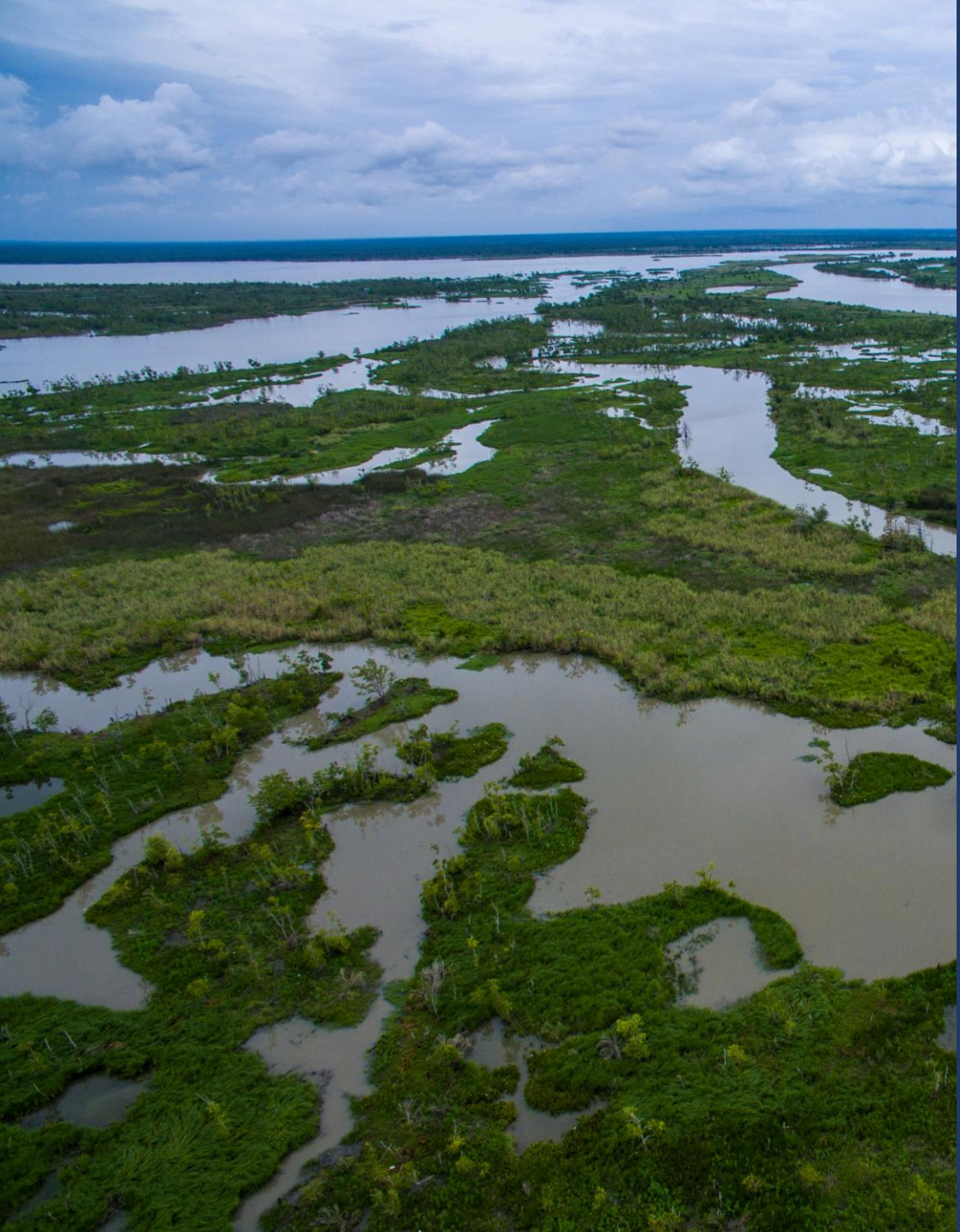




Empowering Decision Makers with Flood Resilience Data

GLO River Basin Flood Studies (RBFS)
Central Region



Agenda

- GLO Planning Mission
- RBFS Study Overview
 - Program Goals
 - Technical Study Partners
- Central Region Study Overview
 - Stakeholder Engagement
 - Data Collection
 - Baseline Modeling
 - Alternatives Analysis
 - Funding & Technical Assistance



Introductions



Jet Hays
Deputy Director CDR
Texas GLO



Ashley Poe, P.E., CFM
GLO Central Region Team
Project Manager
Freese and Nichols, Inc



Mark Pauls, P.E., CFM
GLO Central Region Team
Technical Advisor
Freese and Nichols, Inc



Planning Mission

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.

Our planning studies focus on:

- Gathering or generating the data necessary to make informed decisions
- Building tools and platforms that allow stakeholders to interact with the data
- Making recommendations for actionable and sustainable future steps



GLO's River Basin Flood Studies (RBFS)

The Texas General Land Office (GLO) initiated the RBFS to provide declared disaster-impacted counties with flood modeling that identifies flooding hotspots and supports project development. The **goals** for the flood study are to:

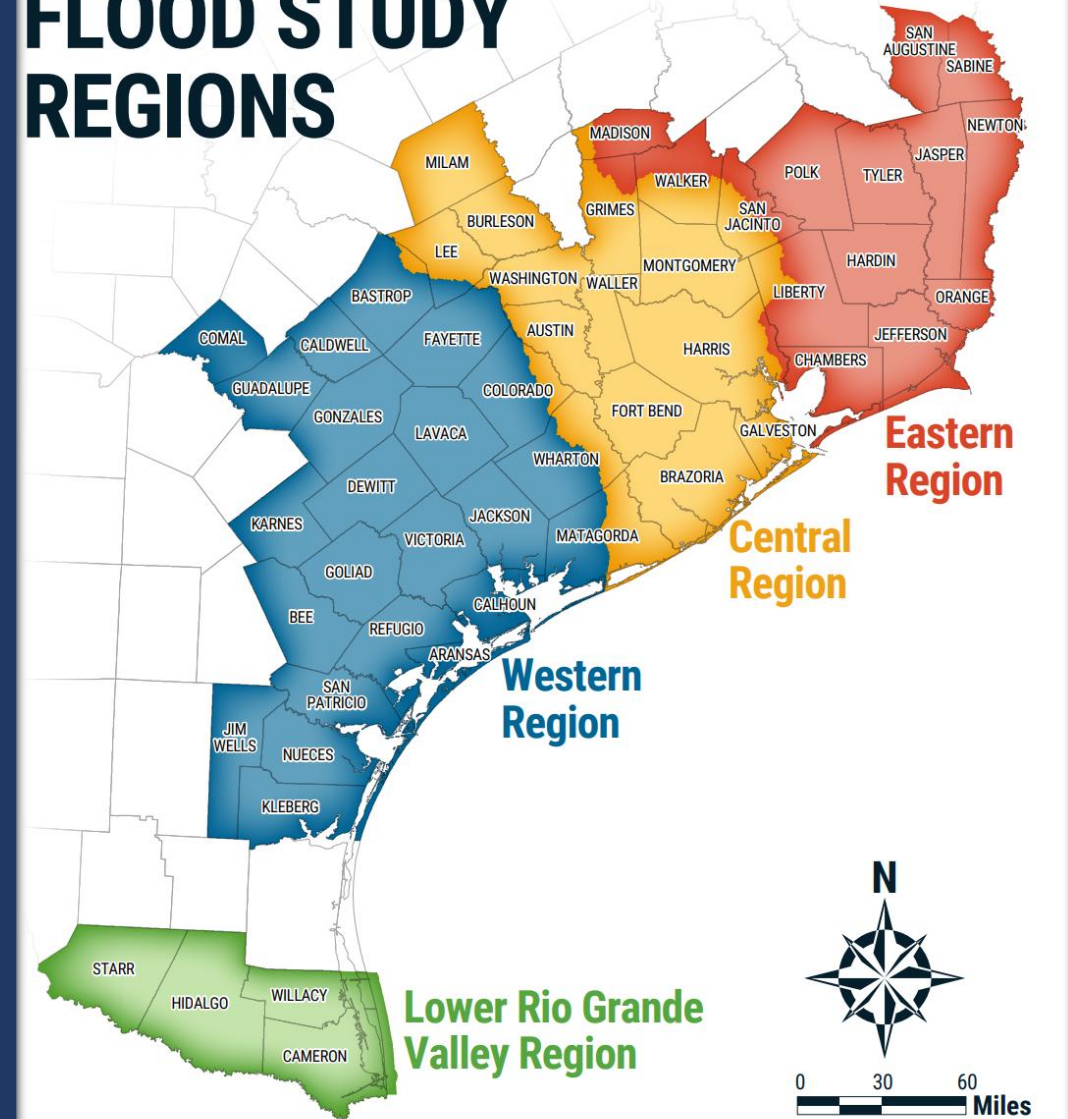
- Develop modeling to support flood mitigation and understanding of flood risk
- Identify large-scale or regional flood projects that strengthen the resilience of our communities
- Align identified projects with funding opportunities

This is a one-time planning effort, and the data produced by RBFS will also be used to support current and future Texas State Regional Flood Plans.



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FLOOD STUDY REGIONS



Delivery Partners

Coordinating Efforts & Reducing Duplication

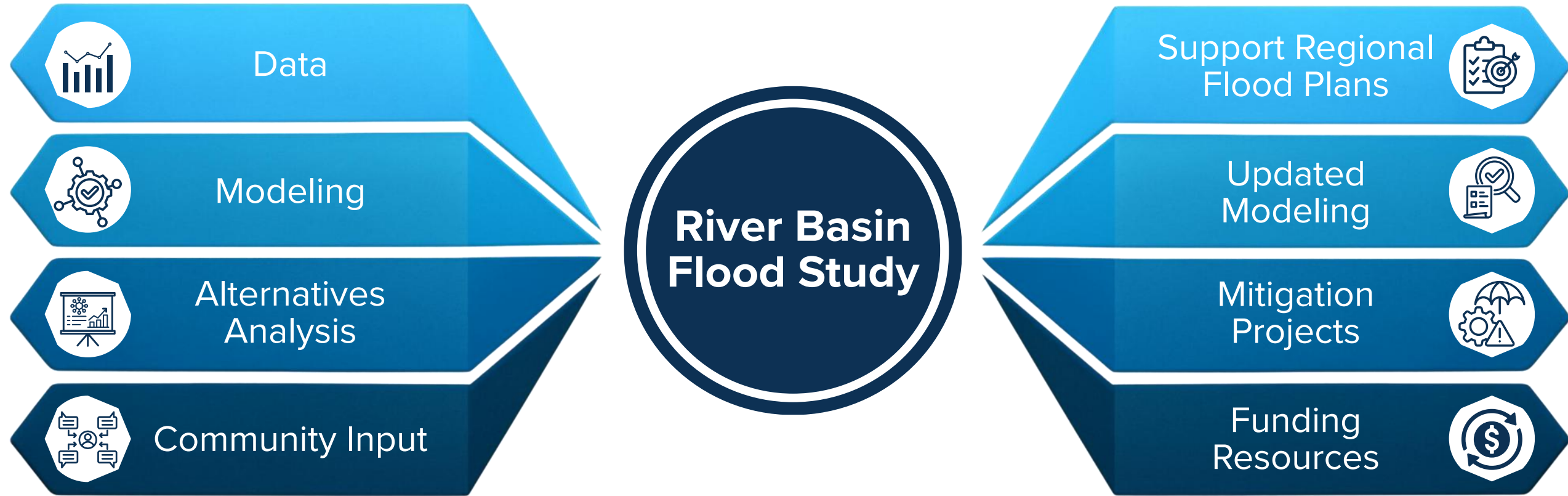
The GLO has partnered with federal and state agencies and organizations, seeking to draw from their strengths, expertise, and capabilities to further enhance and expedite the study while coordinating efforts.



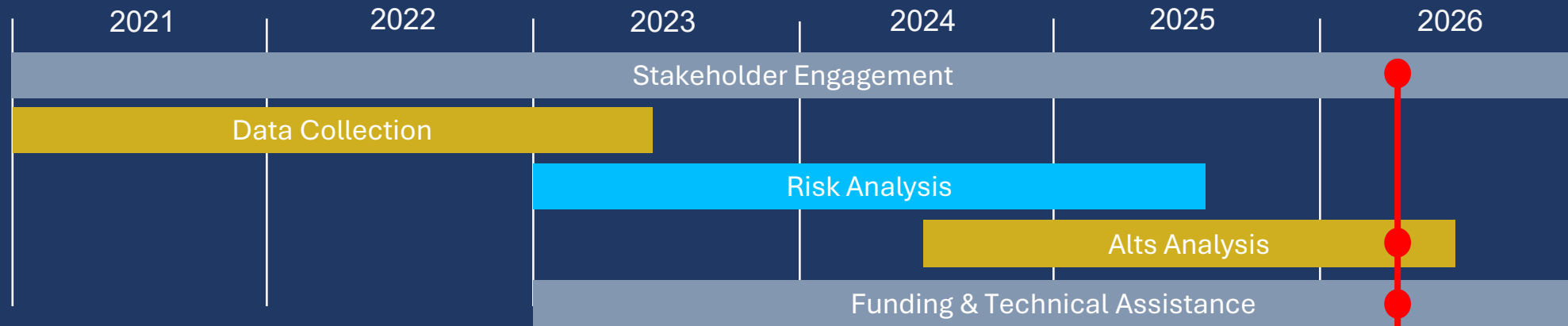
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Study Activities & Outcomes



Study Phases and Timeline



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WE ARE HERE

Stakeholder Engagement and Data Collection

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Early Engagement Strategies & Successes



80+ Meetings Held



800+ Stakeholder Emails, Phone Calls, & Feedback



80,000+ pieces of data collected
7,300+ model files collected

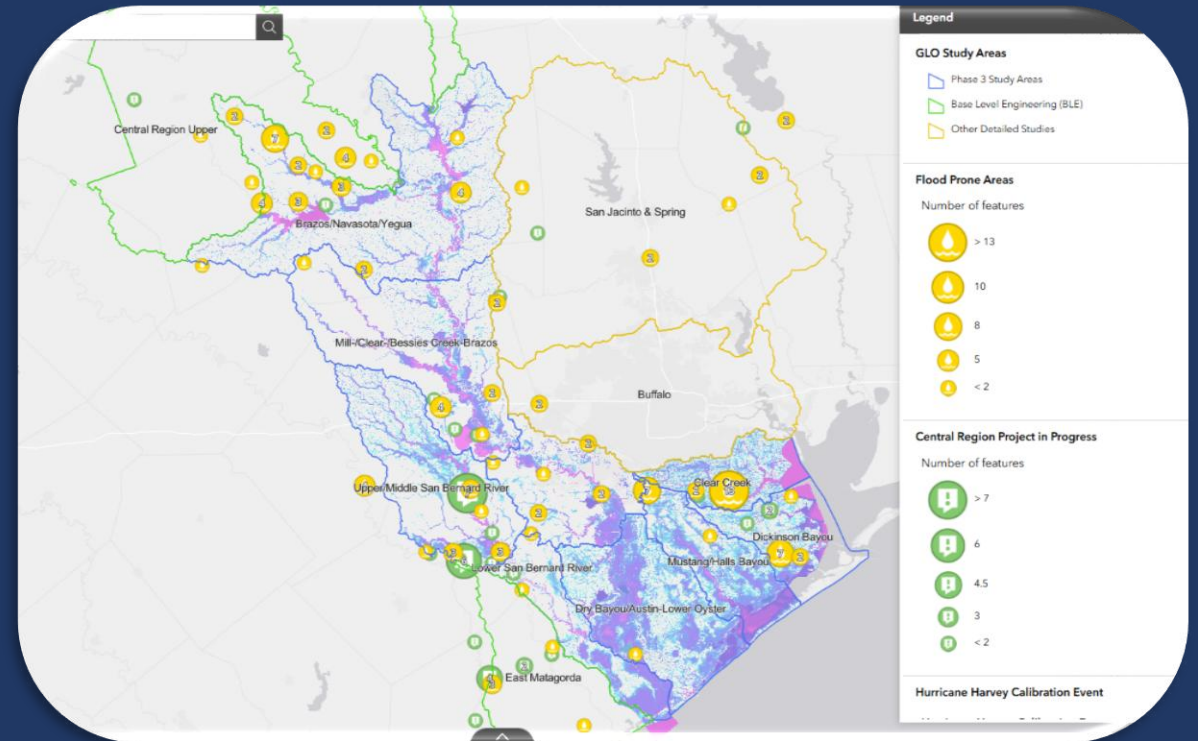
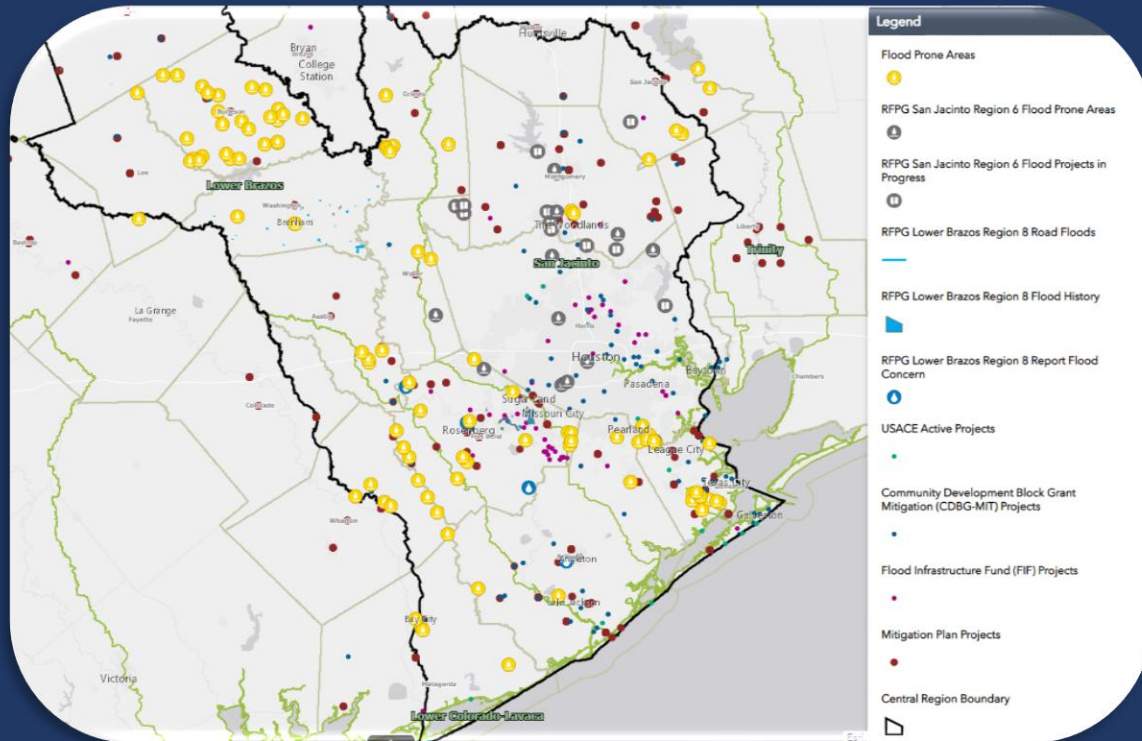


Alignment with Regional Flood Planning Groups

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Interactive Stakeholder Webmaps



Leveraging Collected Data

GLO River Basin Flood Study

Collected data was used to refine our assessment of existing flood risk and inform identification and prioritization of projects.

Texas Disaster Information System (TDIS)

Collected data was used to **inform the state-wide data management system** that is being developed to house and view disaster data for communities to utilize and leverage in the future.

TWDB Regional Flood Planning

TWDB and GLO signed a data sharing agreement allowing collected data and insights to be shared with RFPGs to inform the **first and second cycle of the Regional Flood Plans.**



Data Transfers

★ Transfer Data to/from RFPGs

PHASE 1



STAKEHOLDER
ENGAGEMENT

PHASE 2



DATA
COLLECTION

PHASE 3



RISK
ANALYSIS

PHASE 4

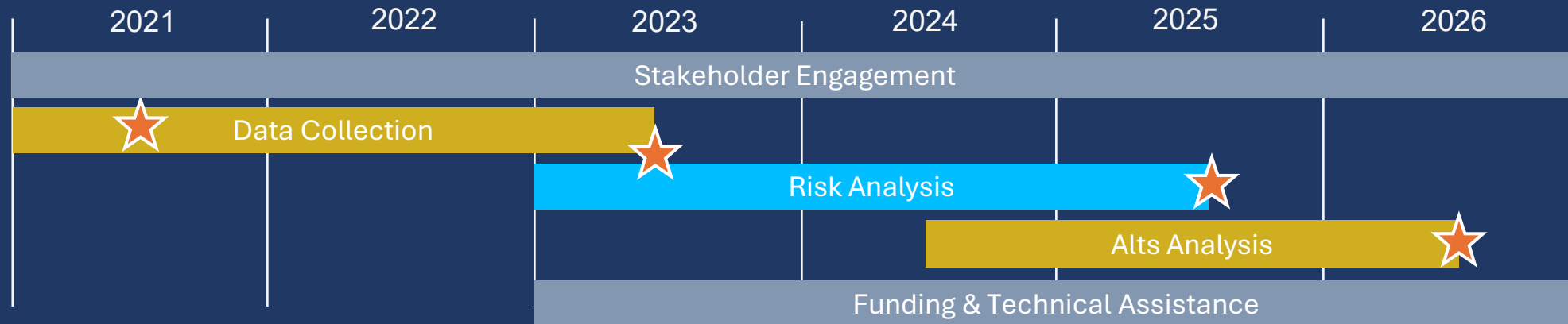


ALTERNATIVES
ANALYSIS

PHASE 5



FUNDING &
ASSISTANCE



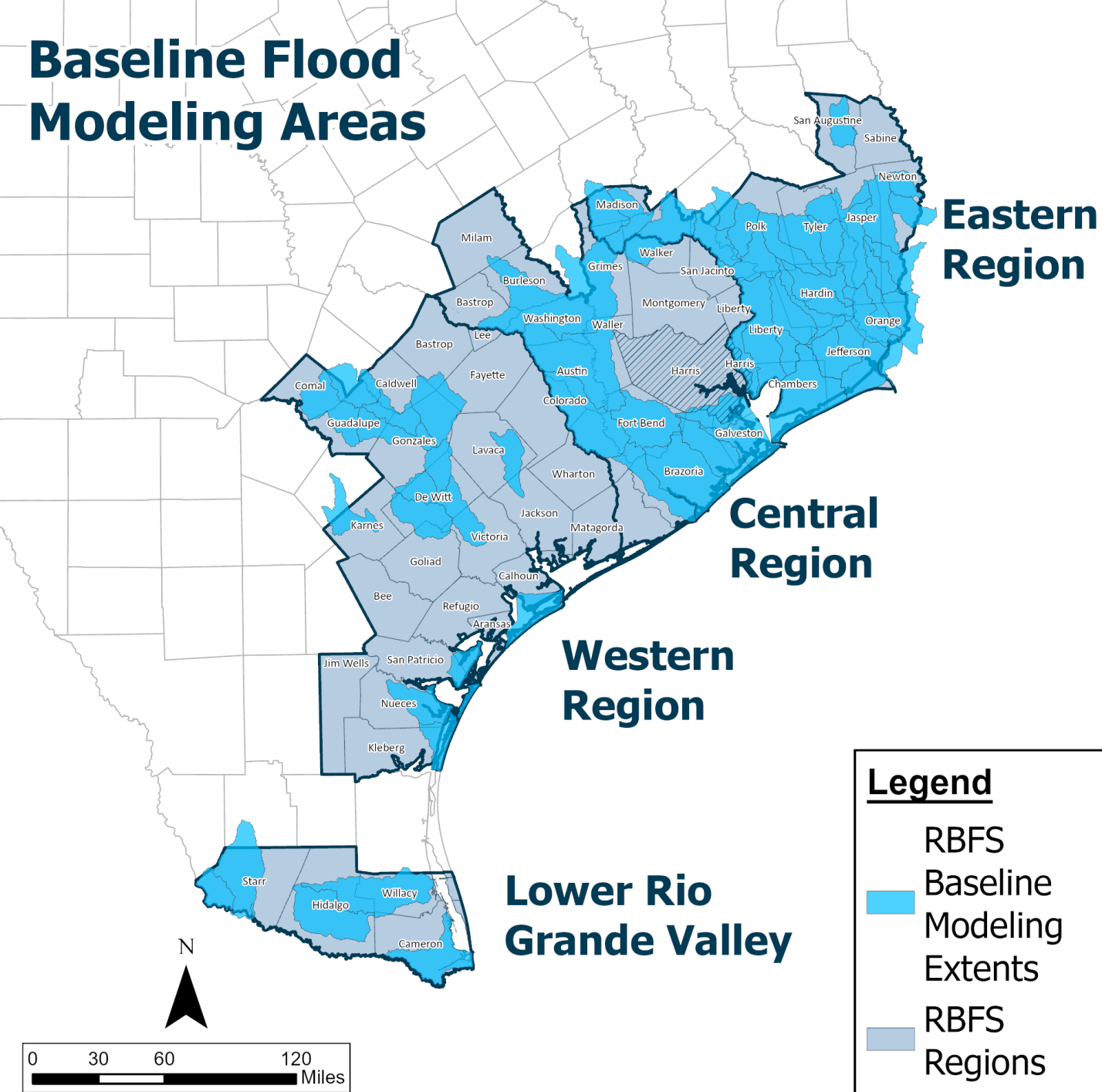
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Baseline Modeling

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Baseline Flood Modeling Areas



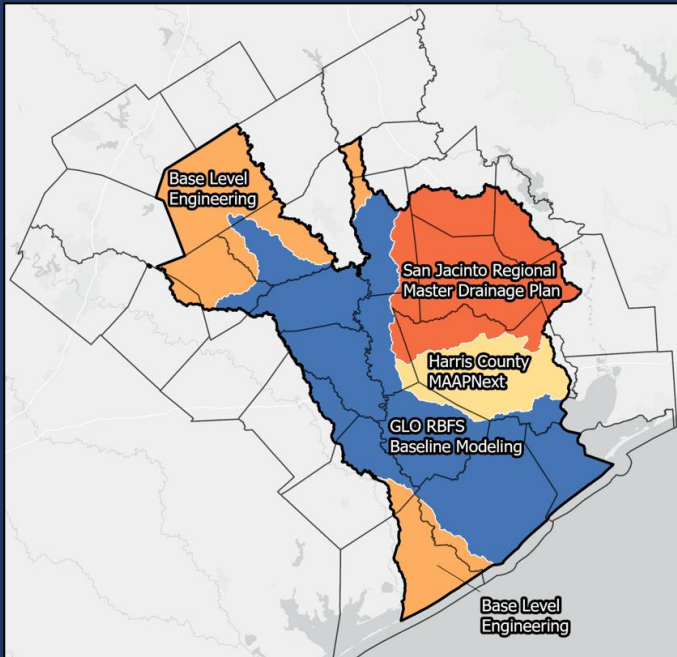
Modeling Areas

- Phases 1/2 included as assessment for watershed prioritization and stream level risk evaluation.
- Risk prioritization favored population density and flooded structures/roadways.
- Avoided redundancy with existing/ongoing projects.
- Leveraged existing & best available data to develop modeling conducive to the evaluation of regional-scale projects.

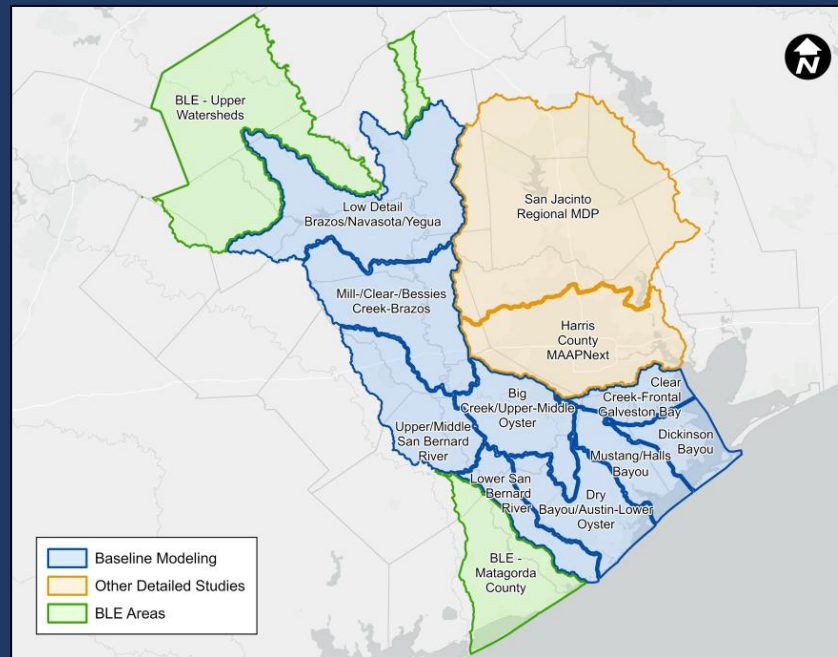


Baseline Model Coverage

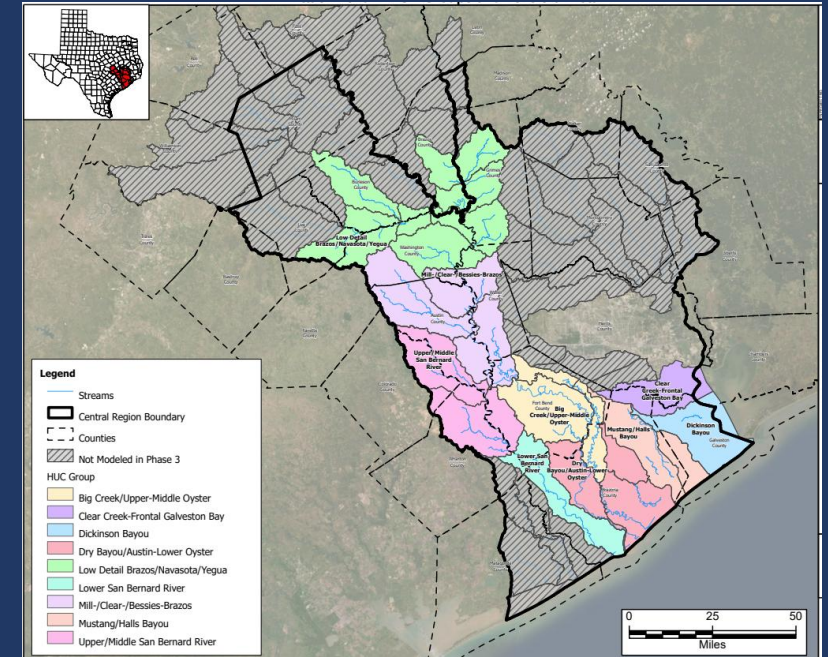
Comprehensive Model Coverage
(Maximizing Benefit for Region Stakeholders)



Modeling Scale Conducive to Achieving Study Goals
(Potential Large-scale Project Development)



Model Extents & Assignments Optimized for Efficiency
(Model Development and BC Coordination)



Modeling At-a-Glance

Rainfall & Hydrology

HEC-HMS used to apply design storms and frequency-based rainfall to simulate runoff. NOAA Atlas-14 rainfall data was used to develop model hydrology.

Hydraulic Modeling

HEC-RAS used to build 2D models of rivers, channels, and watersheds to represent flow dynamics. Terrain (lidar), bathymetric, land use, and hydraulic crossing structure data used to inform and add detail to the model domain. Sensitivity and uncertainty analyses performed to optimize model parameters and ensure model accuracy.

Coastal Modeling

Where applicable, incorporated surge and tidal boundary conditions for coastal areas. U.S Army Corps of Engineers Coastal Texas Study and NOAA tidal gages used to inform coastal analyses.

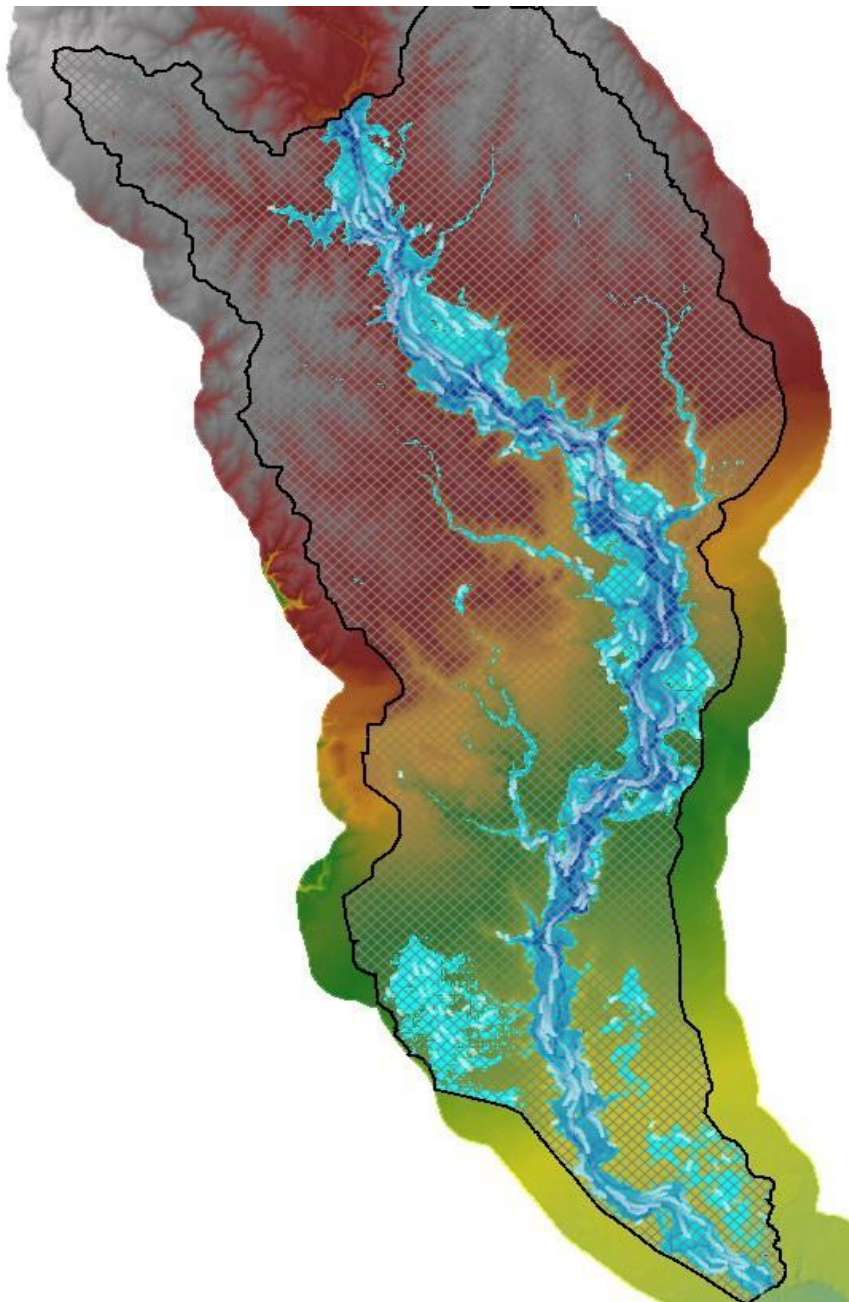
Calibration & Validation

Compare both hydrologic and hydraulic model output to observed data to confirm accuracy where data was available. USGS high water marks, USGS gage records, and TxDOT road closures from past flood events used to verify modeling results.

Quality Assurance

Modeling approaches reviewed by U.S. Army Corps of Engineers. Modeling packages independently reviewed by GLO's Technical Flood Model Reviewer.

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Key Findings & Limitations

Key Findings

- Achieved nearly full coverage of Central Region with flood risk models and maps
- Hot spots cluster along main streams and overflows
- 2D rain-on-mesh models capture pluvial, fluvial, and coastal flooding, leading to greater 1% AEP flooding vs. effective FEMA FIS in general
- Transition zones between surge- and rainfall-dominant areas are limited; most areas are clearly influenced by one dominant source

Limitations

- Rainfall uncertainty (differences between MRMS, NWS Stage IV QPE, gages)
- Limited calibration data and bathymetry in some areas
- Bridges and culverts are primarily taken from as-built plans or previous studies
- Interior leveed areas and storm sewers not modeled
- Overland waves in shoreline areas can't be modeled by HEC-RAS



RBFS Program Modeling By the Numbers

64

BASELINE MODELING
PACKAGES

22,000

SQUARE MILES OF
MODELING

51

COUNTIES WITH
MODELING



How Communities Can Leverage RBFS Models

Integrate H&H modeling into the risk assessment of your local **Hazard Mitigation Plan**.



Represent existing flood risk in upcoming **2028 Regional Flood Plans** (funded and managed by TWDB).



Update to assess impact of potential changes **for future conditions** (such as future development).



Analyze flood mitigation solutions and use as support for **funding applications**.



Inform **boundary conditions** used in local drainage studies.



Adopt as **best-available data** to communicate riverine and coastal flood risk and manage development around floodplains.



Inform your **CIP and prioritization**.



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Data & Models Query Tool (DMQT)

Baseline Models Available to Download Now!

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TDIS Data & Models Query Tool (DMQT)

Create a free account to access search options and download data

The screenshot displays the TDIS Data & Models Query Tool (DMQT) interface. At the top, the TDIS logo and the text "DATA & MODELS QUERY TOOL" are visible. A "Login" button is highlighted in the top right corner. The main area is a map of Texas with several counties highlighted in blue. A sidebar on the left contains various search and navigation icons, with a yellow box around it and the text "Other available search options". A yellow box around the Houston area on the map has the text "Zoom to area of interest" pointing to it. The map shows major cities like Las Vegas, Santa Fe, Albuquerque, Amarillo, Lubbock, Fort Worth, Dallas, Austin, Houston, and San Antonio. The Gulf of Mexico is visible at the bottom right.

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TEXAS A&M UNIVERSITY

Tool Link - <https://dmqt.cloud.tdis.io/>

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TDIS Data & Models Query Tool (DMQT)

TDIS DATA & MODELS QUERY TOOL

Logout Feedback TEXAS A&M UNIVERSITY

Brazoria County

- RASv641**
RBFS
This is a hydraulic HEC-RAS (version 6.4.1) model for the Lower San Bernard River HUC-10. This model...
- Central_LowerSanBernard_100pct_HEC-HMSv410**
RBFS
This is a hydrologic HEC-HMS (version 4.10) model for the Lower San Bernard River HUC-10. This model...
- Central_DryBayou-AustinBayou-LowerOyster_100pct_HEC-RASv641**
RBFS
This is a hydraulic HEC-RAS (version 6.4.1) model for the Dry Bayou/Austin Bayou/Lower Oyster HUC-10...
- Central_LowerSanBernard_100pct_HEC-RASv641**
RBFS
Low detail 2D HEC-RAS (version 6.4.1) hydraulic model of the Lower San Bernard HUC-10 that borders t...
- Central_Brazos_100pct_HEC-HMSv410**
RBFS
This is a hydrologic HEC-HMS (version 4.10) model for the Brazos River. This model was originally de...

Choose model/data to preview

Click on county of interest (example: Brazoria County)

Tool Link - <https://dmqt.cloud.tdis.io/>

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TDIS Data & Models Query Tool (DMQT)

Central_DryBayou-AustinBayou-LowerOyster_100pct_HEC-RASv641

General Information

Contact Information

HUC:

12040205, 12070104

County:

Brazoria, Fort Bend

City:

Angleton, Freeport, Danbury, West Columbia, Richwood, Lake Jackson, Clute, Oyster Creek, Surfside Beach, Sandy Point

Model Description:

This is a hydraulic HEC-RAS (version 6.4.1) model for the Dry Bayou/Austin Bayou/Lower Oyster HUC-10. This model was developed by the Central Region team for the Texas General Land Office's River Basin Flood Study during Phase 3 of the study.

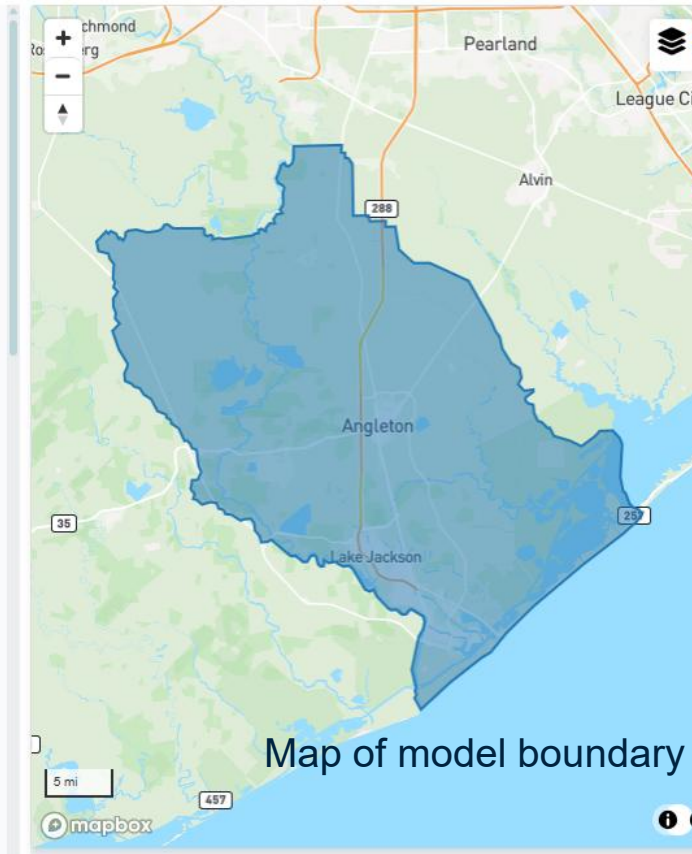
Model Purpose:

The enclosed hydrologic and hydraulic models, final report, and GIS data were developed for the Texas General Land Office (GLO) for its Regional River Basin Flood Study project.

The purpose of these models, final report, and associated

N/A* - Not Available/Not Applicable/Not Specified

Model metadata



Map of model boundary

Model Files Listing

Available Files for Download

Complete Model Package

12040205_12070104_Dry Bayou-Austin Bayou-Lower ... 740.77 GB

Model Results

Results.zip 31.22 GB

Reports

Dry Bayou, Austin, Lower Oyster GLO RBFS Baseline C... 274.7 MB

Dry Bayou, Austin, Lower Oyster GLO RBFS Baseline Re... 21.1 MB

Spatial Data

DryBayou_Austin_LowerOyster.zip 35.0 MB

Choose to download full package, results, boundary, or report

Close

Tool Link - <https://dmqt.cloud.tdis.io/>

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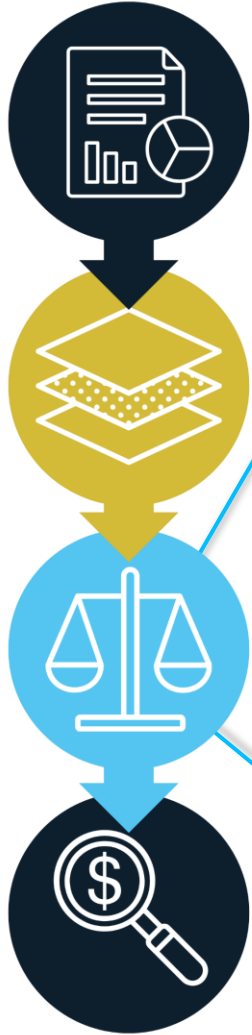


Alternatives Analysis

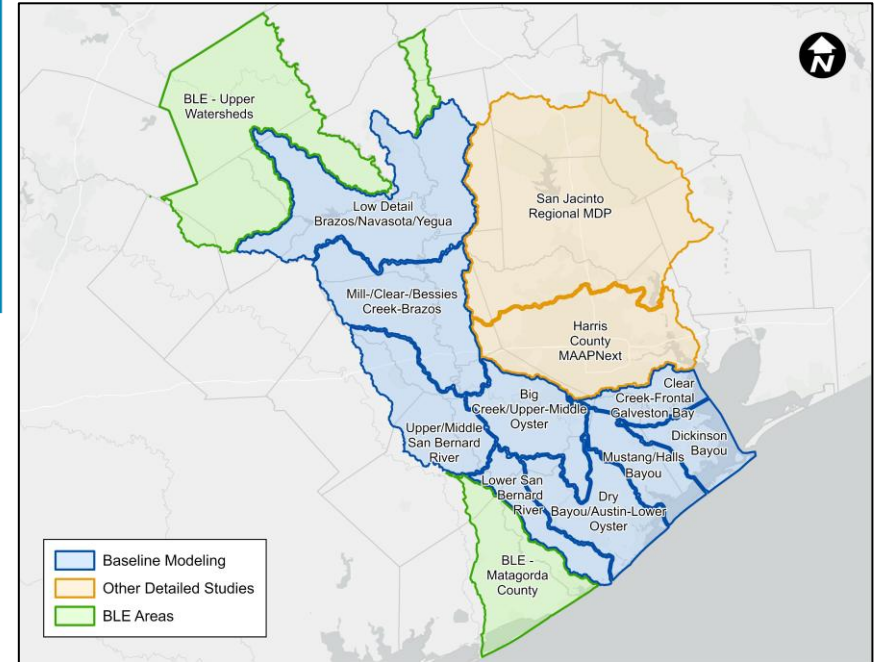
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Selection of Mitigation Areas

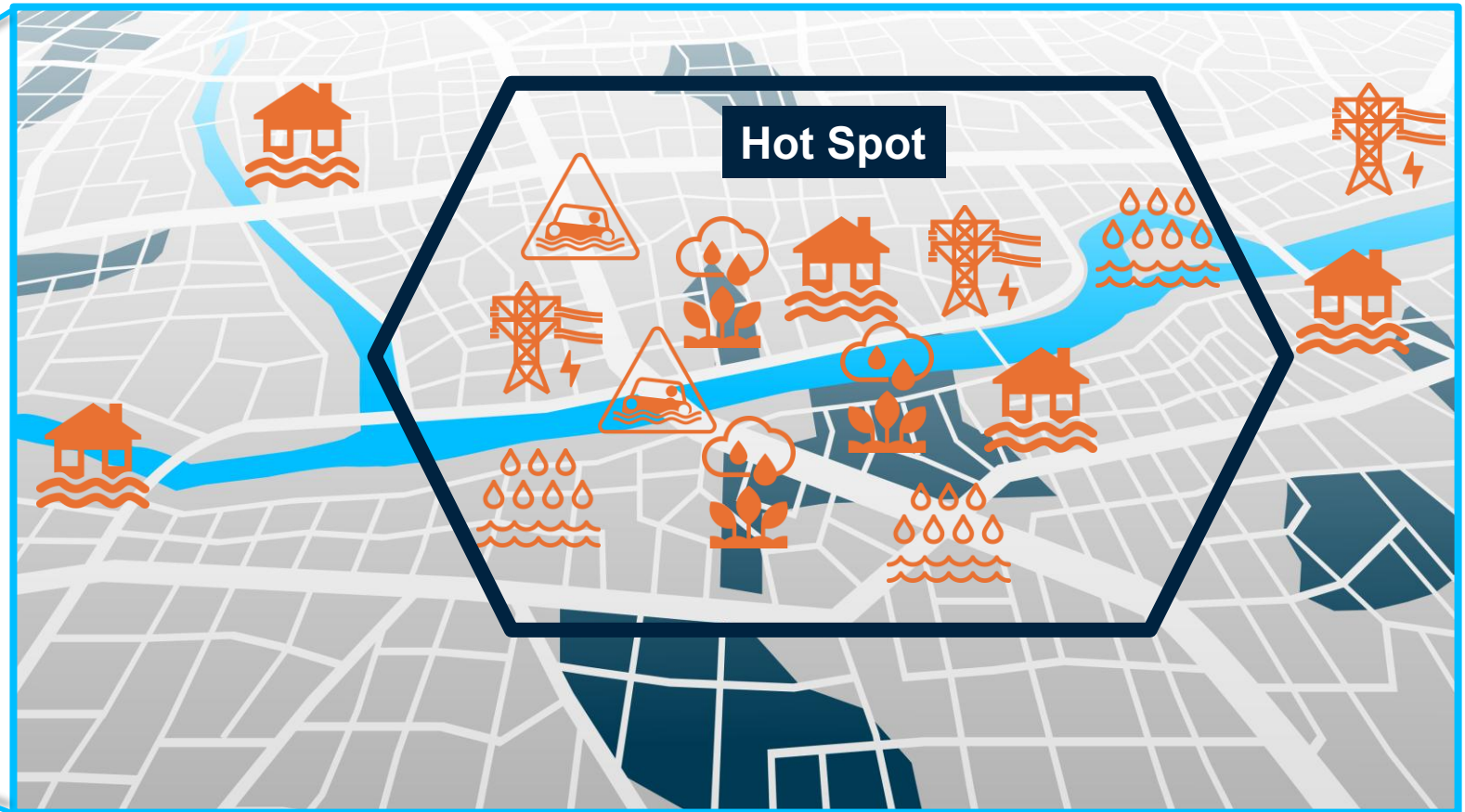


Hotspot Determination

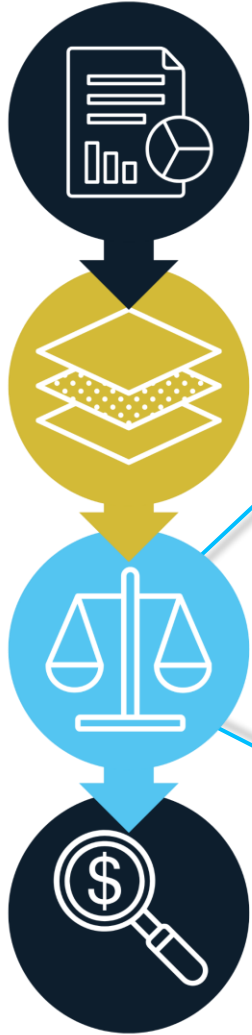


Hot Spot Analysis

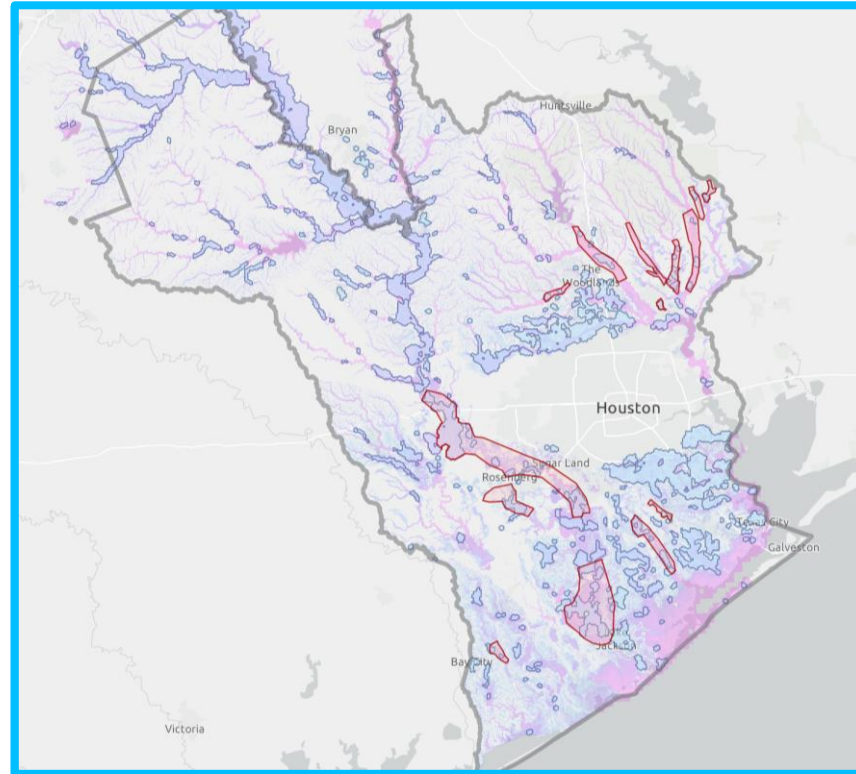
Hotspot Indicators



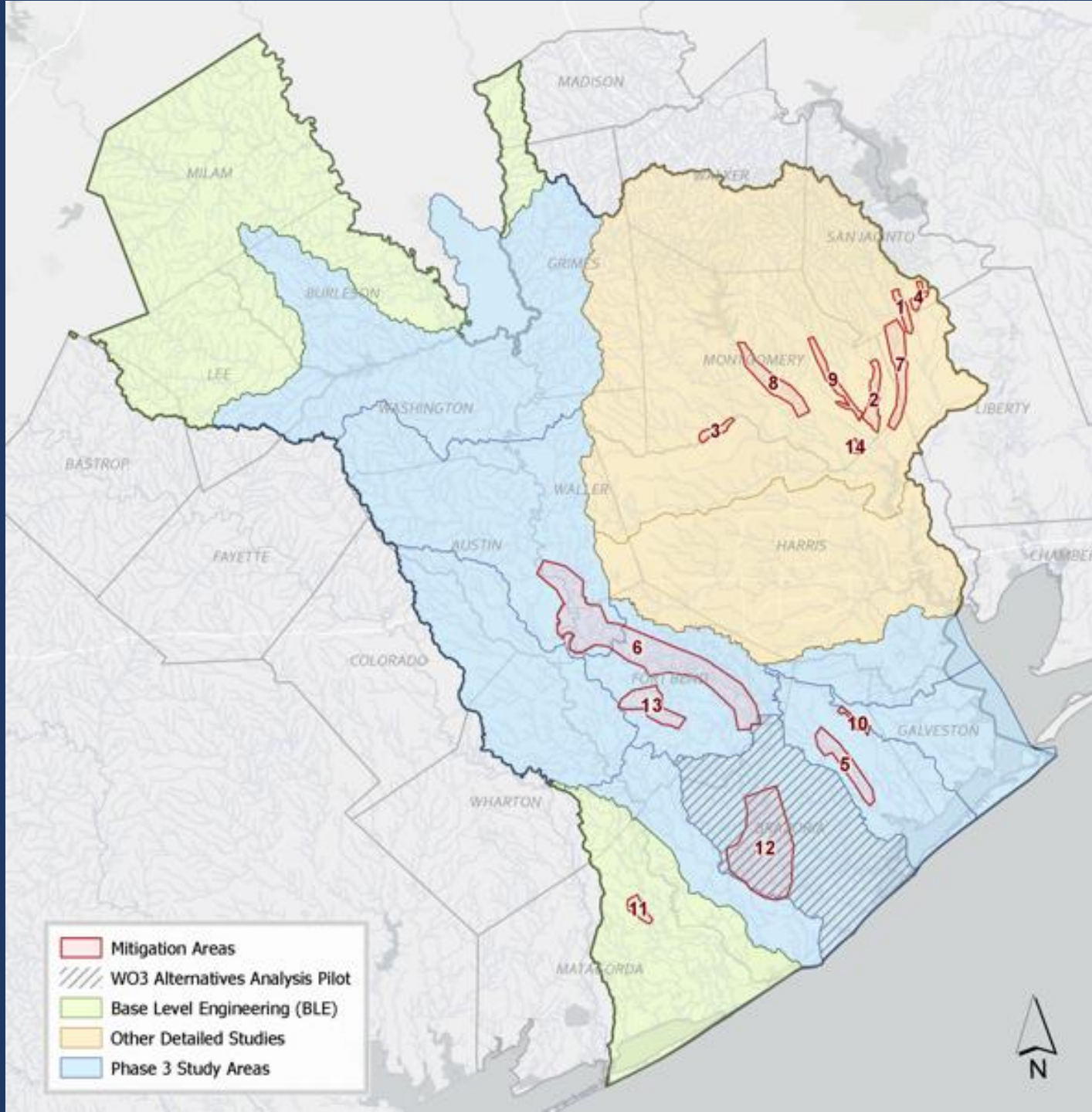
Hot Spot Analysis



Hotspot to Mitigation Area Process



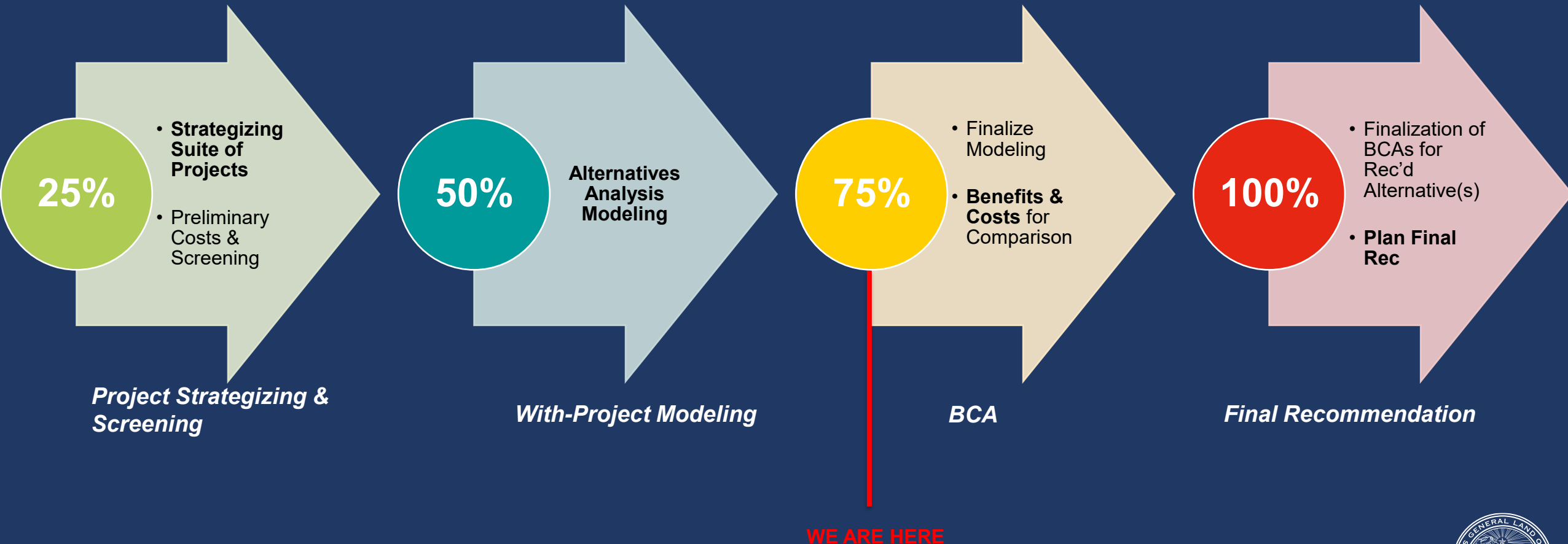
Mitigation Areas



Map Key Label No	Mitigation Area Name	Area (sq mi)
1	Reese Bayou	8.7
2	Lower Peach Creek	17.8
3	Spring Creek Near Tomball	7.0
4	Luce Bayou Near Cleveland	5.4
5	Chocolate Bayou	30.6
6	Middle Brazos River	202.5
7	Lower East Fork San Jacinto	33.9
8	West Fork San Jacinto Near Conroe	32.8
9	Lower Caney Creek	17.0
10	Mustang Bayou Near Alvin	5.5
11	Lower Hardeman Slough	8.9
12	Lower Brazos River	135.3
13	Big Creek	33.3
14	Bens Branch	2.7



Alternatives Analysis Milestones



Potential Mitigation Strategies



Conveyance
Improvements



Structure
Elevation



Detention



Infrastructure
Elevation



Nature-Based
Solutions



Flood
Barrier/Levee



Pumping
Systems



Diversion

Mitigation Alternatives Goals



Reduce Flood Risk



Are they implementable?



Enhance/advance previous efforts



Promote Cost-Effectiveness



Promote Equity and Benefit Socially Vulnerable
Populations



Identify Opportunities for Co-Benefits



Alternatives Analysis Next Steps



Detailed benefit cost analysis



Optimize modeling for flood reduction benefit



Incorporate stakeholder feedback



Mitigation alternative scoring and ranking



Funding and Technical Assistance

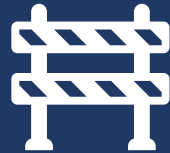
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Funding and Technical Assistance

Activities for all Stakeholders

- Flood Early Warning System/Gauge Network Enhancement Recommendations
- Baseline Modeling Office Hours
- MATCH Tool + Training Webinar and Materials



Activities to Advance Projects

Recommendations for boosting eligibility and competitiveness

- Sponsorship & Champions
- Identification of Co-Benefits
- Project Funding Strategies



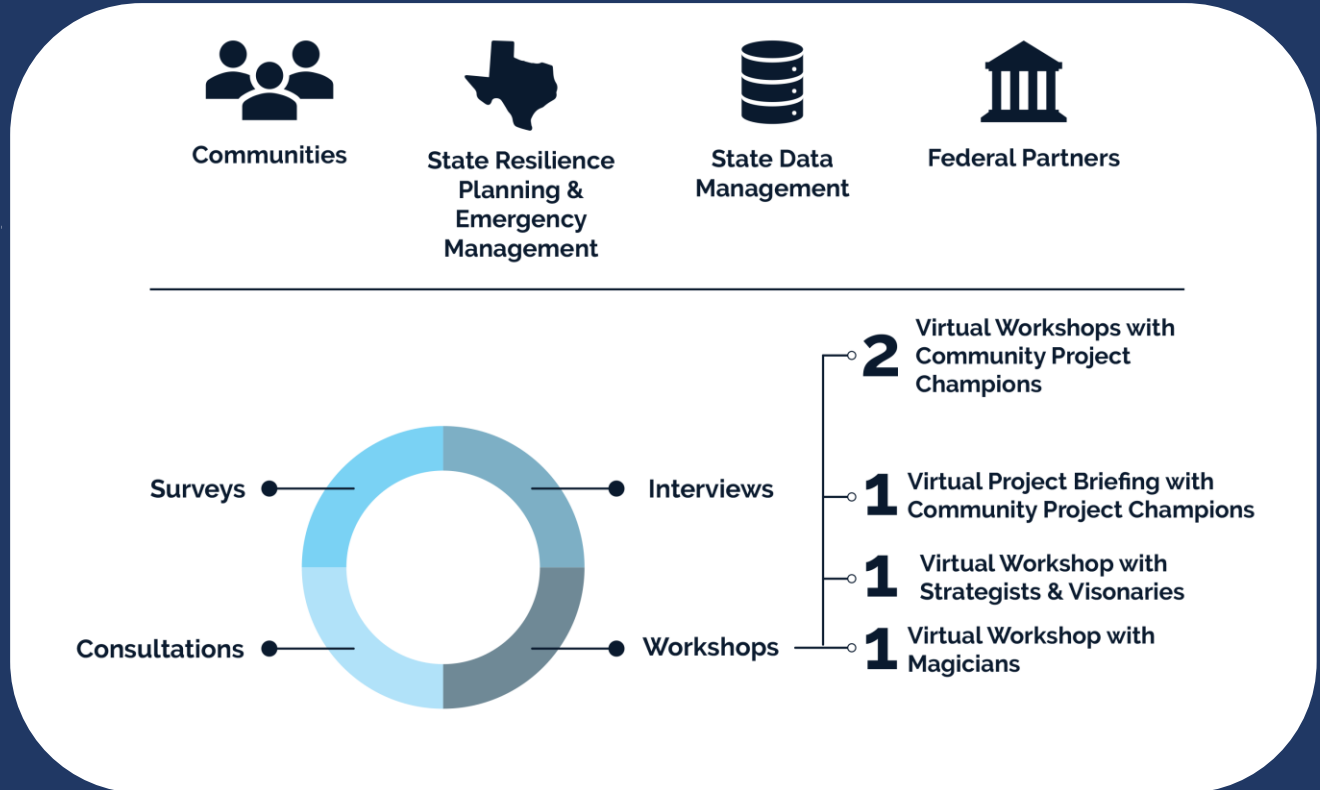
Mitigation Assistance for Tailoring Choices (MATCH) Tool

Available to use Now!

The MATCH Tool's objective is to align unfunded or concept mitigation projects with funding sources.



Development Approach





MATCH

Welcome to the Mitigation Assistance for Tailoring Choices (MATCH) Tool. This tool aims to support communities pursuing flood mitigation and resilience projects.



Funding Opportunities

View and compare available sources of funding for flood mitigation projects.



Projects

Discover funded structural and non-structural flood mitigation projects across Texas.



Application Insights

Generate insights and suggestions for your funding and project match.



Resources

Explore resources to support application development and answer frequently asked questions.

MATCH

409.741.4331

idrt@tamug.edu

Institute for a Disaster Resilient Texas

Texas A&M University

[View Announcements](#)



Visit the MATCH
Tool Website



<https://findfundingtx.cloud.tdis.io/>

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Participate In
&
Share the Survey



tinyurl.com/GLORegionWideSurvey

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Questions?

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www.glo.texas.gov/disaster-recovery