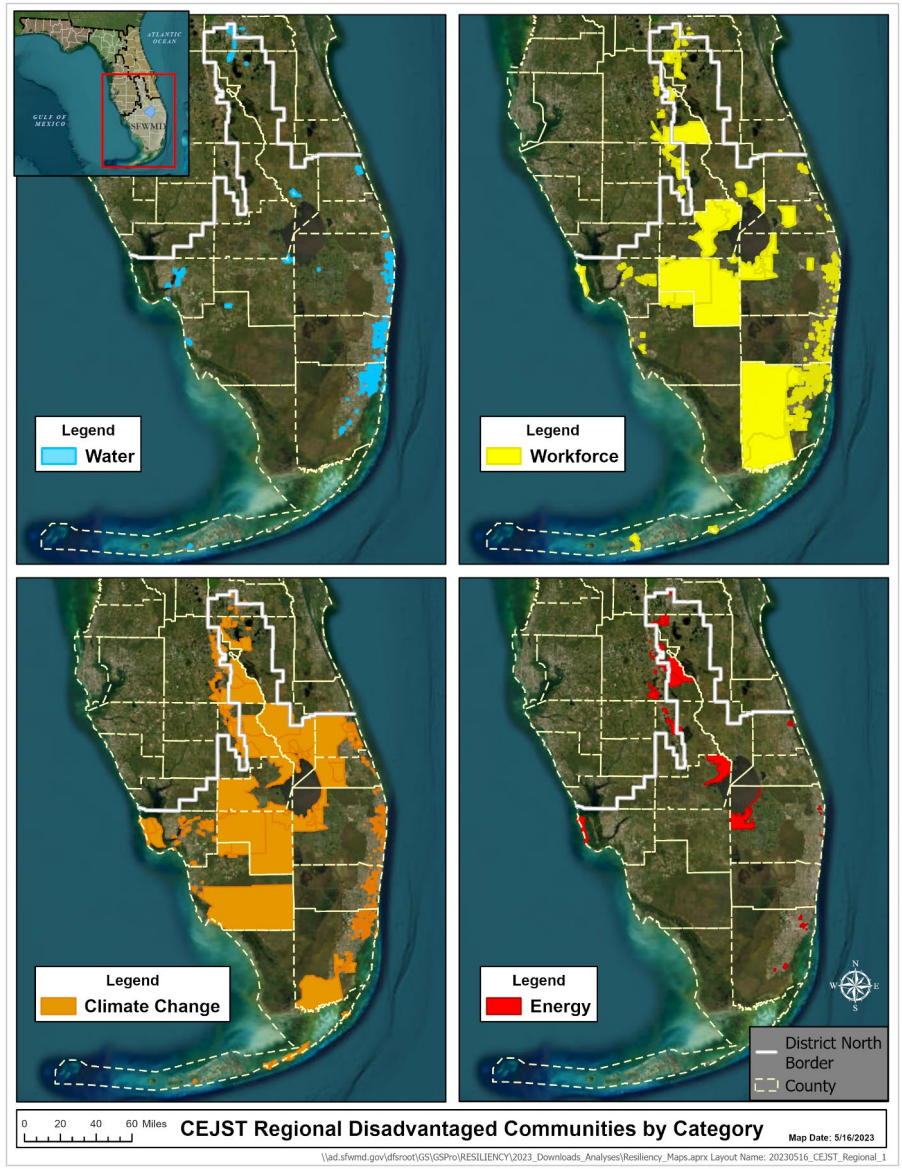
Map Date: 3/31/2023

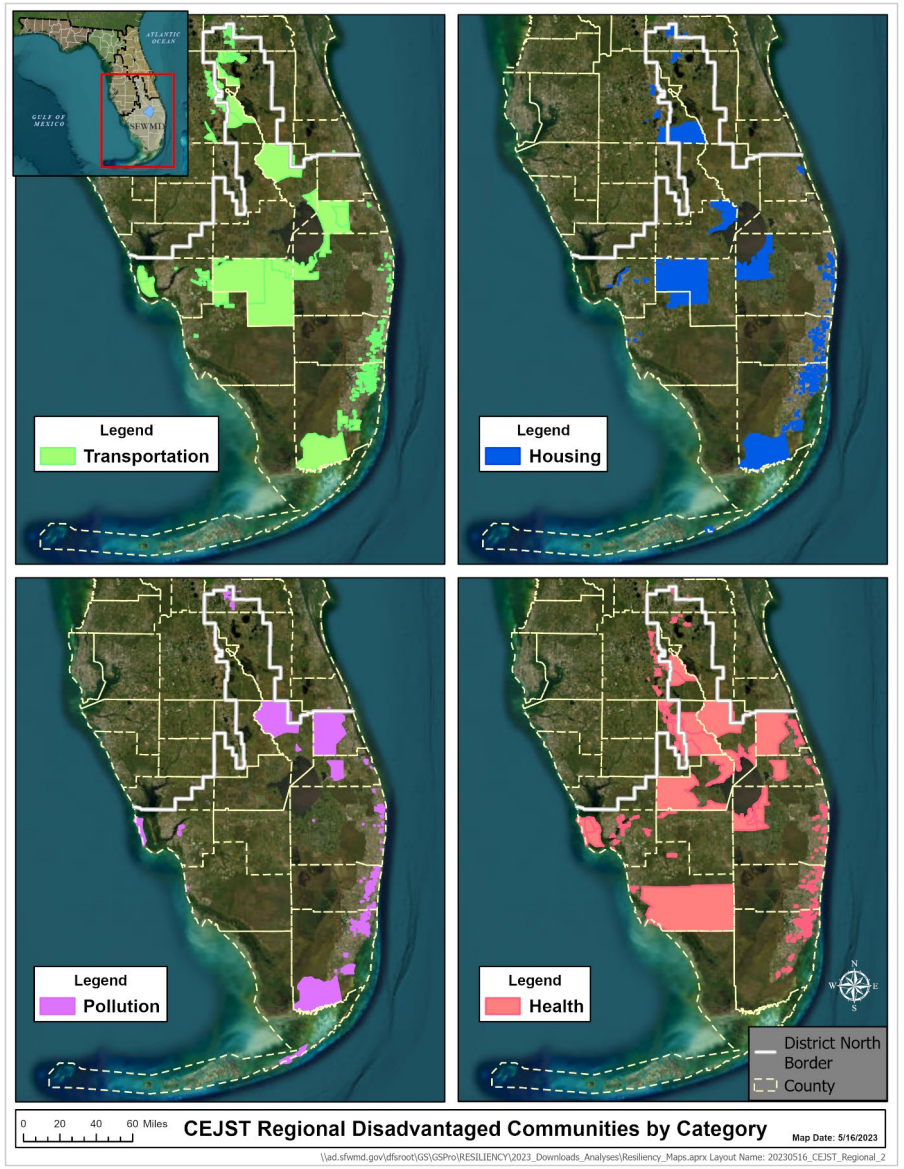
\\ad.sfwmd.gov\dfsroot\GS\GSPro\RESILIENCY\2023_Downloads_Analyses\Resiliency_Maps.aprx Layout Name: 20230516_CDC_SVI_Regional

COUNCIL ON ENVIRONMENTAL QUALITY (CEQ), CLIMATE AND ECONOMIC JUSTICE SCREENING TOOL (CEJST)

Council on Environmental Quality (CEQ), Climate and Economic Justice Screening Tool (CEJST)

- **Basis:** socioeconomic data plus environmental, historical, and community data
- **Application:** Identify as disadvantaged

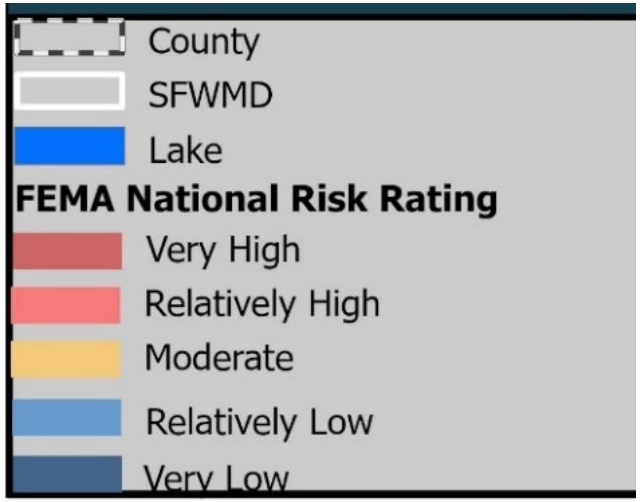


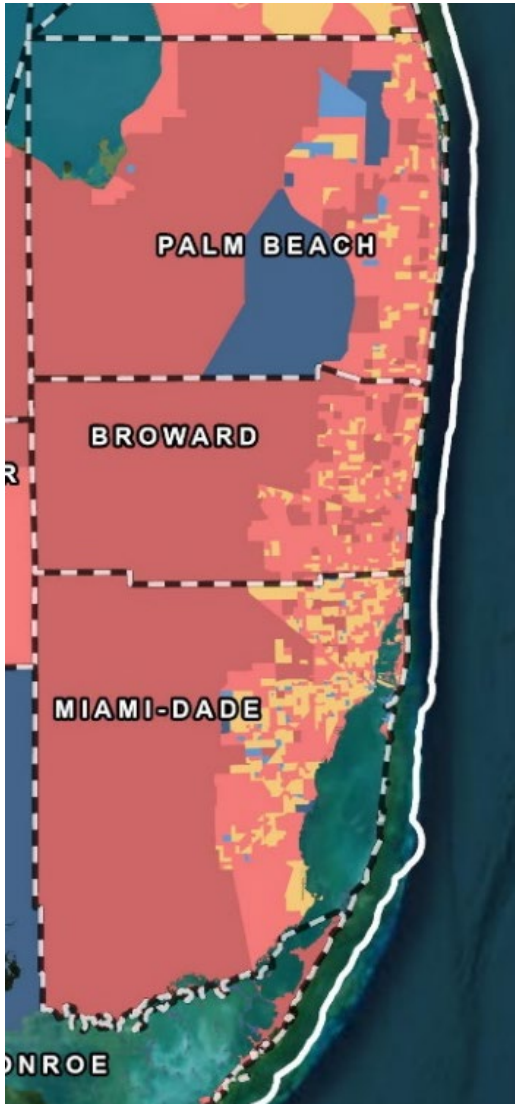


FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) NATIONAL RISK INDEX (NRI)

Federal Emergency Management Agency (FEMA)
National Risk Index (NRI)

- **Basis:** Socioeconomic data plus hazard exposure and community resilience data
- **Application:** Rate relative risk





FEMA National Risk Index Rating for Census Tracts

40 Miles

Current Time: 8/3/2023 4:30 PM

JACKSONVILLE ENVIRONMENTAL JUSTICE (EJ) PROGRAM

The USACE and project non-federal sponsors works and/or partners directly with community groups and local governments in Florida and Puerto Rico to address Environmental Justice issues associated with coastal storm risk management, flood risk management, and ecosystem restoration projects. The Corps and South Florida Water Management District (SFWMD) also employs full-time Tribal Liaisons, Cindy Thomas and Armando Ramirez, who work closely with groups of Native Americans that have an ancestral or historical interest in the project area footprint

3. BREAKOUT SESSION INSTRUCTIONS AND GOALS

Presenter: Gustavo Suarez – USACE, Planning Technical Lead (In-Person)
Jenny Smith – SFWMD, Planning Technical Lead (Virtual)
Zulamet Vega-Liriano – USACE, Chief of Watershed Planning Section (Virtual)

STUDY OBJECTIVE

The study objective is to:

"Enhance existing C&SF water control system and salinity control structure's functionality and capacity to ***improve flood risk management*** and ***resiliency*** which has been degraded by inland inundation and changed conditions within southern Palm Beach, Broward and Miami Dade Counties over **50-year period of analysis from 2035-2085**."

BREAKOUT SESSIONS

Table Cluster 1 - Reach A: Broward and Hillsboro Basins

Table Cluster 2 - Reach B: Little River and Nearby Basins

Table Cluster 3 - Reach C: Miami River and Nearby Basins

Table Cluster 4 - Reach D: South Miami Basins

1 Reach per Table Cluster

Each Table Cluster Discussing All Accounts for the Assigned Reach

BREAKOUT SESSIONS – 90 MINUTES

Task: Group Assign Table Cluster Leader

Each Table Cluster To Discuss for the Assigned Reach

Regional Economic Development (RED), discussion (25 minutes)
Reporting (5 minutes)

Other Social Effects(OSE) Discussion (25 minutes)
Reporting (5 minutes)

Environmental Quality (EQ) discussion (25 minutes)
Reporting (5 minutes)

Performance Metrics (PM)	
Performance Metrics (PM)	What to measure How to measure
Example:	***Example:***
PM	
PM	
PM	
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USACE Planning Guidance:

Completeness is the extent to which the alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other Federal and non-Federal entities.

Effectiveness is the extent to which the alternative plans contribute to achieve the planning objectives.

Efficiency is the extent to which an alternative plan is the most cost-effective means of achieving the objectives.

Acceptability is the extent to which the alternative plans are acceptable in terms of applicable laws, regulations and public policies. Appropriate mitigation of adverse effects shall be an integral component of each alternative plan.

RECAP/NEXT STEPS – 30 MINUTES

General Workshop Recap

Table Cluster Leaders Report to the Entire Workshop Group

Table Cluster 1 - Reach A: Broward and Hillsboro Basins (5 minutes)

Table Cluster 2 - Reach B: Little River and Nearby Basins (5 minutes)

Table Cluster 3 - Reach C: Miami River and Nearby Basins (5 minutes)

Table Cluster 4 - Reach D: South Miami Basins (5 minutes)

Next Steps (10 minutes)

4. BREAKOUT SESSIONS

Regional Economic Development (RED), discussion (25 minutes)
Reporting (5 minutes)

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

Other Social Effects (OSE) Discussion (25 minutes)
Reporting (5 minutes)

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

Environmental Quality (EQ) discussion (25 minutes)
Reporting (5 minutes)

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

4. RECAP

Workshop Recap (5 minutes)

Reach A: Broward and Hillsboro Basins

Workshop Recap (5 minutes)

Reach B: Little River and Nearby Basins

Workshop Recap (5 minutes)

Reach C: Miami River and Nearby Basins

Workshop Recap (5 minutes)

Reach D: South Miami Basins

NEXT STEPS

Presenters: Marci Jackson – USACE , Chief of Plan Formulation Branch
Tim Gysan – USACE, Project Manager

COMMENTS TO BE RECEIVED BY EMAIL AT
CSFFRSCOMMENTS@USACE.ARMY.MIL

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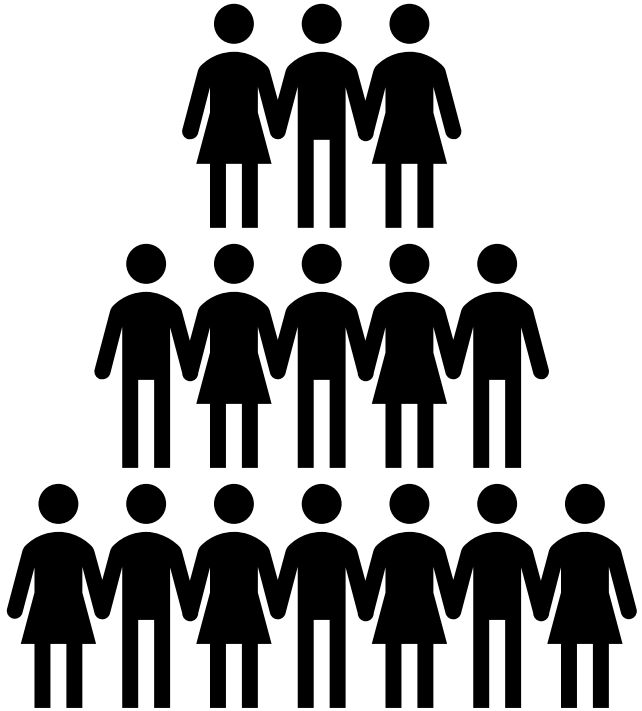

COLLABORATION!