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

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GLO Central Region Team
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GLO Central Region Team
Technical Advisor
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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:

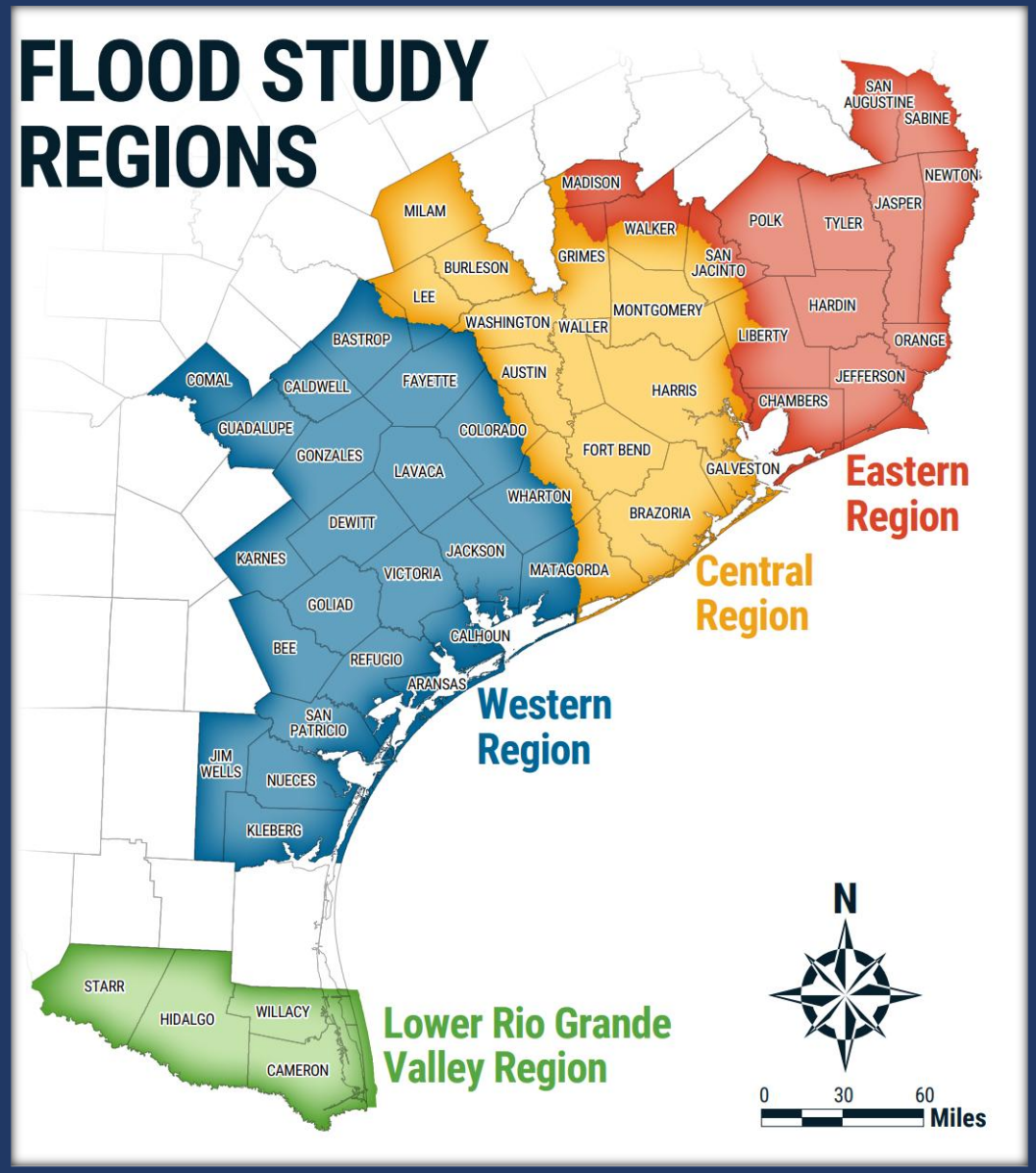
- Gathering or generating the data necessary to make informed decisions
- Building tools and platforms that allow stakeholders to interact with the data
- Making recommendations for actionable and sustainable future steps

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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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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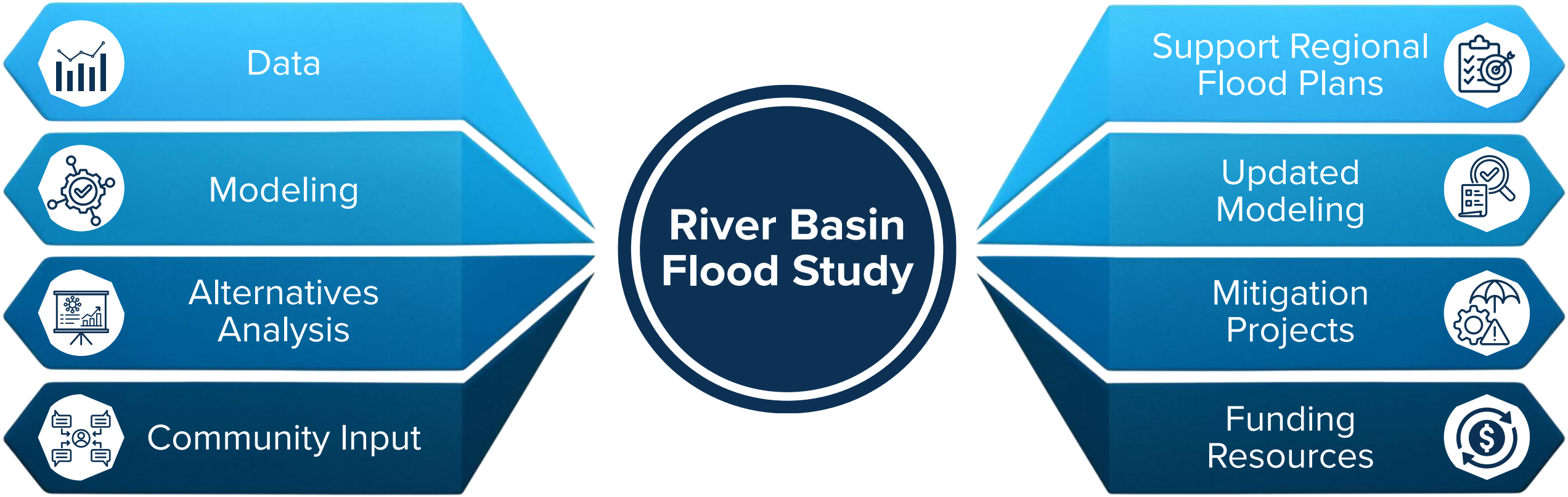
Study Activities & Outcomes



Study Phases and Timeline

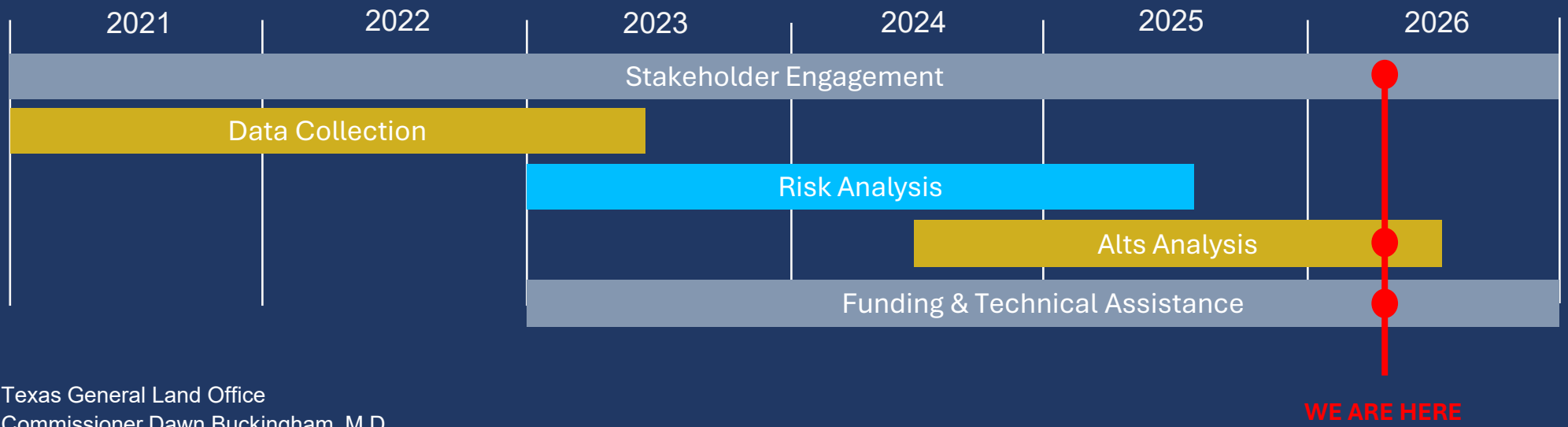
PHASE 1
STAKEHOLDER ENGAGEMENT

PHASE 2
DATA COLLECTION

PHASE 3
RISK ANALYSIS

PHASE 4
ALTERNATIVES ANALYSIS

PHASE 5
FUNDING & ASSISTANCE



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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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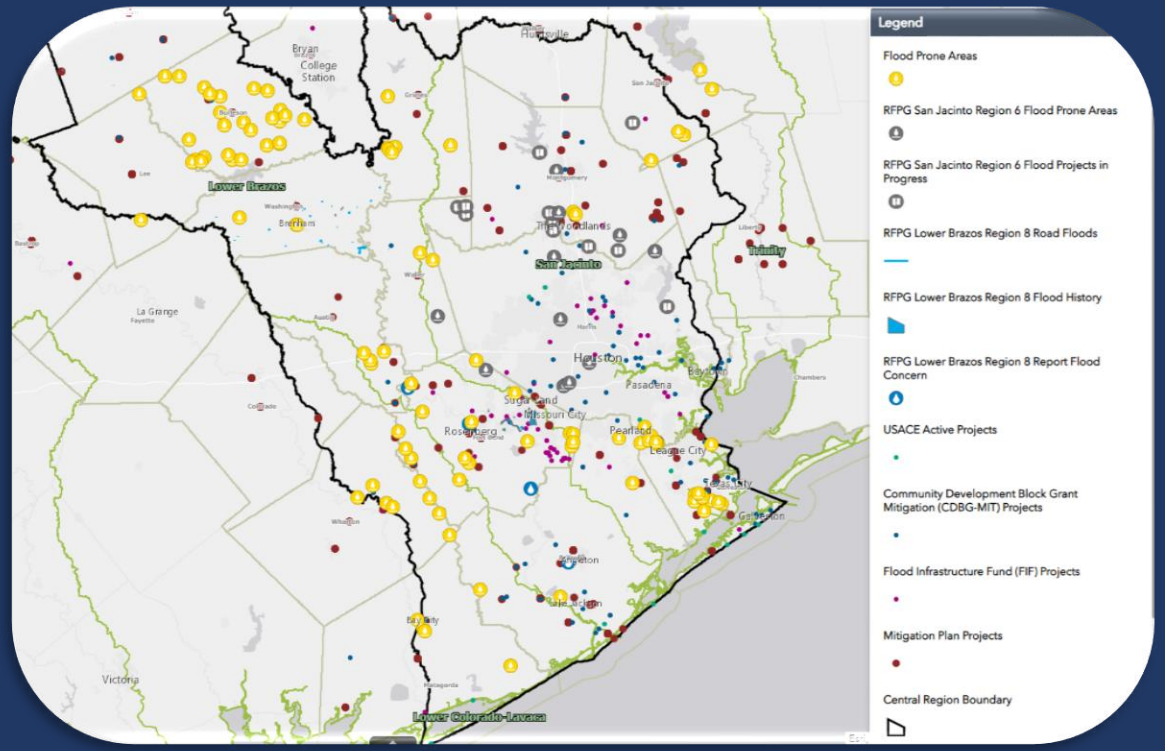
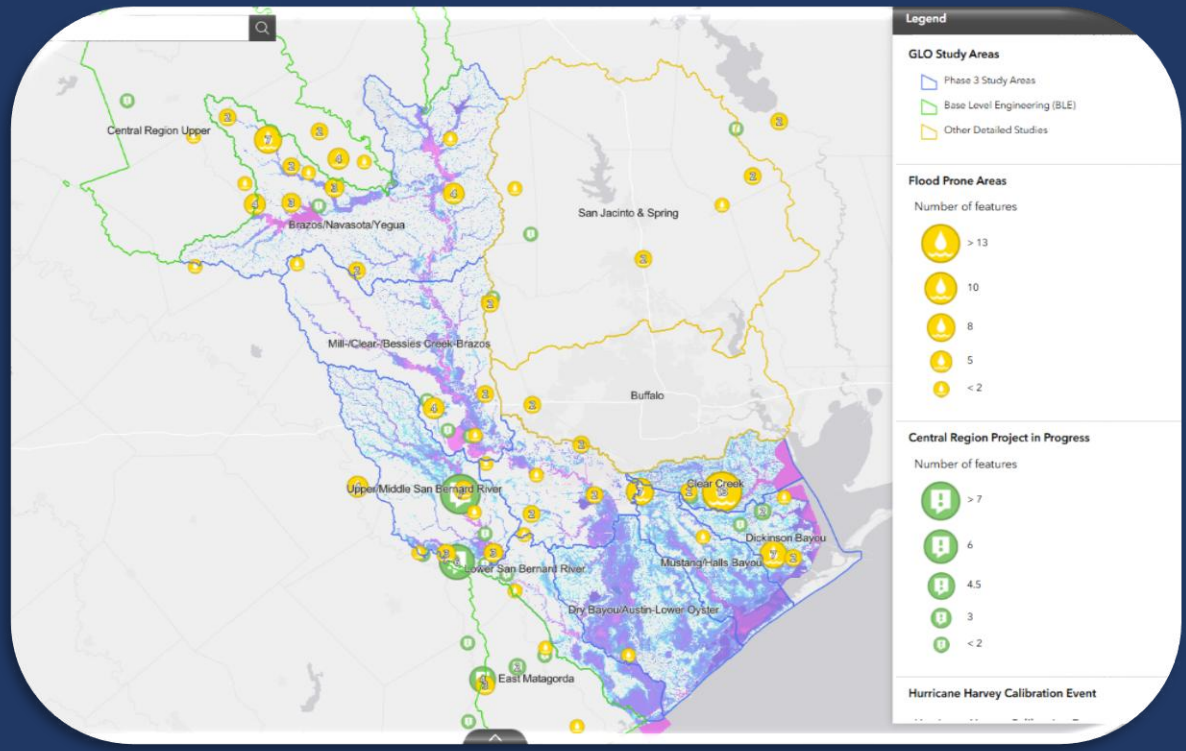
Interactive Stakeholder Webmaps





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Leveraging Collected Data

GLO River Basin Flood Study	Texas Disaster Information System (TDIS)	TWDB Regional Flood Planning
Collected data was used to refine our assessment of existing flood risk and inform identification and prioritization of projects.	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 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

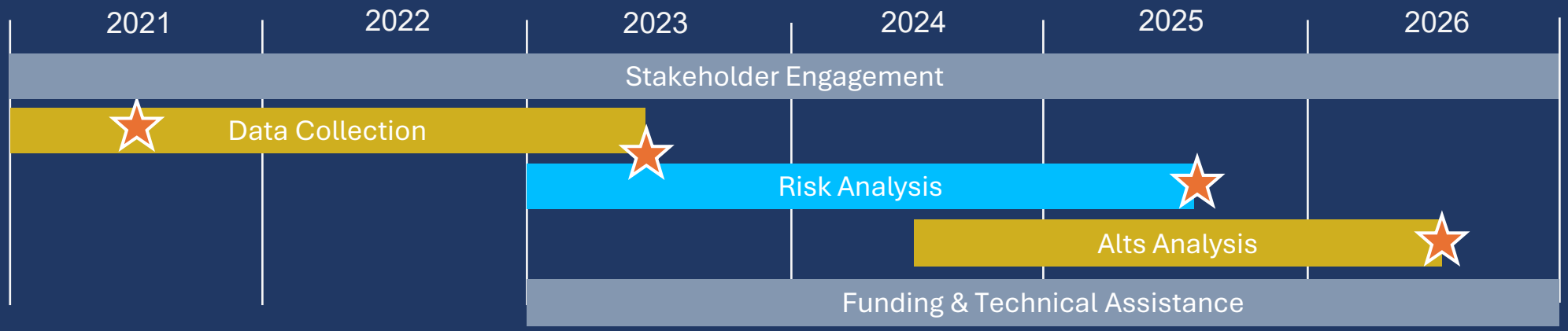
PHASE 1
STAKEHOLDER ENGAGEMENT

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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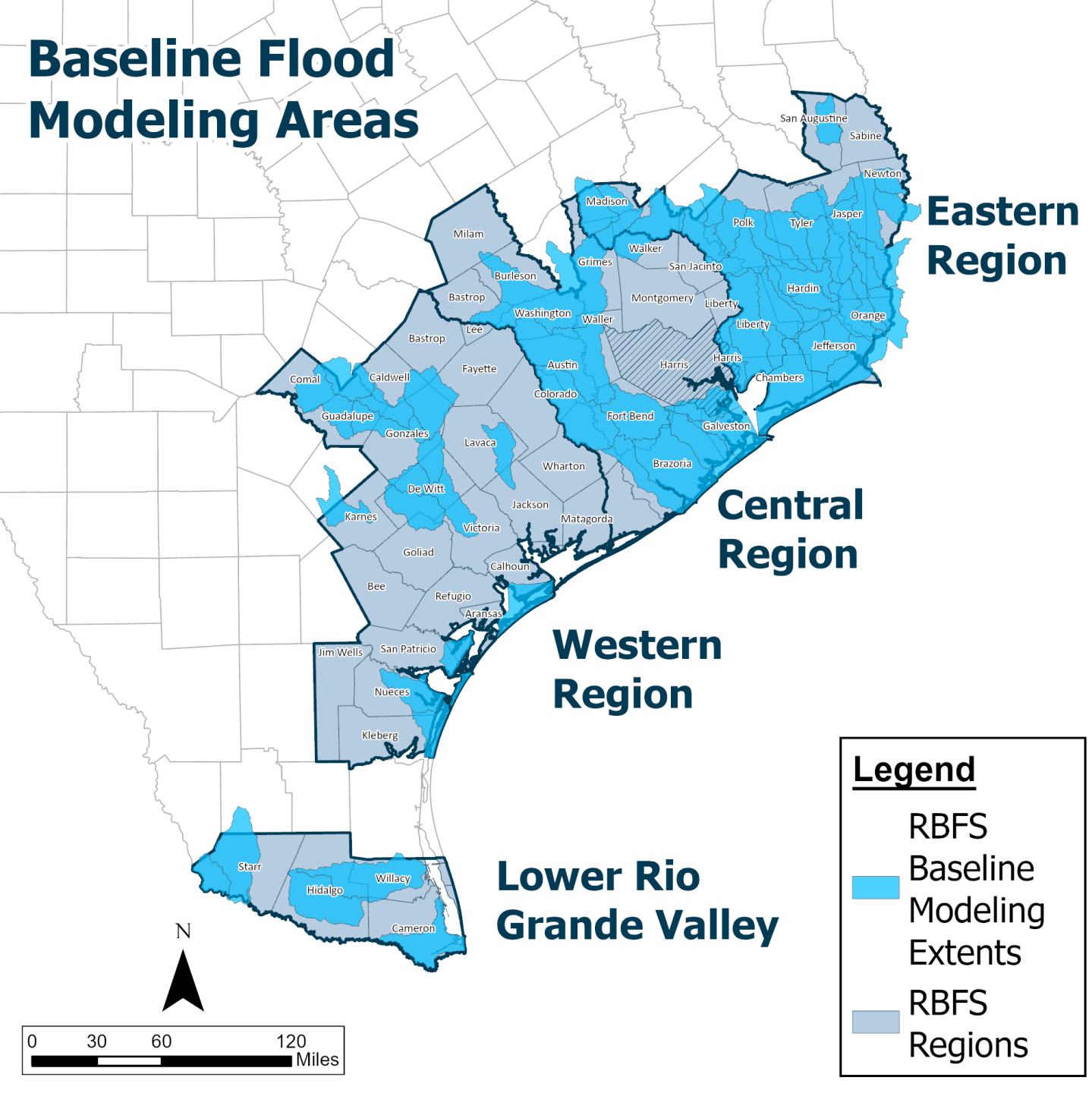

Modeling Areas

- 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.

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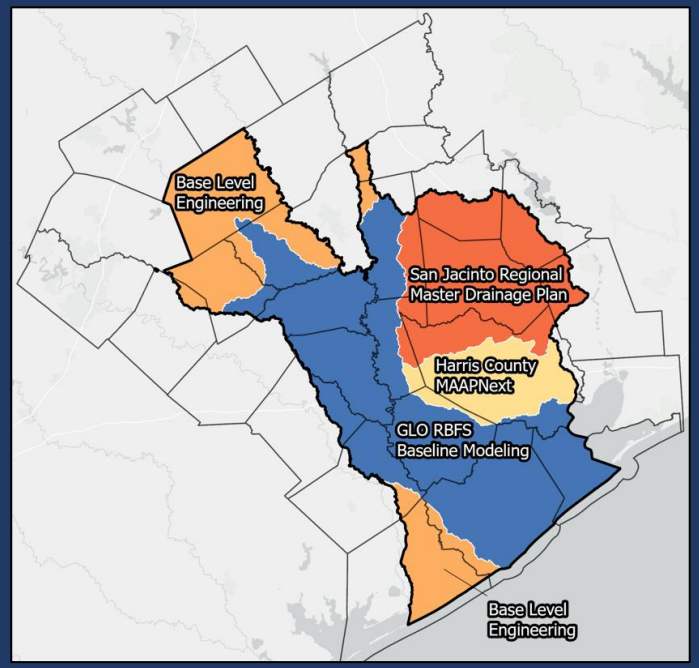
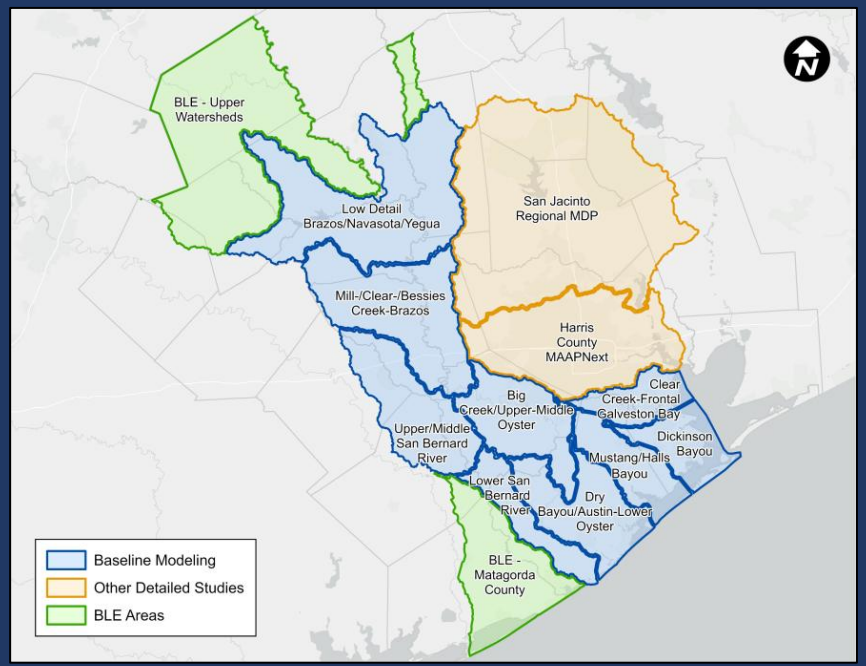
Baseline Model Coverage

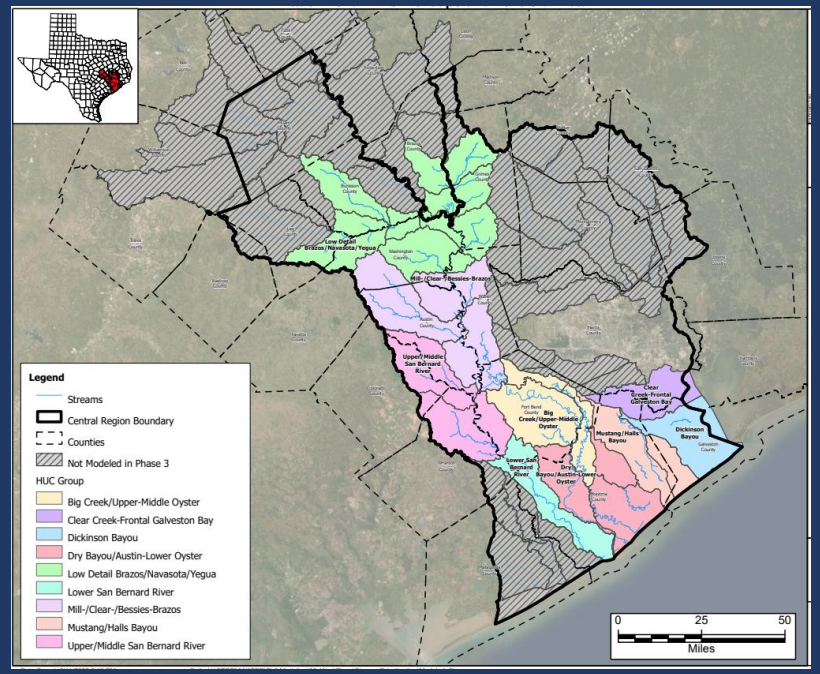
Comprehensive Model Coverage
(Maximizing Benefit for Region Stakeholders)



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



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



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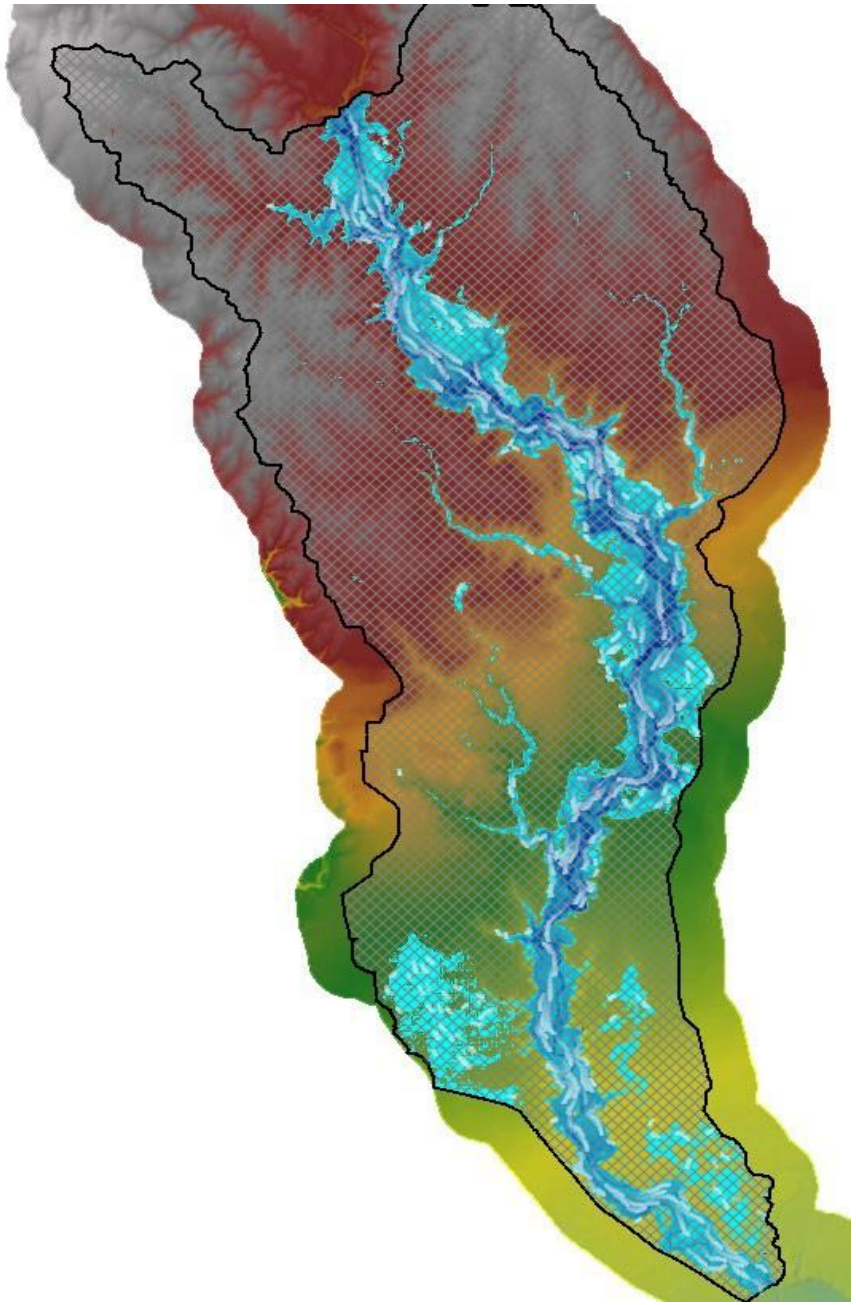

Modeling At-a-Glance

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

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Image credits: goodmorningamerica.com

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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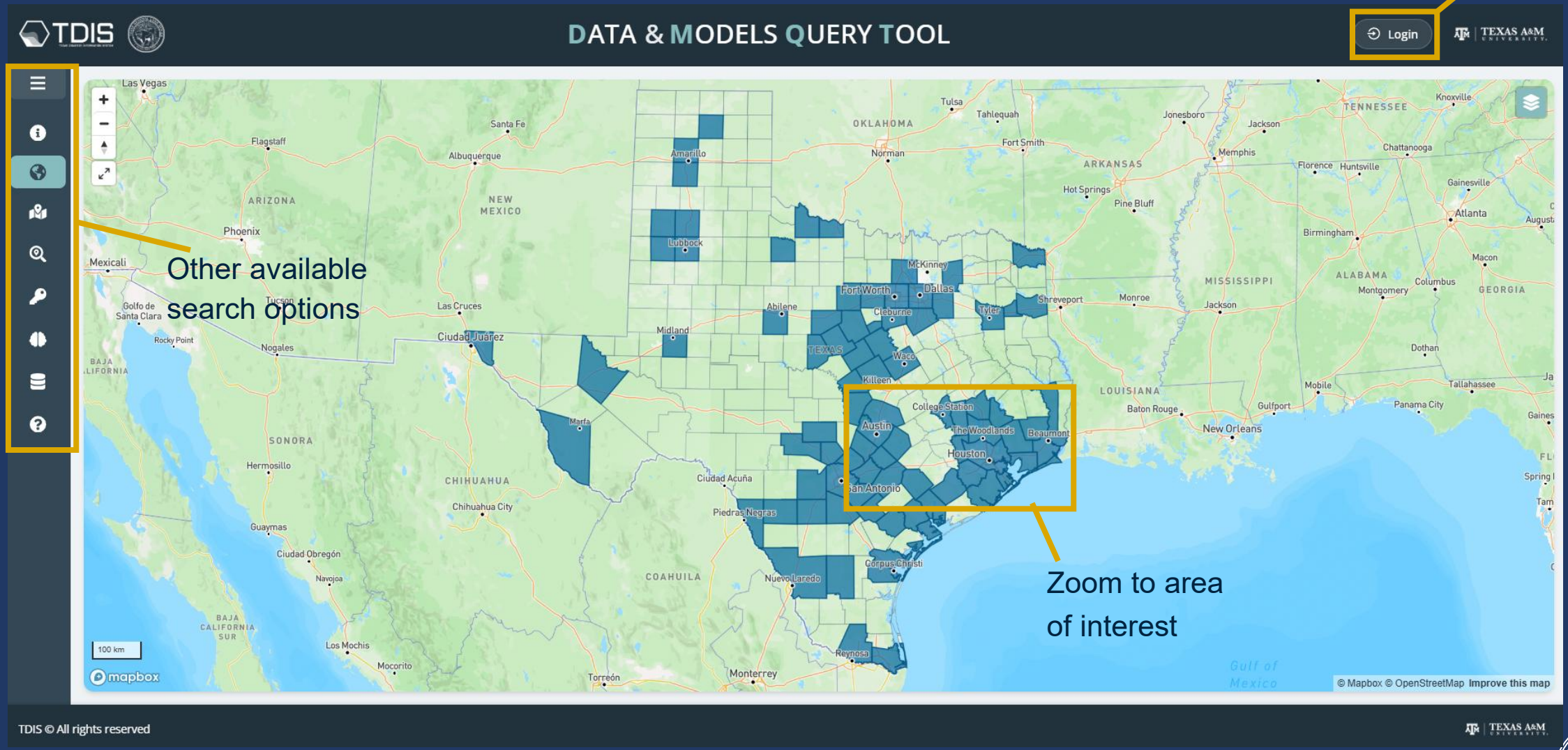
TDIS Data & Models Query Tool (DMQT)

Create a free account to access search options and download data



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

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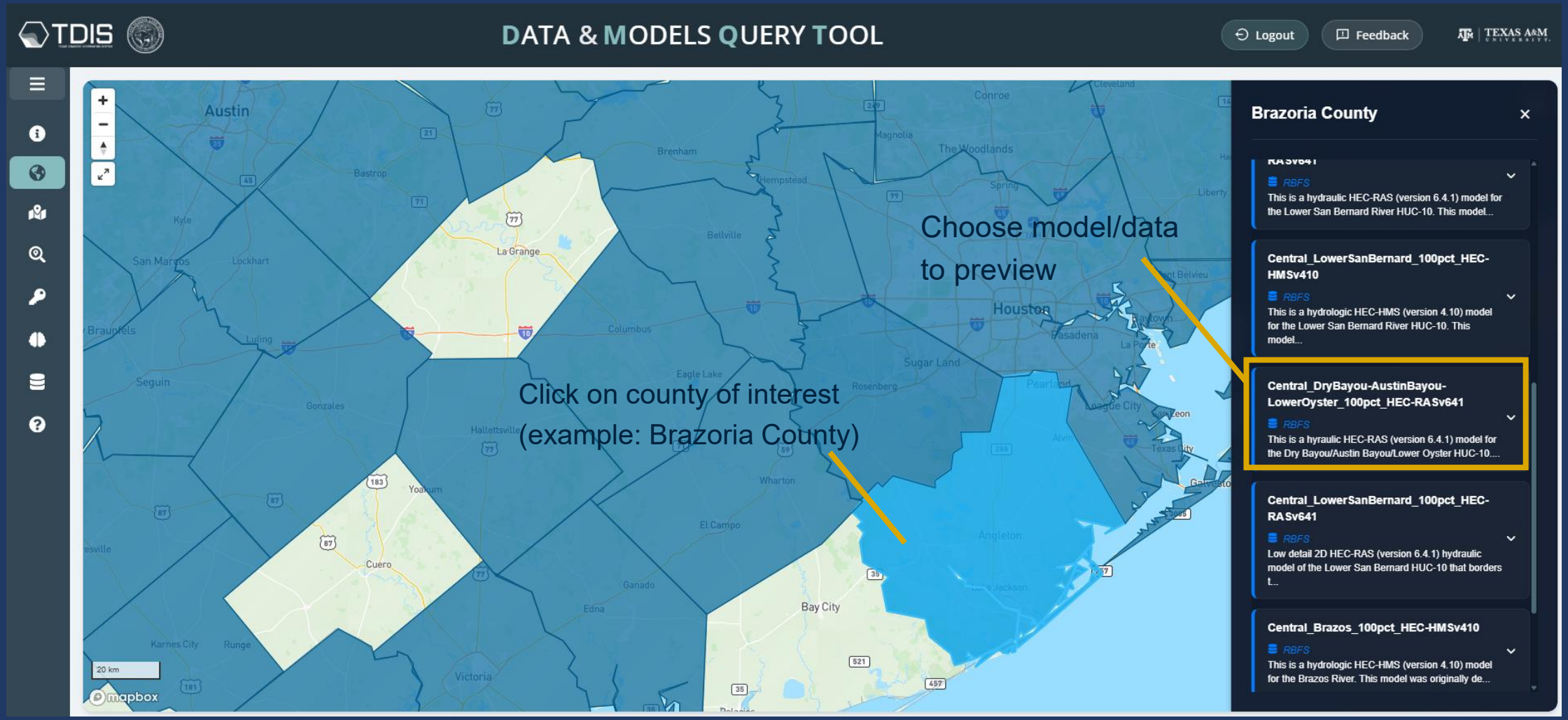
TDIS Data & Models Query Tool (DMQT)



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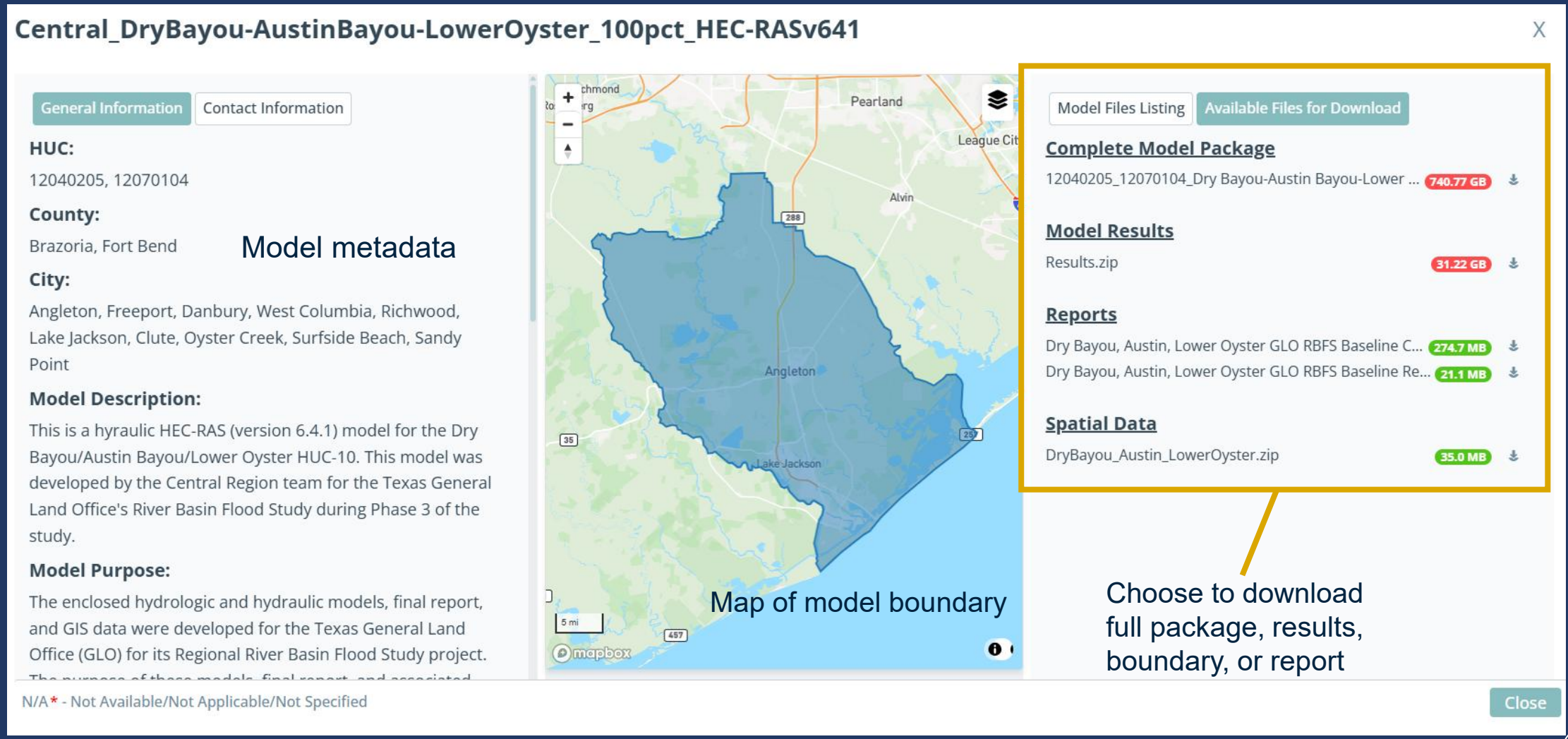

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Alternatives Analysis

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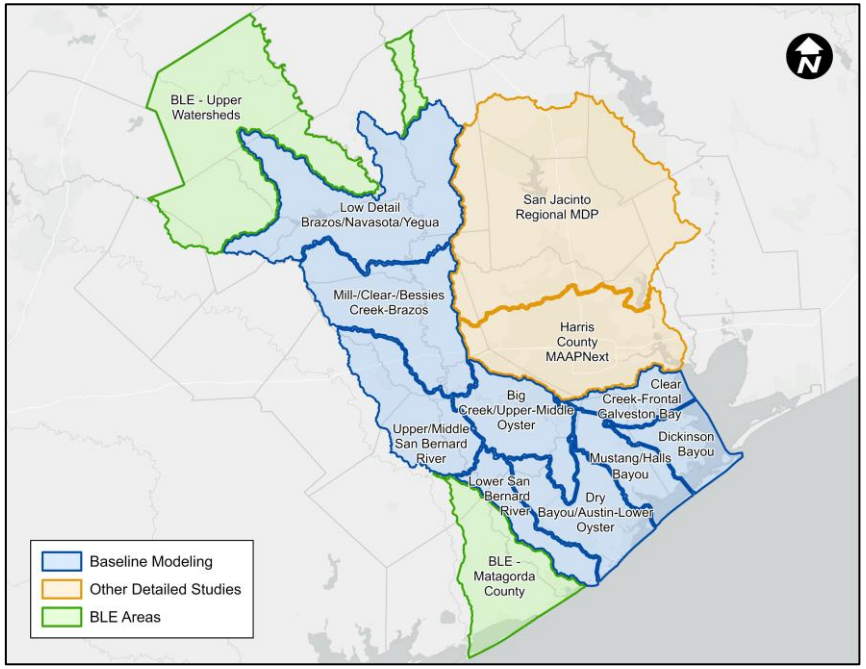
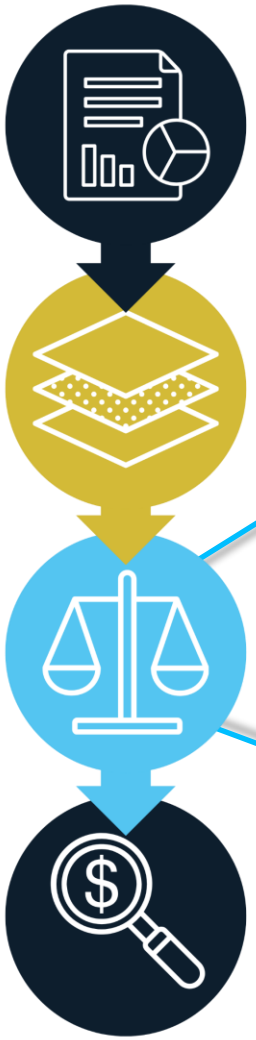
Selection of Mitigation Areas

Hotspot Determination

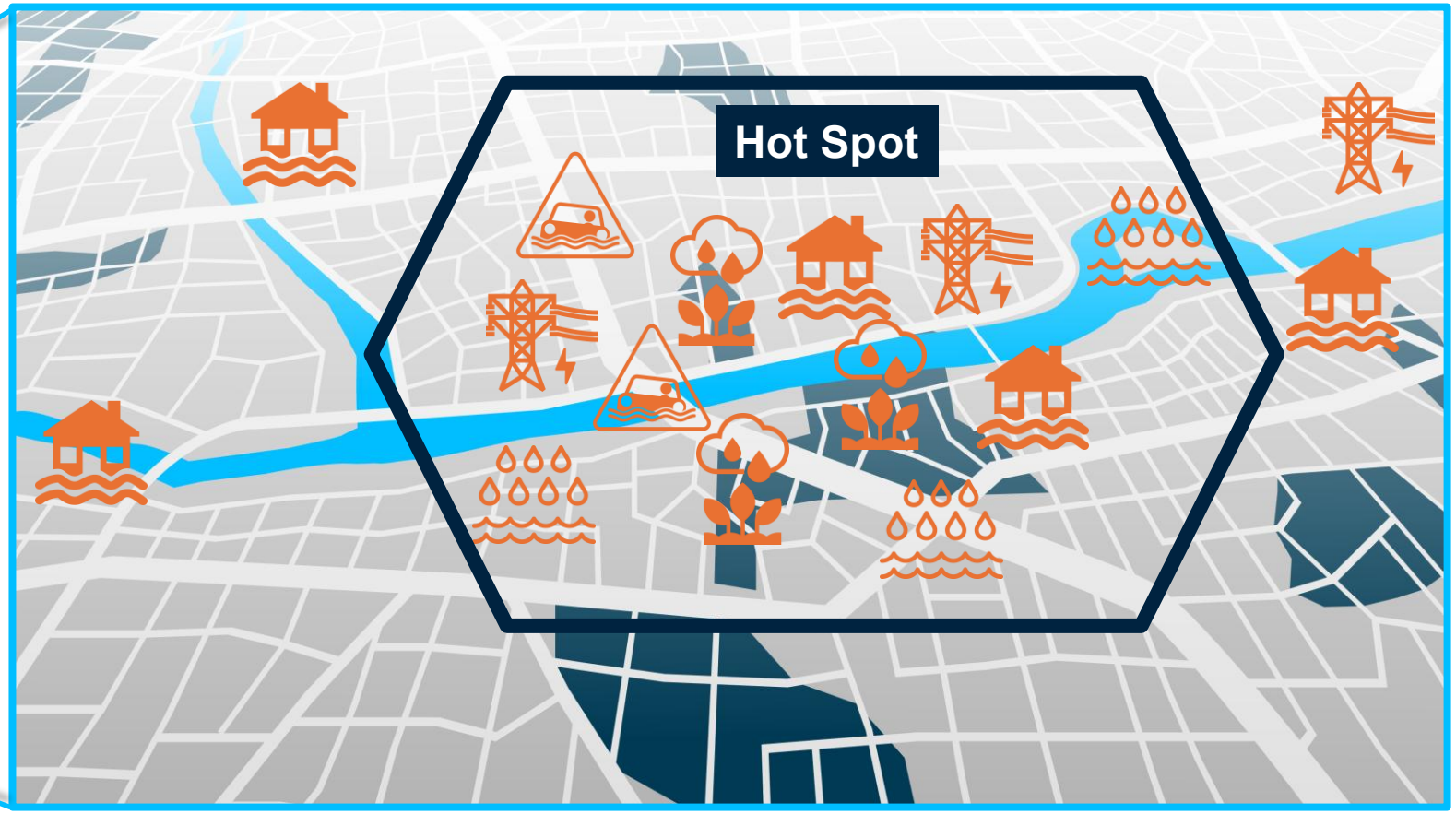
- Flood risk to structures
- Flood risk to critical infrastructure
- Flood risk to agricultural land
- Flood risk to roadways
- Flooding extent



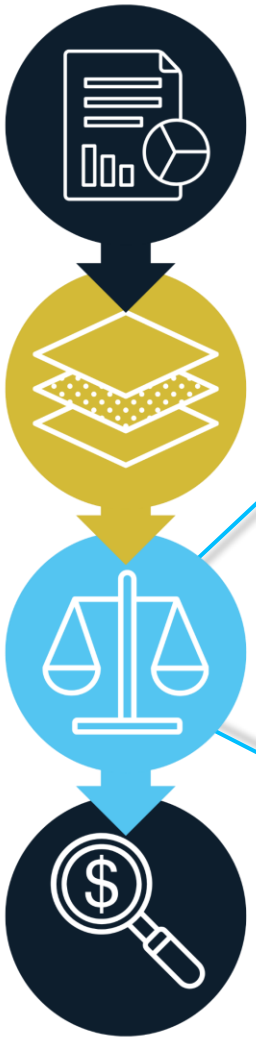
Hot Spot Analysis



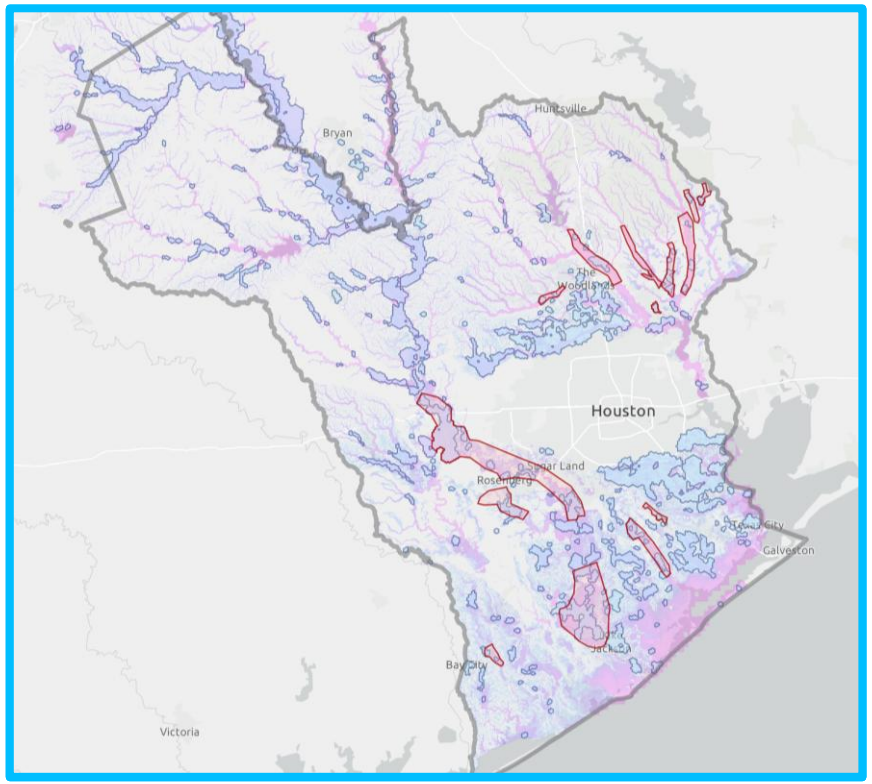
Hotspot Indicators

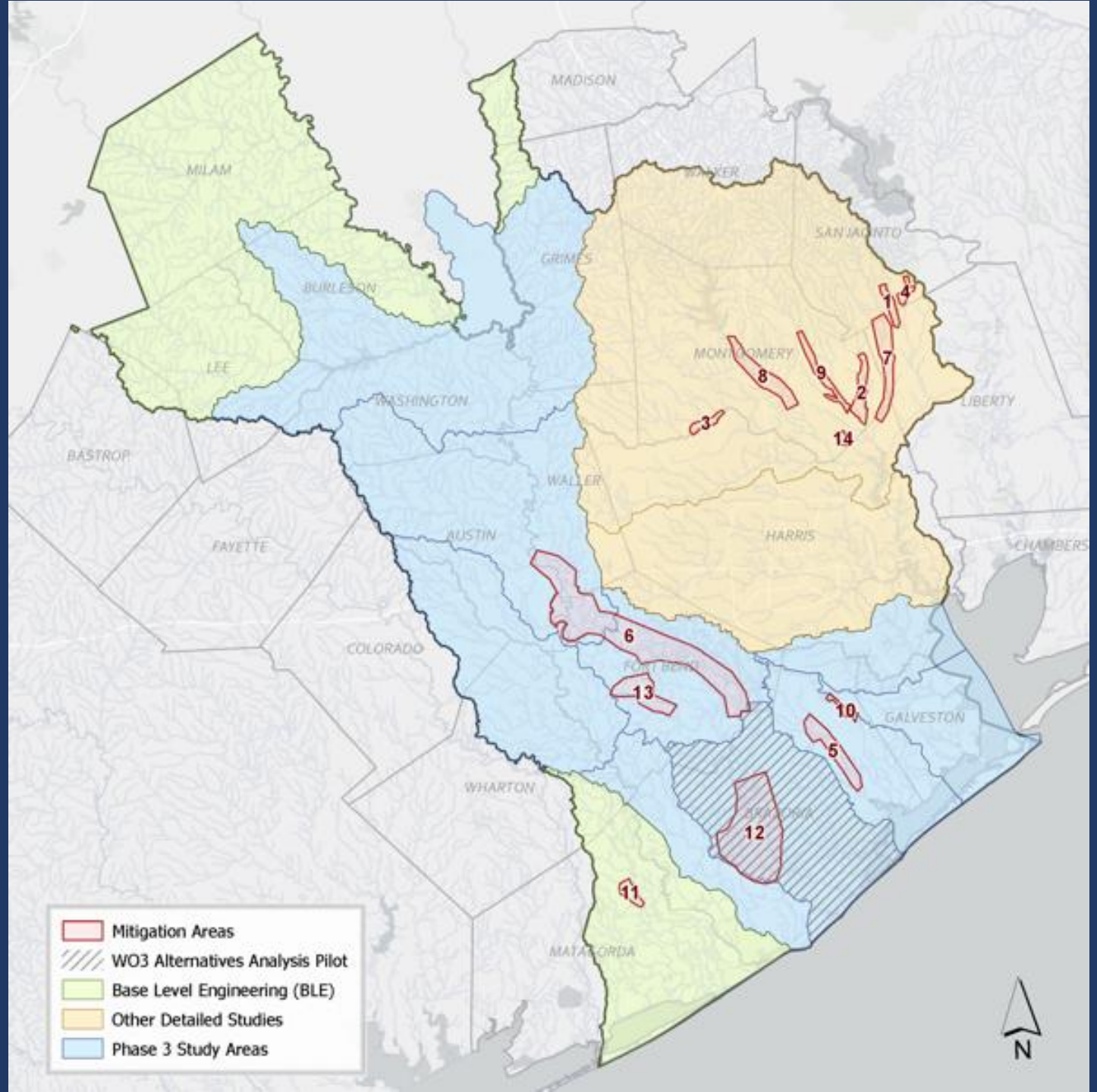


Hot Spot Analysis



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

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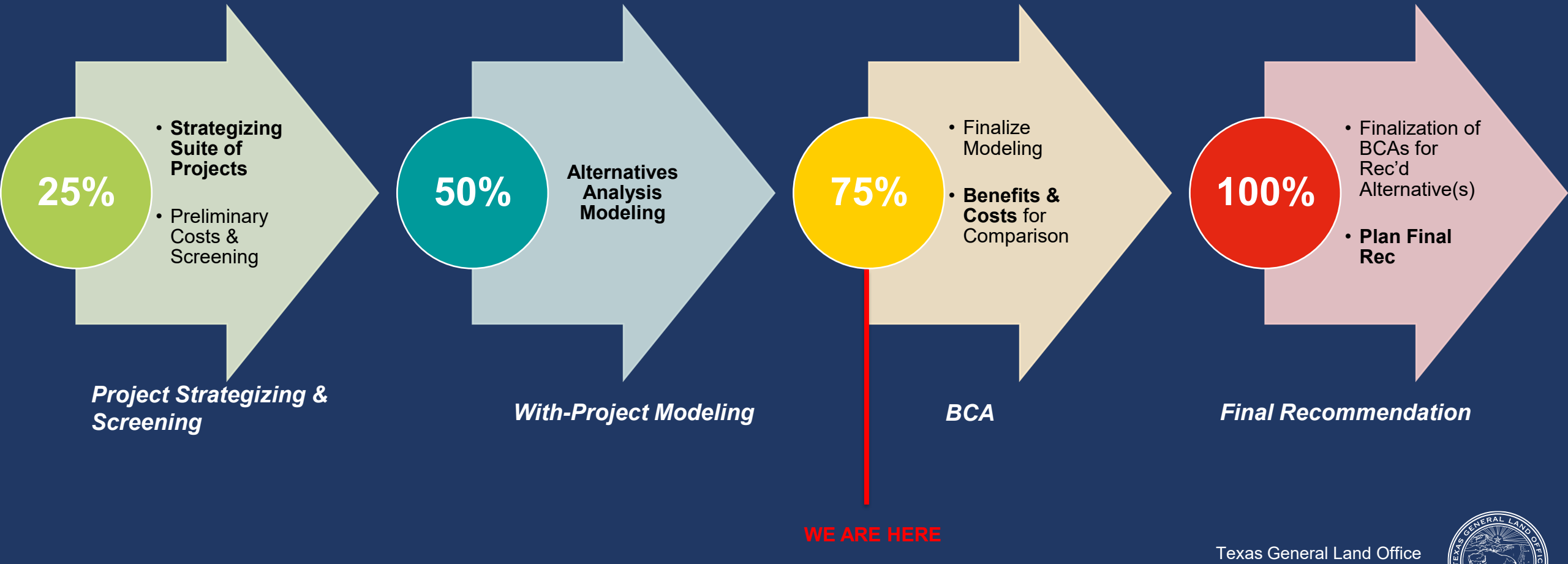
Alternatives Analysis Milestones



Potential Mitigation Strategies

Conveyance Improvements

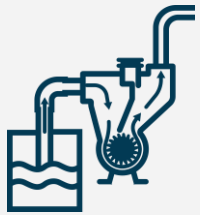
Structure Elevation

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.

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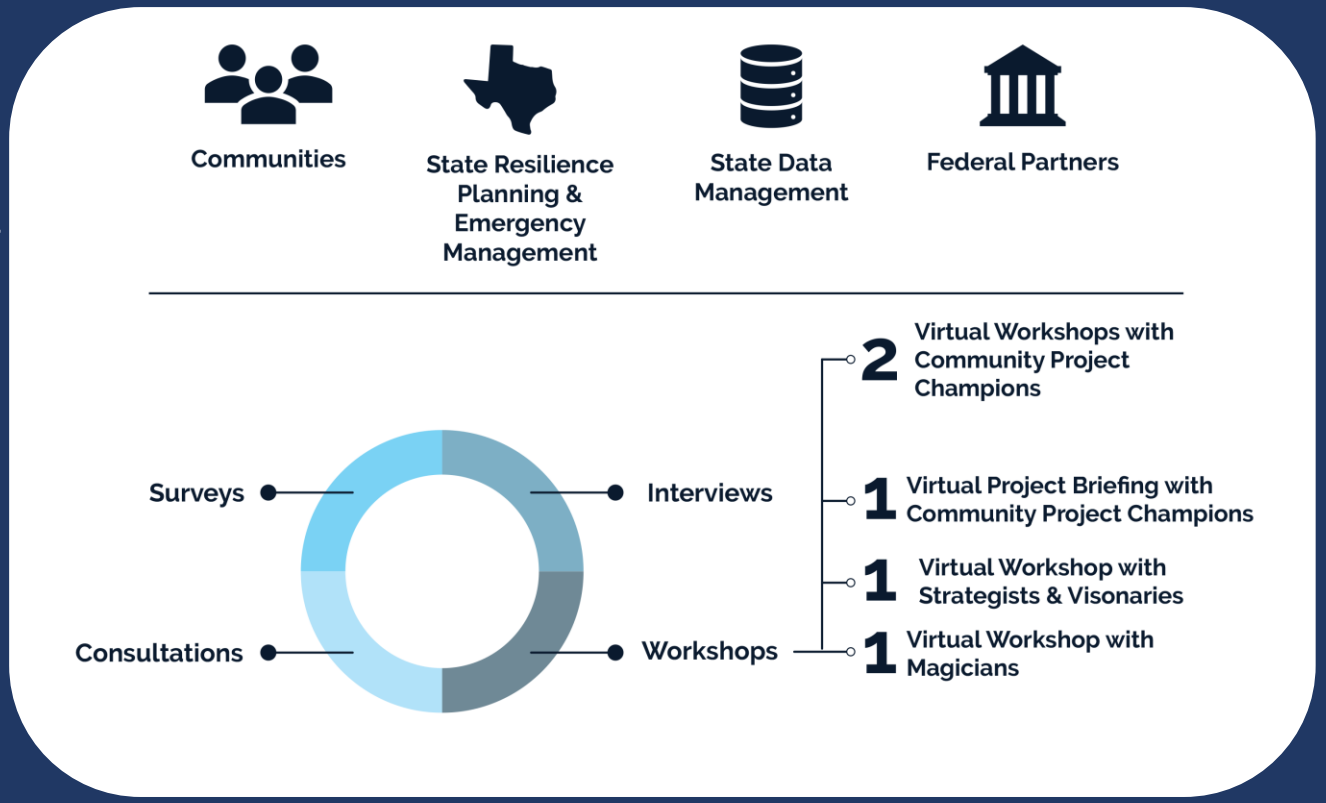
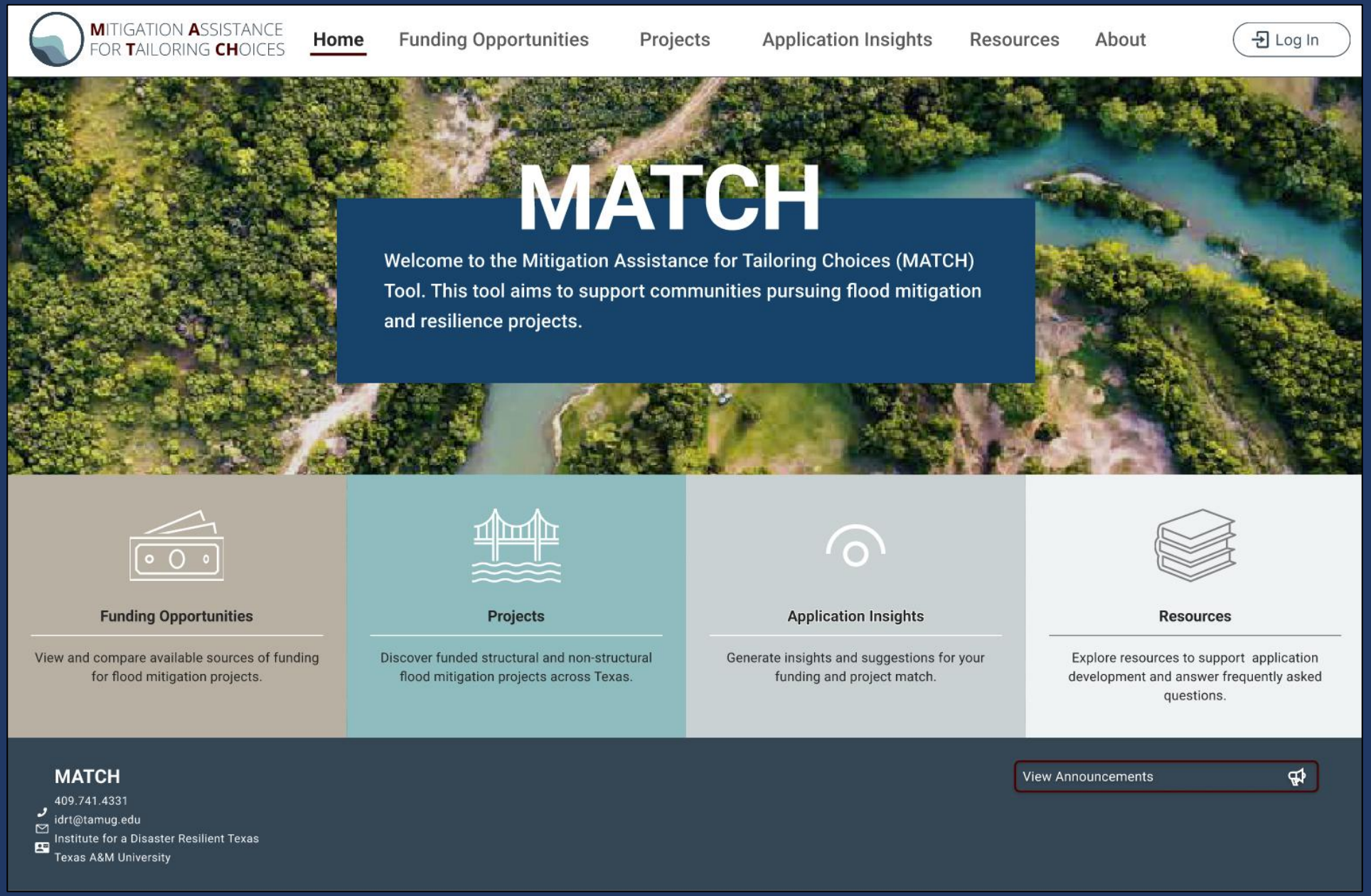
Development Approach

- Environmental Scan
- Engage Users and Refine Use Cases
- Requirement Analysis
- Implementation Road Map
- Agile Development and Training





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Visit the MATCH Tool Website

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

Participate In
&
Share the Survey

tinyurl.com/GLORegionWideSurvey

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Questions?

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