

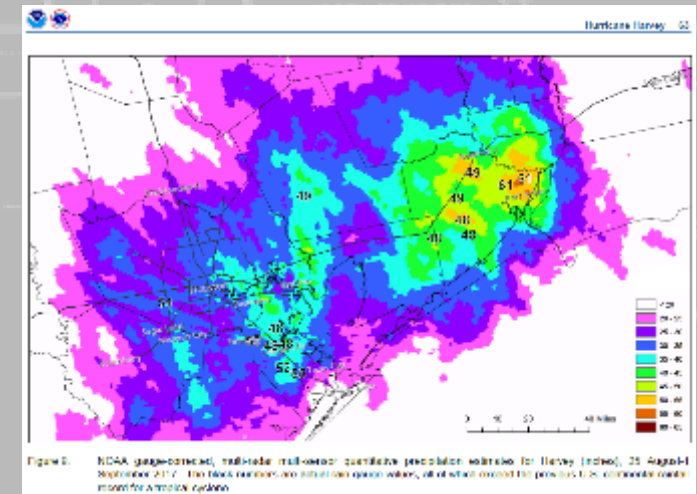
USACE PROJECTS, COLLABORATION, AND PARTNERING GALVESTON DISTRICT

Coraggio Maglio, PE
Chief of Hydraulics and Hydrology,
Engineering & Construction Division
USACE-Galveston District

May 20, 2021

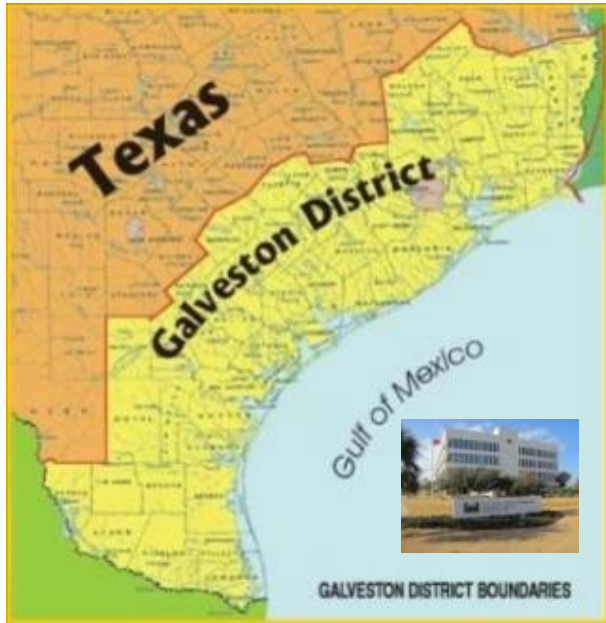


US Army Corps
of Engineers®





USACE Galveston District (SWG): History and Mission

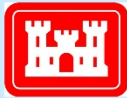


- Navigation (NAV)
- Flood Risk Management (FRM)
- Coastal Storm Risk Management (CSRM)
- Regulatory
- Ecosystem Restoration (ER)
- Emergency Management
- Interagency & International Support



- First engineer district in Texas, established 1880
- 50,000 square mile district boundary, ~100+ miles inland
- 28 ports handling 538+ M tons of commerce annually (FY 16)
- 1,000+ miles of channels
 - 750 miles shallow draft
 - 270 miles of deep draft
- 367 miles of Gulf coastline
- 30-40 M cubic yards/yr material dredged
- 16 Congressional districts
- 48 Texas counties, Louisiana parishes
- 18 Coastal counties - bays / estuaries
- 9 coastal basins





Texas Ports
Coastal Navigation
Value to the Nation

LEADING U.S. PORTS

(2017 Tonnage)

Houston #2 – 260.1 million tons
#1 Foreign Tonnage & #2 Total Tonnage

Beaumont #5 – 89.4 m.tons
#1 Military Port in World

Corpus Christi #6 – 87.3 m.tons
America's Energy Gateway

Port Arthur #17 – 39.2 m.tons
Vital Break-Bulk Port

Texas City #18 – 37.7 m.tons
Services Largest Petrochemical Complex

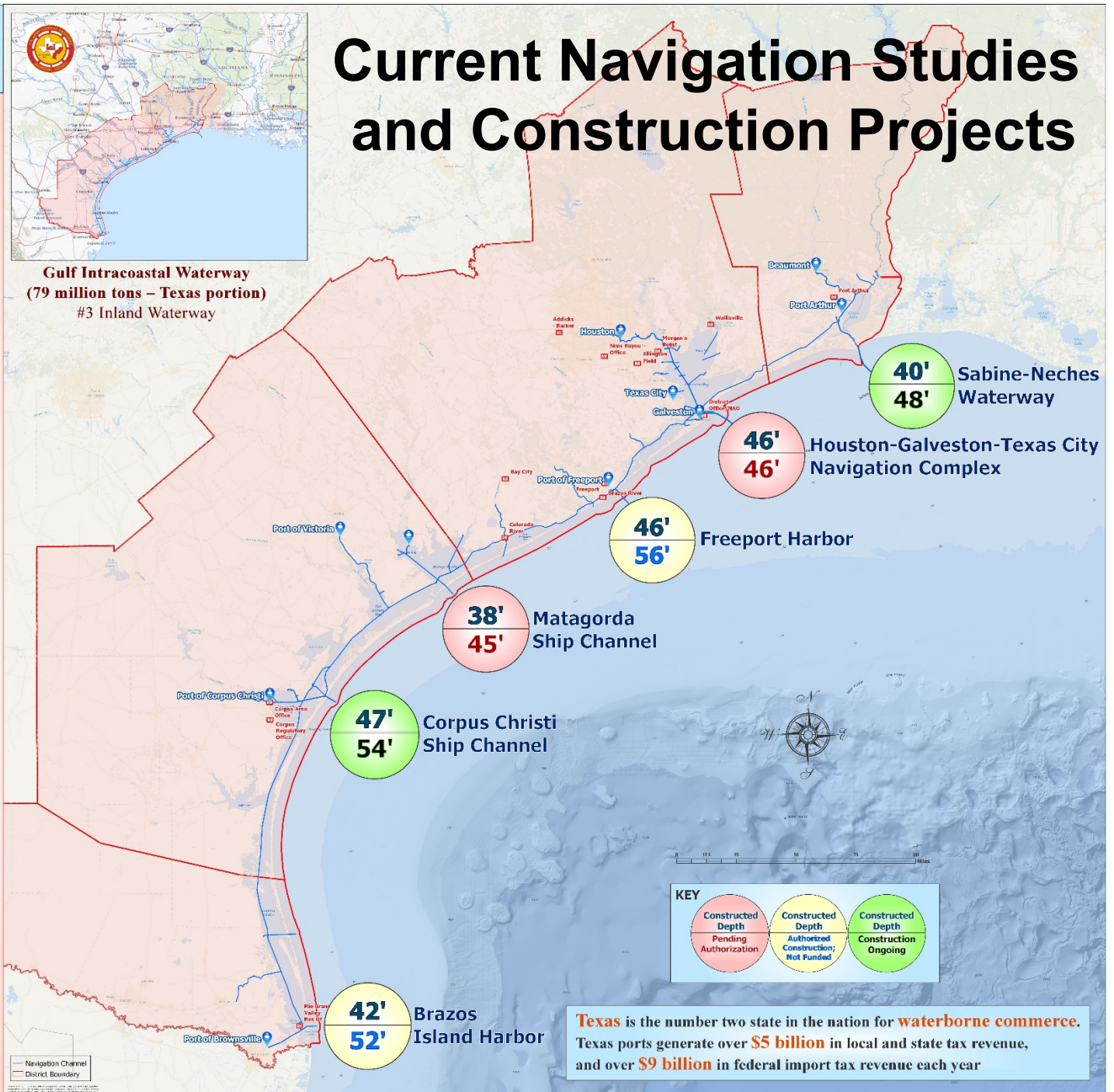
Freeport #31 – 24.5 m.tons
Connecting Global Services
Via Caribbean Relay Port

Galveston #59 – 7.8 m.tons
#4 Cruise Ship Port

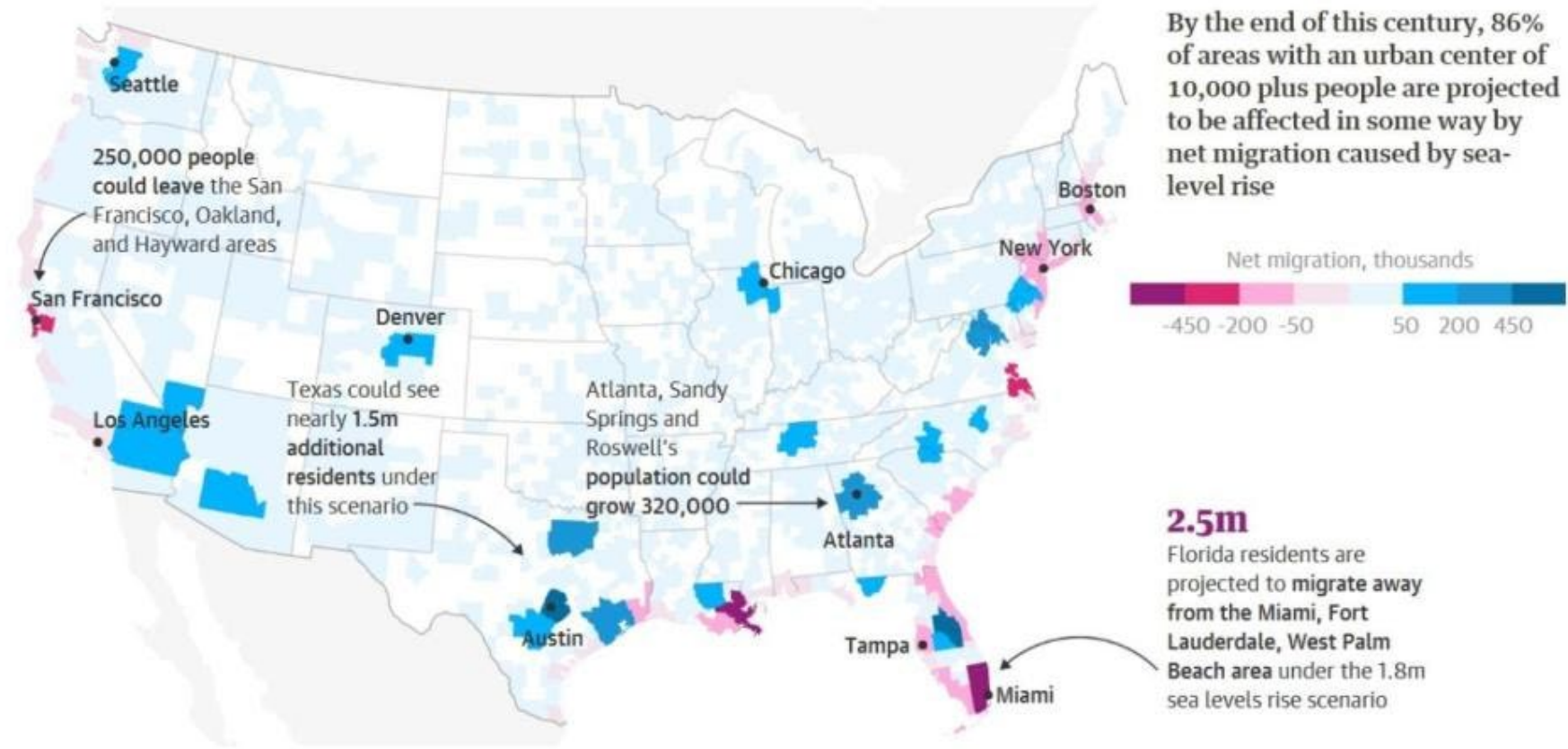
Brownsville #61 – 7.7 m.tons
#1 Ship Recycling Port

Victoria #80 – 4.3 m.tons
#2 Shallow-Draft Port for Domestic
Crude Petroleum

Calhoun County Port #81 - 4.3 m.tons
(Matagorda Ship Channel)



Inhabitation Trends and Coastal Flood Potential



Guardian graphic. Source: Nature climate change, Mathew E. Hauer

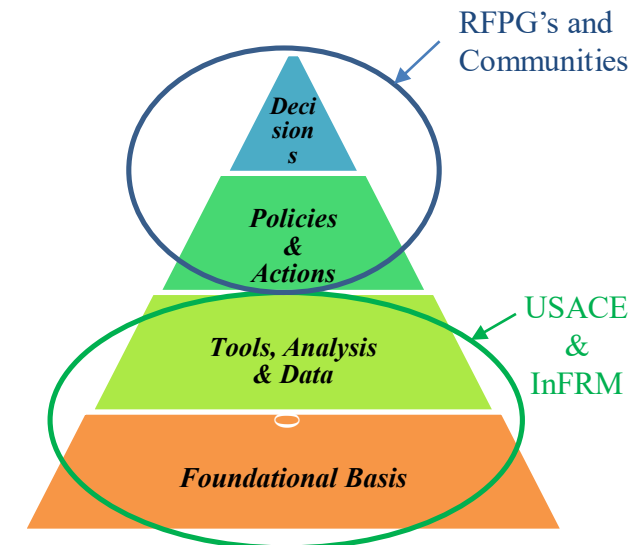
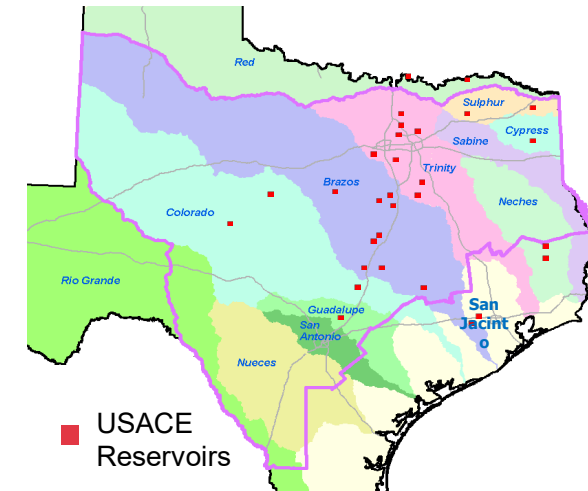
Implication: Increased river flood and coastal storm damage risks to inhabitation and development



US Army Corps of Engineers Role in Flood Risk Reduction



- **US Army Corps of Engineers (USACE) Dam Operations**
 - Owns and operates 29 multipurpose reservoirs, oversees flood operations for others
 - Reservoirs establish and maintain river conditions in 7 river systems (\$100B+ damages prevented)
 - Funding partner for network of stream and precipitation gages across the state
- **Numerous statewide flood damage reduction projects including coastal**
- **Funding assistance to communities for flood damage reduction projects**
 - Feasibility studies (cost sharing)
 - Planning Assistance to States (PAS) – funding for a broad range of studies from flooding to water availability (cost sharing)
 - Flood Plain Management Services (FPMS) – assists communities with floodplain related studies (cost share or reimbursable)
- **Technical expertise**
 - Regional planners, program managers, scientist and engineers and designers
 - National virtual teams – allows rapid repositioning of resources
 - Real-time flood forecasting and inundation mapping
 - Storm shifting
 - Research, education and application development (ERDC & HEC)



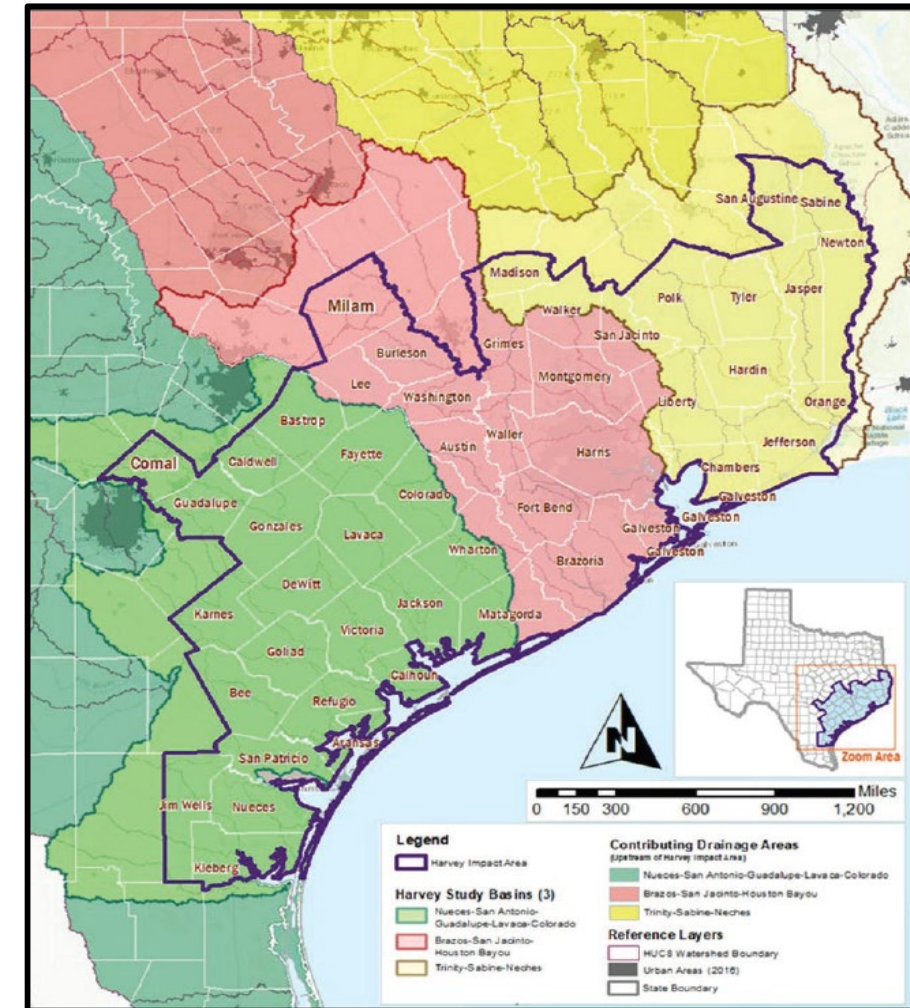


Regional Flood Studies – SWF Leading Technical Oversight with SWG Support



Mission Statement: GLO-CDR Planning team designs and oversees planning studies to collect, analyze, and communicate disaster-related data to assist decision makers to better protect Texans from future disasters.

- 3 Regions - \$25M/region (\$75M Total) – A&E's: Dannenbaum, Freese & Nichols, and AECOM
- Region 4 - RGV (\$10M) also to be included – GLO-CDBG funded A&E's
- Five-phase study
 1. Data Collection & Stake Holder Engagement Plans
 2. Pilot Study
 3. Flood Model Development
 4. Alternatives Analysis and Cost-Benefit Analysis
 5. Recommendations and Pursuit of Additional Mitigation Funds



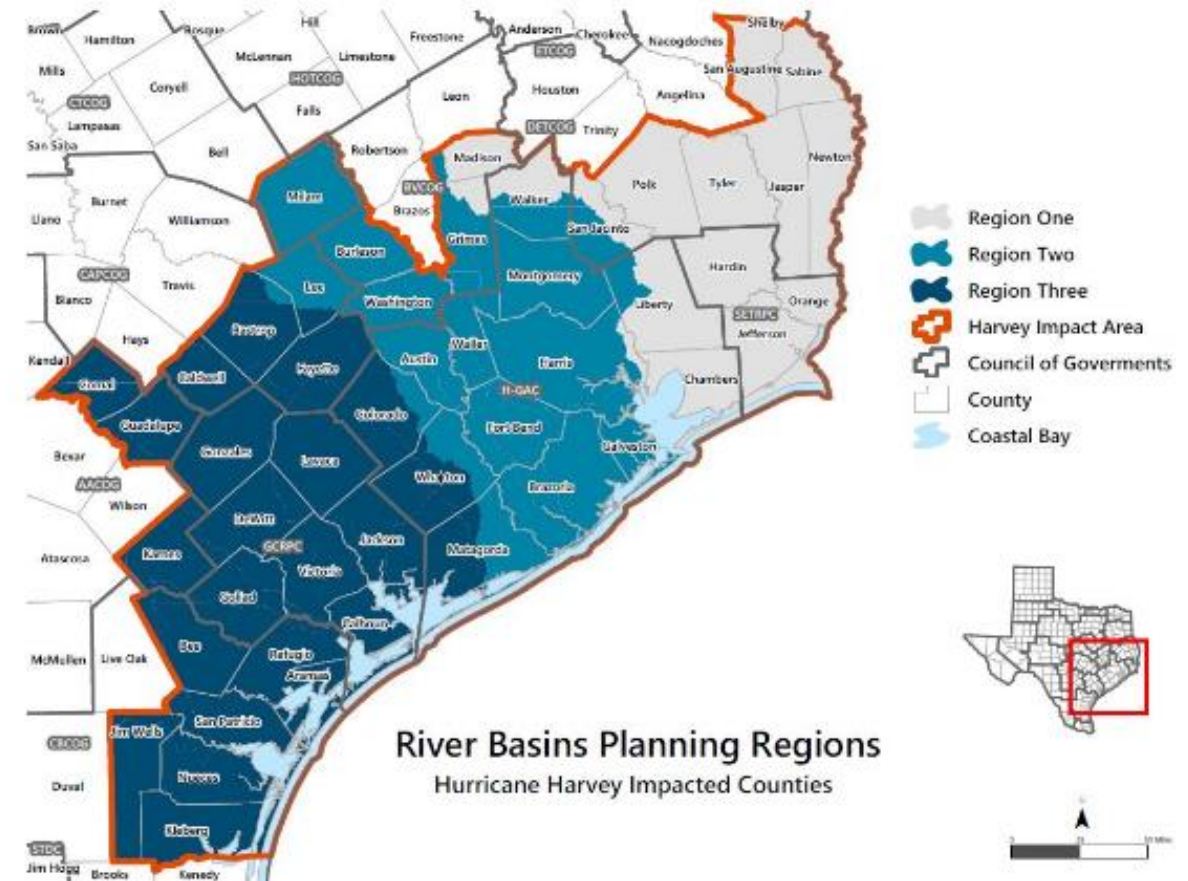


Texas Integrated Flooding Framework - Planning Resiliency



Purpose: Develop a framework for implementing a comprehensive, science-based strategy to address riverine, pluvial, and coastal resiliency for Texas

- Lead by the TWDB
 - USACE and USGS supporting
- \$3M Budget over 3 years
- Four-phase study
 1. Data and Monitoring Gap Analysis
 2. Data Management and Visualization
 3. Integrated Flood Modeling Framework
 4. Planning and Outreach
- Due – 30 June 2024



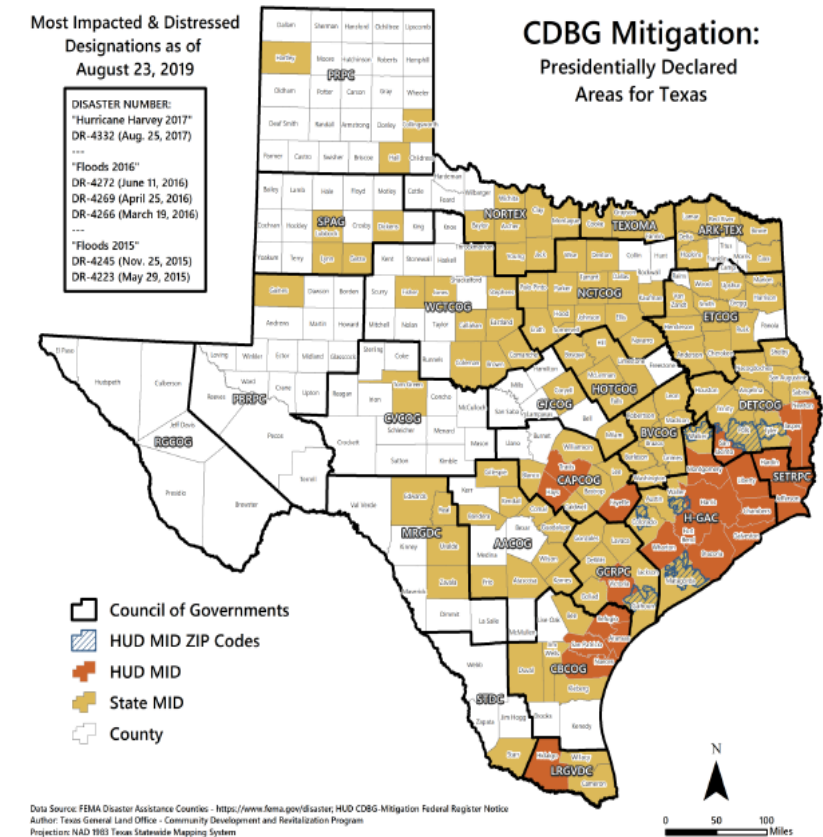


Texas Integrated Flooding Initiative - Implementation



Purpose: Generate comprehensive fundamental datasets, expand real-time data collection, and enhance publicly available flood information; and develop accurate coastwide assessments of flood risk to enable more efficient, affordable, and transparent mitigation planning in the Coastal regions of Texas

- Texas Water Development Board, USACE, USGS
- Estimated at between \$10-100M investment over a decade
- Four-phase effort:
 1. Monitoring Systems Evaluation & Implementation
 2. Database Infrastructure, Interoperability & Visualization
 3. Coupled Coastal Modeling System Design
 4. Comprehensive Flood Hazard Identification & Planning

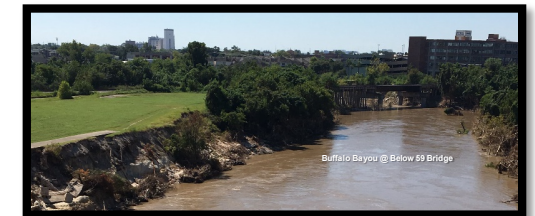
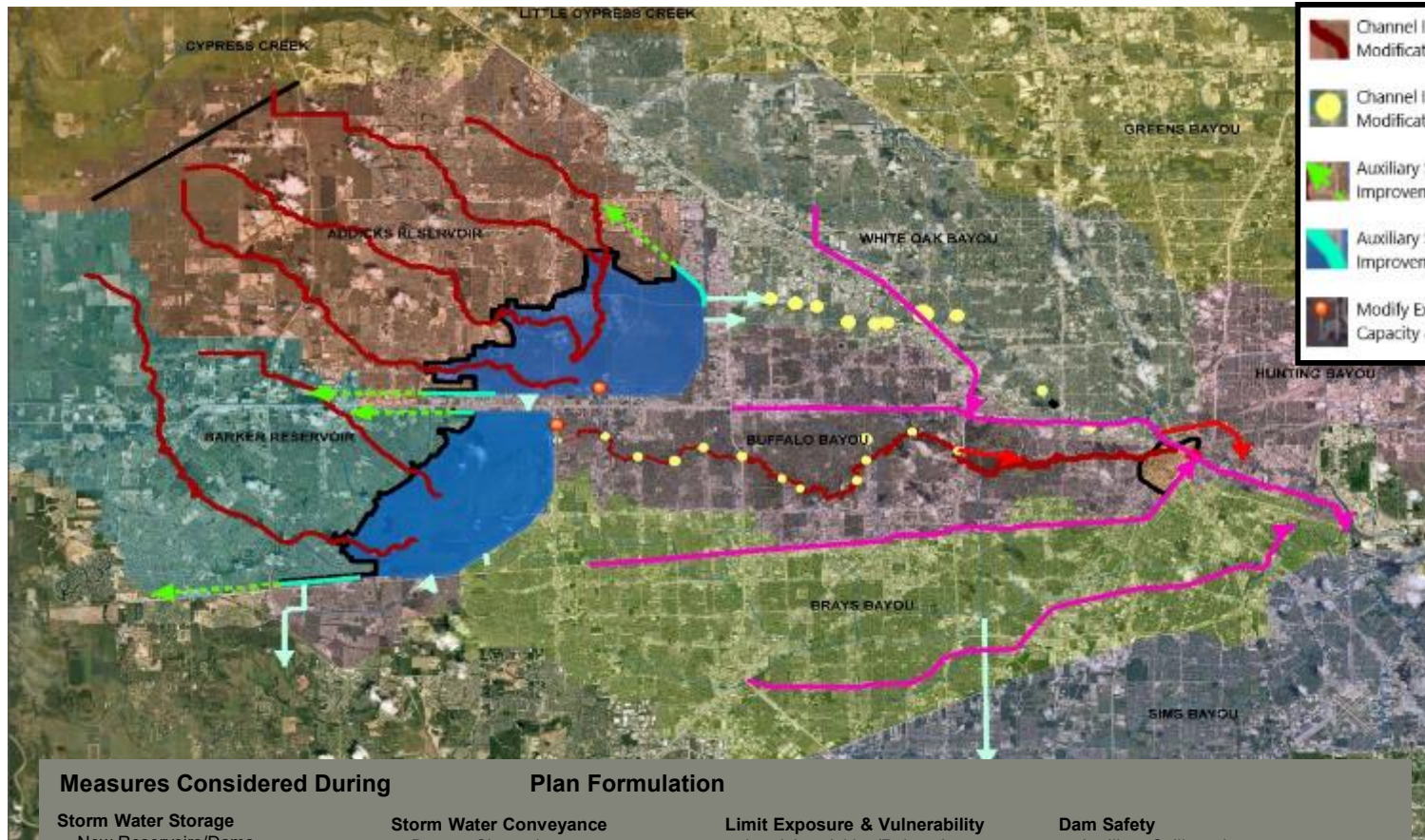




Buffalo Bayou & Tributaries, Resiliency Study, TX



Buffalo Bayou and Tributaries, TX, Resiliency Study: \$6 M to investigate and identify alternatives to reduce flooding in and around reservoir dams during major storm events.



Measures Considered During

- Storm Water Storage
 - New Reservoirs/Dams
 - New Detention
 - Sedimentation Basins
 - Increase Reservoir Storage
 - Levees/Floodwalls

Plan Formulation

- Storm Water Conveyance
 - Bypass Channels
 - Diversion Channels
 - Tunnels
 - Channel Improvements

- Limit Exposure & Vulnerability
 - Land Acquisition/Relocation
 - Flood Proofing
 - Warning Systems
 - Raising a Structure in Place
 - Update Emergency Action Plans and Hazard Maps

- Dam Safety
 - Auxiliary Spillway Improvements
 - Relocation of Auxiliary Spillway
 - Modify Dam Operations
 - Remove Dams

- Interim Report made public 2 OCT 20
 - Public comment Period extended to 20 NOV 20.
 - 4 virtual information sessions held.
- Cost ROM \$ Billions



Coastal Texas Protection and Restoration, TX



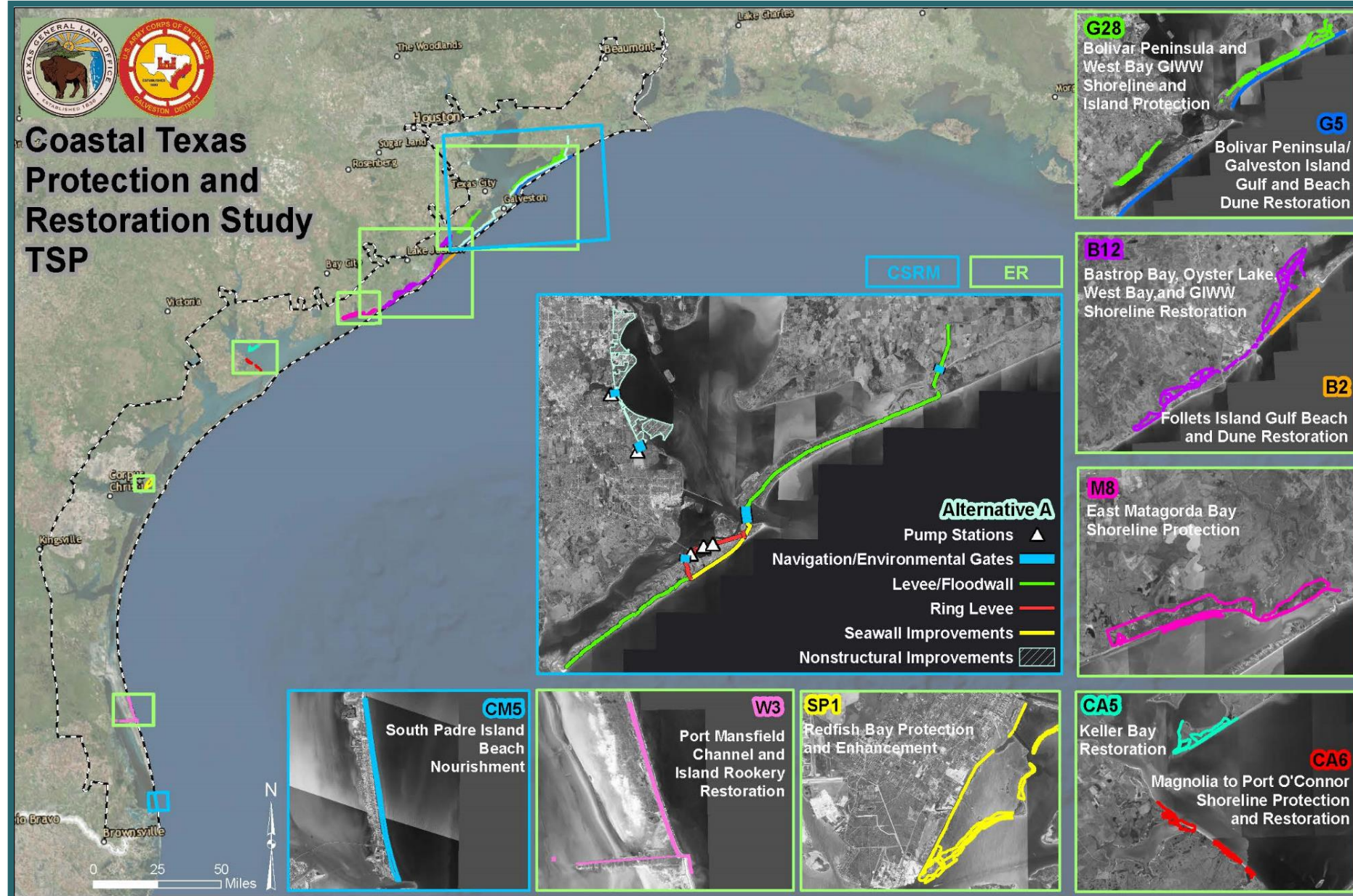
Cost:
+\$20m Feasibility Study

Status:
Chiefs Report to
Congress - May 2021

Non-Federal Sponsor:
Texas General Land
Office

Scope: Coastal Storm
Risk Management &
Ecosystem Restoration
along the Texas Coast

<http://coastalstudy.texas.gov/>





Resacas at Brownsville, Texas



Phase: PED

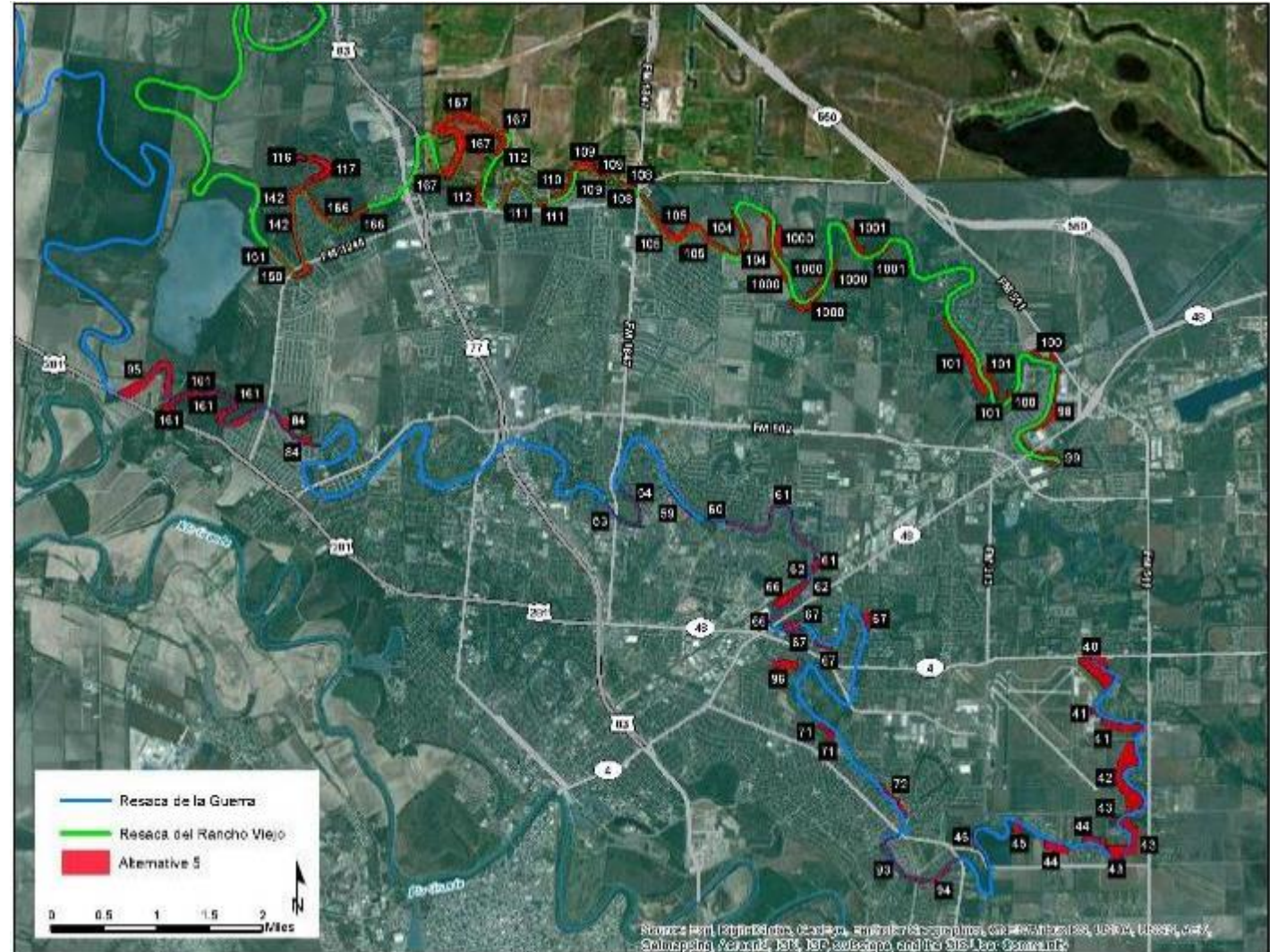
Purpose: Ecosystem Restoration

Sponsor: Brownsville Public Utilities Board / City of Brownsville (GI/CG)

Scope: Resaca del Rancho Viejo & Resaca de la Guerra

Cost: \$260M

The total area restored would include 845 acres providing connectivity through 44 “stepping stone” areas consisting of 625 acres of terrestrial riparian habitat restoration, 220 acres of aquatic habitat restoration, and 33 miles of shoreline aquatic planting. The recommended plan includes 763 acres of city and private lands, 28 acres of state Texas Parks and Wildlife Department (TPWD) lands, and 54 acres of federal United States Fish and Wildlife Service (USFWS) lands.





Sabine to Galveston, Texas



Cost: \$3.8B

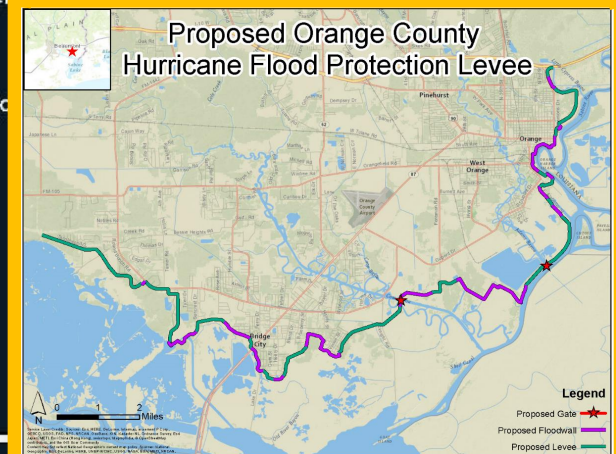
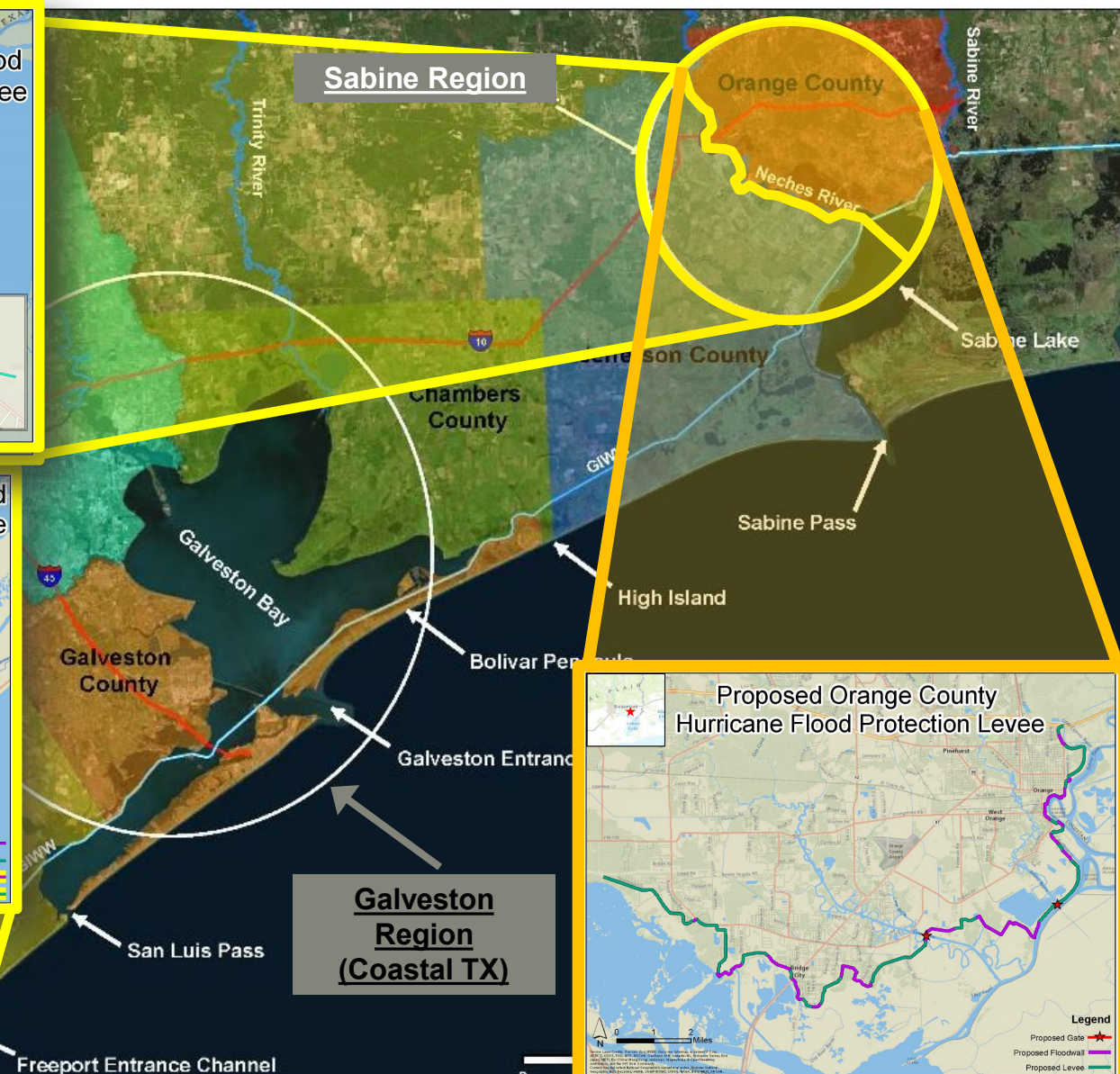
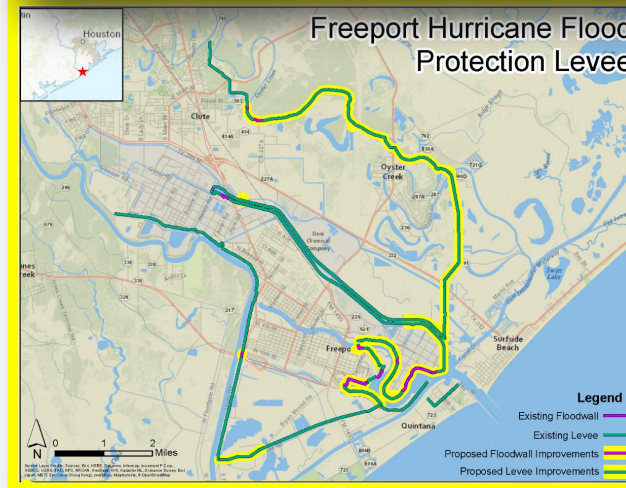
Phase: PED

Purpose: CSRM

Port Arthur Sponsor:
Jefferson County DD7

Freeport Sponsor:
Velasco Drainage District

Orange Co. Sponsor:
Orange County





Small Project and Studies



Active CAP Projects

| Sect | Project Name | Phase | Local Sponsor |
|------|---|-------------|--|
| 14 | City of Columbus | D&I | City of Columbus |
| 14 | Matagorda County Nature Center | D&I | Matagorda County |
| 206 | Resacas Boulevard | D&I | City of Brownsville |
| 14 | Mary Rhodes Pump Station | Feasibility | Corpus Christi |
| 204 | Galveston Island Coastal Erosion | Feasibility | Galveston Park Board |
| 206 | Galveston County MUD 12 Ecosystem Restoration | Feasibility | Galv Cnty MUD 12/ City of La Marque |
| 1122 | Hickory Cove Marsh | Feasibility | Orange County Navigation & Port District |

Active PAS Project:

- SPI Nearshore Berm: Final Report complete 30DEC
- Dellanera Beach Structure: In Progress
- Lower Clear Creek & Dickinson Bayou: In Progress will need FY21 funding during Q1
- SPI & Cameron County Reg Sed Mgmt Plan: NFS's Exec Agreement November
- Liberty County: Closeout awaiting audit completion. RM reviewing audit.
- Fort Bend Cnty Brazos River: Closeout awaiting audit completion. Waiting on WIK from NFS.
- Lower Clear Creek & Dickinson Bayou

Potential CAP Projects

| Authority | Project Name | Local Sponsor | LOI Date |
|-----------|------------------------------------|-------------------------------------|------------|
| 107 | Commercial Navigation Improvements | Port of Harlingen | 10/13/2020 |
| 205 | Aransas Pass | City of Aransas Pass | 3/8/2019 |
| 205 | Brownsville | City of Brownsville | 1/18/2019 |
| 205 | China | City of China | 11/1/2019 |
| 205 | Cypress Creek | WCID110 | 7/10/2019 |
| 205 | Clear Brook Meadow | Clear Brook Meadows | 1/31/2019 |
| 205 | Dickinson Bayou | City of Dickinson | 11/7/2019 |
| 205 | Prestonwood Forest | Prestonwood Forest Utility District | 8/4/2019 |
| 208 | Cypress Creek | WCID110 | 7/10/2019 |

Potential PAS Projects

| Project | Type | Project Status |
|---|---------------------|--|
| Port of Victoria | FRM | Agrmt being routed for execution |
| South Padre Island | RSM | NFS's executing new agreement |
| Port of Palacios | Master Plan Develop | Requested new LOI from NFS |
| Port of Mansfield | Master plan RSM | Agmt with NFS for review |
| City of Weslaco | FRM | SOW finalized and inquiring about funding with SWD |
| Harris County Flood Control Watershed Impacts to Houston Ship Channel | FRM | SOW finalized and Agreement Executed |
| Cypress Creek | FRM | Coord in process |
| Aransas Pass | FRM | Coord in process |
| Cameron County Watershed Study- | FRM | Coord in process |
| China | FRM | Coord in process |
| Brooks, Duval and Jim Hogg Co. | FRM/ D&L Safety | Coord in process |
| Prestonwood Forest Utility District – FRM | FRM | Coord in process |



Significant Collaboration Between All State, Federal and Academic Agencies



Open lines of communication:

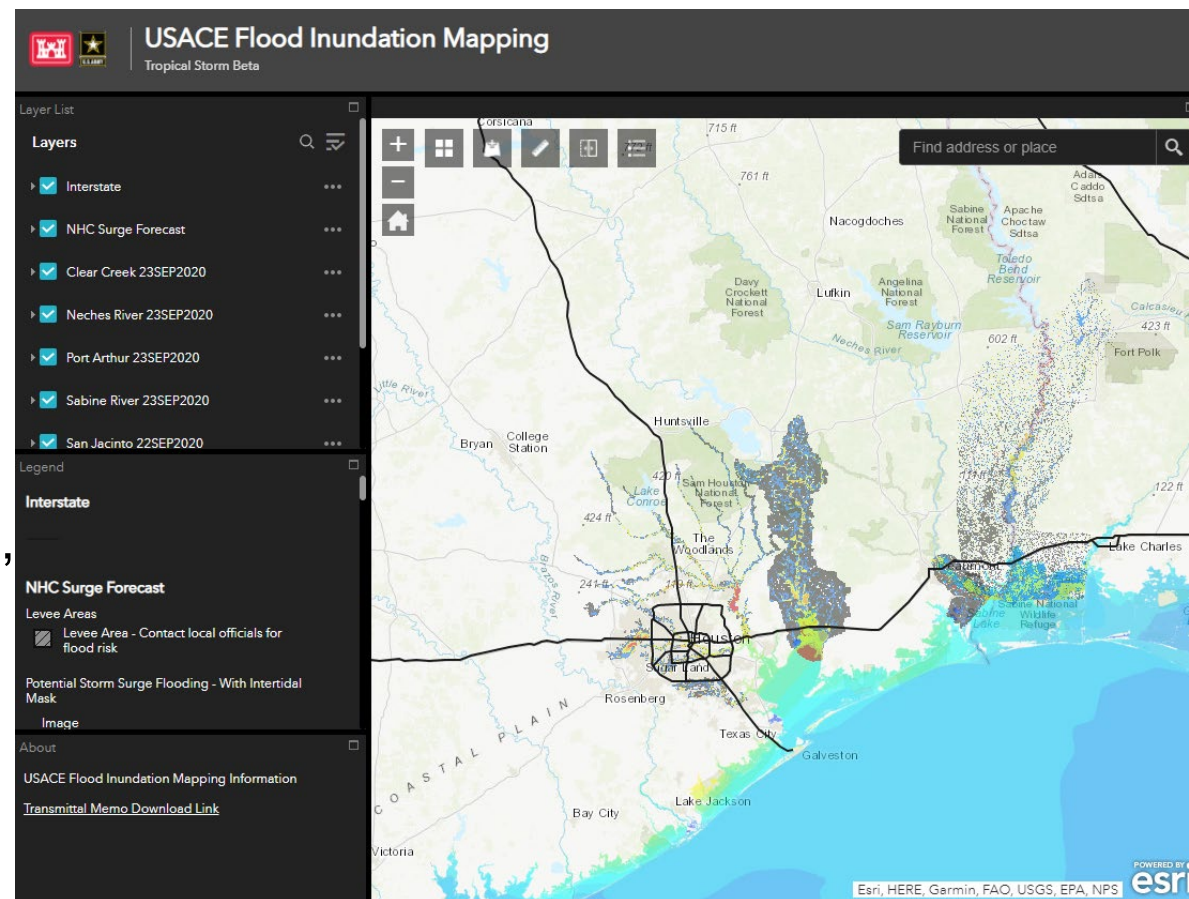
- SilverJackets meetings - monthly
- Conference presentations – TFMA
- Texas Flood Organizing Group - TWDB led

Iowa Flood Center Visit - 6 Jan 20 & 4 Fed 2021

- 30 Texas Attendees: TxGLO, TWDB, USACE, USGS, FEMA, TDEM, NCTCOG, TRA, LCRA, UT, UTA, TAMU AgriLife, NWS

Collaboration in emergency response:

- NWS, TDEM, SWF, MVN, MMC
- Flood inundation map products produced for:
 - 17-21May21, Laura & Marco, Beta, Delta



Coastal Surge, Clear Creek, Buffalo Bayou, San Jacinto, Trinity, Neches, Port Arthur, Sabine





Texas Driving Technical Advancement



Software Investments

1. HEC-RAS 2D rain-on-grid incorporation – Texas funded \$500k
2. HEC-RAS 2D - HEC-RAS 6.0 improvements
 - Spatial infiltration (losses)
 - Spatial precipitation
 - 1-D bridge hydraulics inside of 2D Flow Areas
 - Wind forcing

Model Development

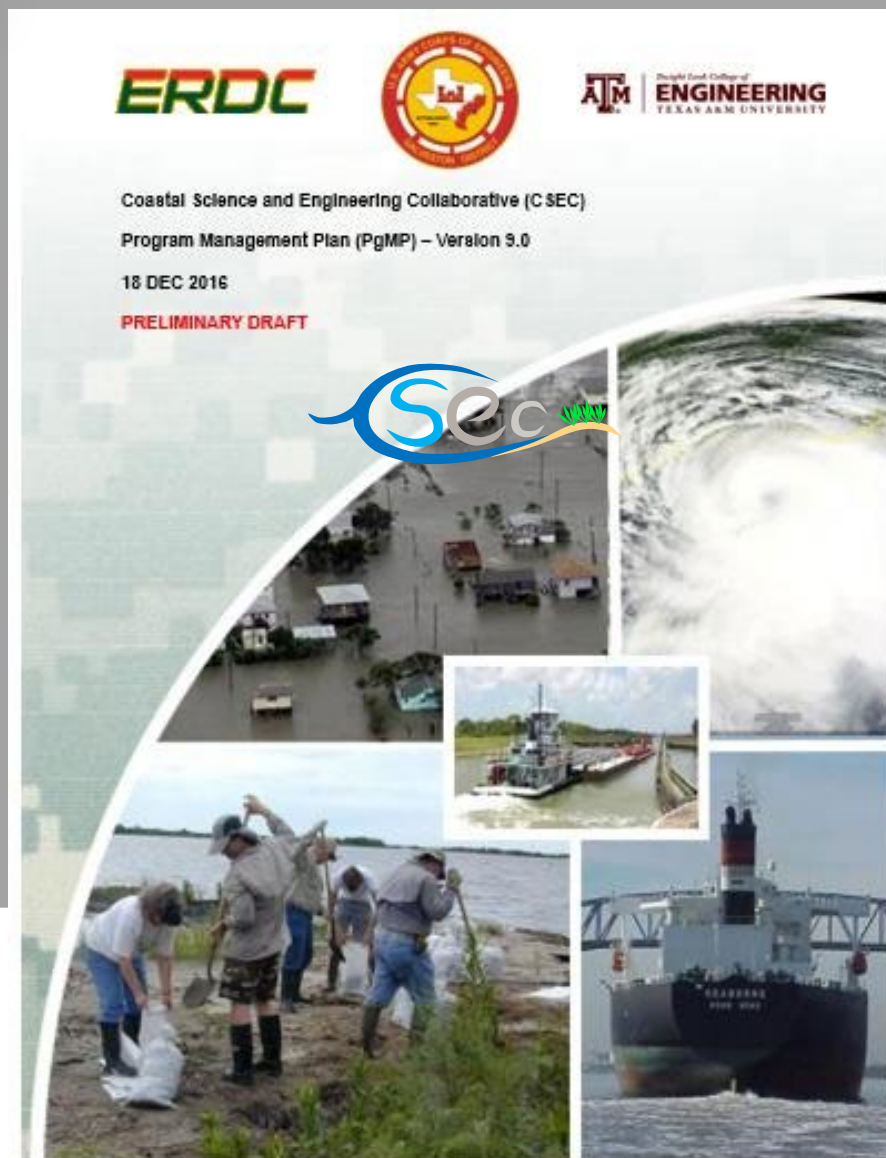
- SWG – developing improved SWAN-ADCIRC Coastal Surge model for Texas - \$600k
- ERDC- Developing improved surge hazard stats and compound flooding analysis - \$230K

Interagency Agreements

- TWDB and USACE-SWF collaboration Floodplain Management Services (FPMS) \$120k FY21
- TWDB and USACE-SWG collaboration FPMS \$75k FY21



Coastal Science and Engineering Collaborative (CSEC)



Accelerate transfer of new science into practice

- Deliver science and engineering to improve coastal project life cycle systems performance and cost

Develop business collaboratively

- Bring together capabilities, resources, and funding from multiple partners for an overall greater value than could be achieved separately

Link academics to practice

- Student learning experiences
- Cultivate recruiting opportunities



Strategic Enabler: Regional Sediment Management (RSM)

...Managing sediment regionally has potential to save money, allow use of natural processes to solve engineering problems, and improve the environment.

Key Elements:

- Uses a river watershed and coastal basin systems approach
- Incorporates physical processes and effects of anthropogenic influences
- Supports stewardship of natural resources in balance with economic development and national security needs



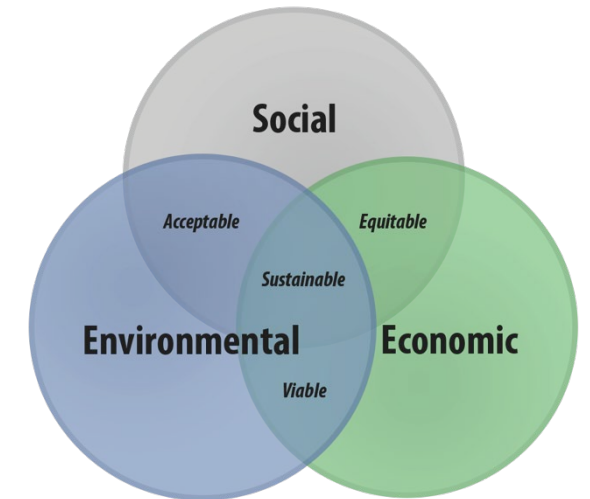


Strategic Enabler: Engineering with Nature (EWN)

...the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.

Key Elements:

- Science and engineering that produces operational efficiencies
- Use of natural processes to maximum benefit
- Broadening and extending benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners





Strategic Enabler: Natural and Nature Based Features (NNBF's)



Water Infrastructure Improvements for the Nation (WIIN) Act

SEC. 1184. CONSIDERATION OF MEASURES.

(a) DEFINITIONS.—In this section, the following definitions apply:

(1) NATURAL FEATURE.—The term “natural feature” means a feature that is created through the action of physical, geological, biological, and chemical processes over time.

(2) NATURE-BASED FEATURE.—The term “nature-based feature” means a feature that is created by human design, engineering, and construction to provide risk reduction in coastal areas by acting in concert with natural processes.



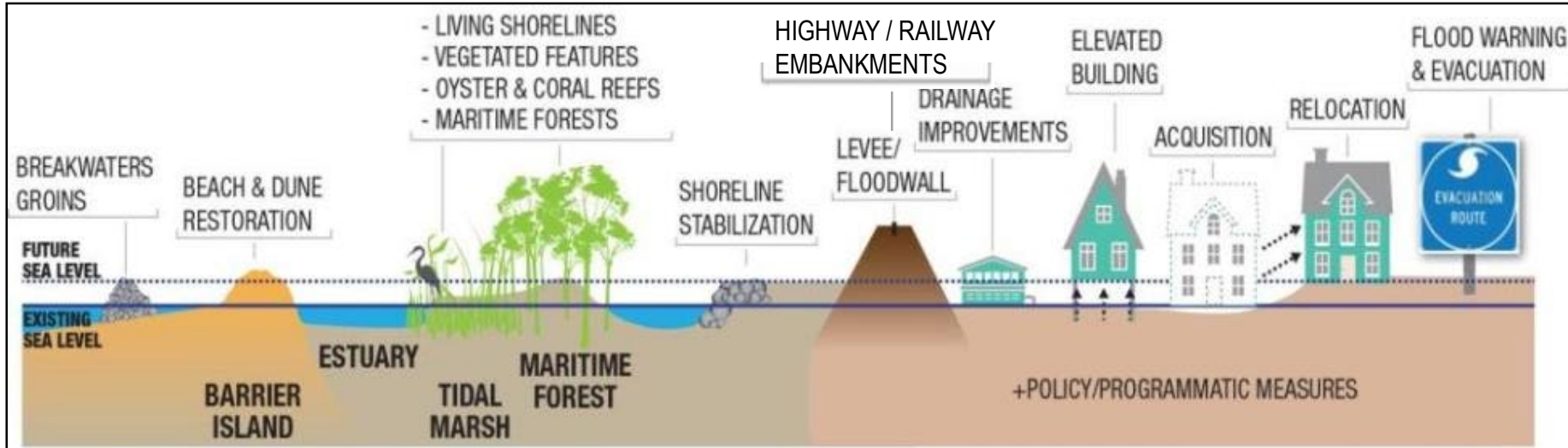
North Padre Island



Galveston Island



Strategic Enabler: Multiple Lines of Defense (MLD)



- Combination of structural, non-structural, and NNBF:
 - Coastal storm damage risk reduction
 - Coastal ecosystem restoration and management
 - Supporting coastal sustainability and resilience
- Uses an integrated systems approach



Comprehensive Coastal Resiliency



Intentional Implementations

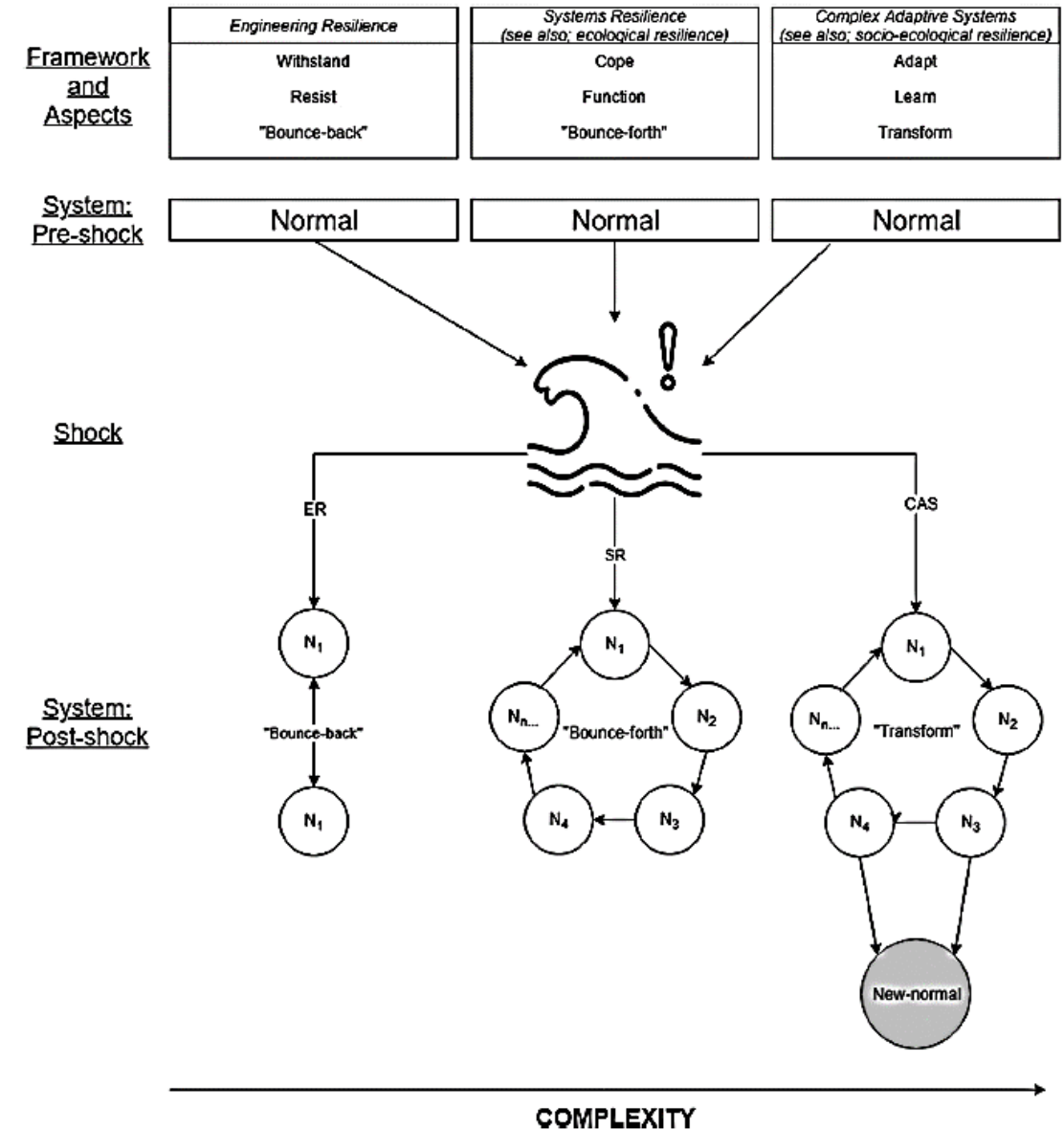
- Prioritize Resilience needs
- Focused
- Structured

Adaptive Management

- Monitoring
- Avoiding repeated mistakes
- Tipping points
-

Develop quantifiable success metrics

- Developing best-practice guidance
- Socialize and communicate success





Conclusion



Collaboration and coordination

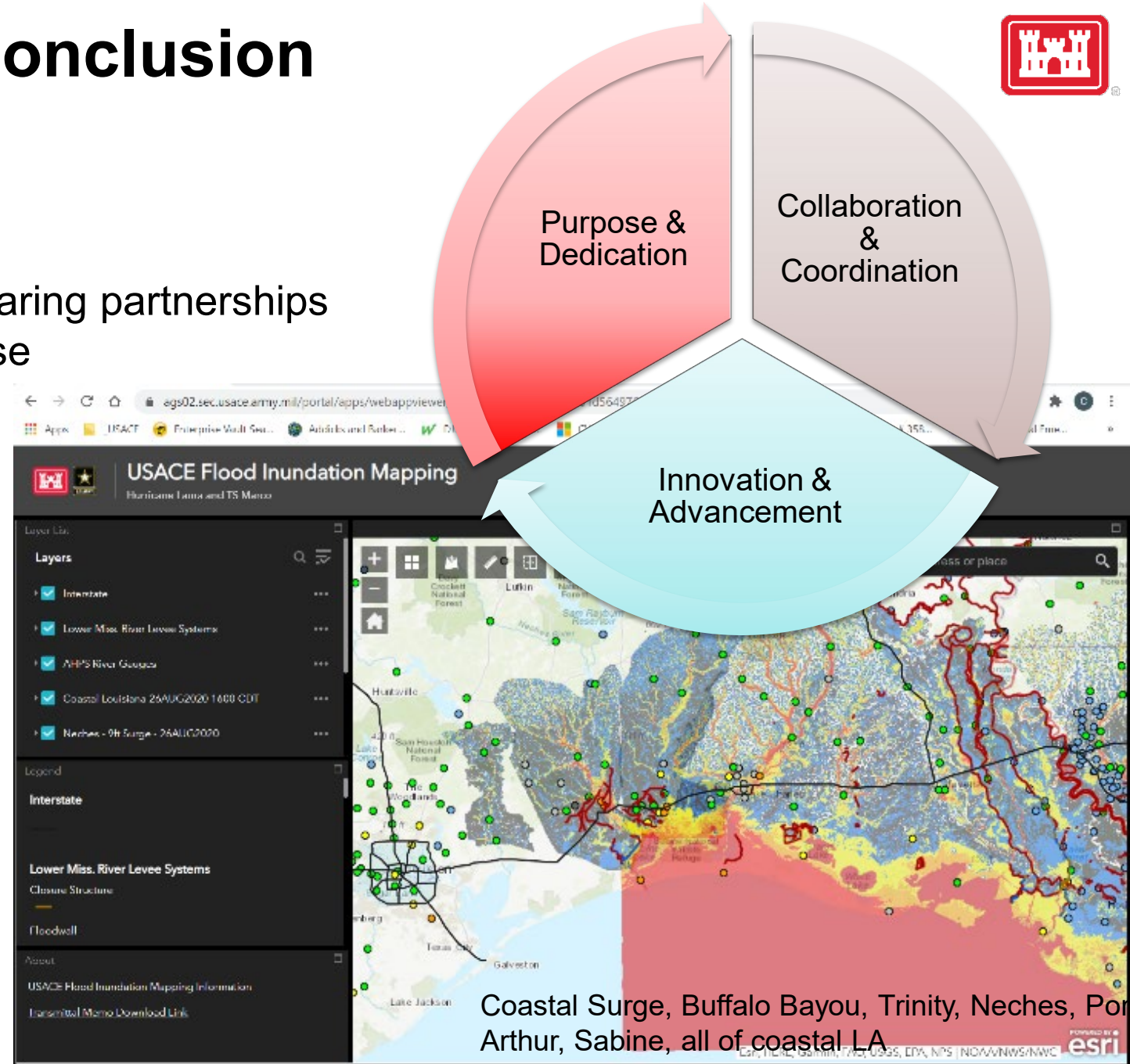
- Lines of communication
- Alignment of resources and data sharing partnerships
- Collaboration in emergency response

Innovation and Advancement

- Software
- Model development
- Webviewers

Purpose and Dedication

- Shared understanding
- Driven conscientious professionals
- Funding
- Resiliency





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ONLINE

www.swg.usace.army.mil

Email - Coraggio.Maglio@usace.army.mil