Welcome to the Edwards and Trinity Regional Aquifer Modeling Project

Stakeholder Advisory Forum

Thank you for signing in early.

The meeting will begin at 10:00 am, Central Daylight Time

Please stay muted during the meeting and use the chat box to submit questions

Texas Water Development Board

Agenda

Update on Edwards and Trinity Regional Modeling Project

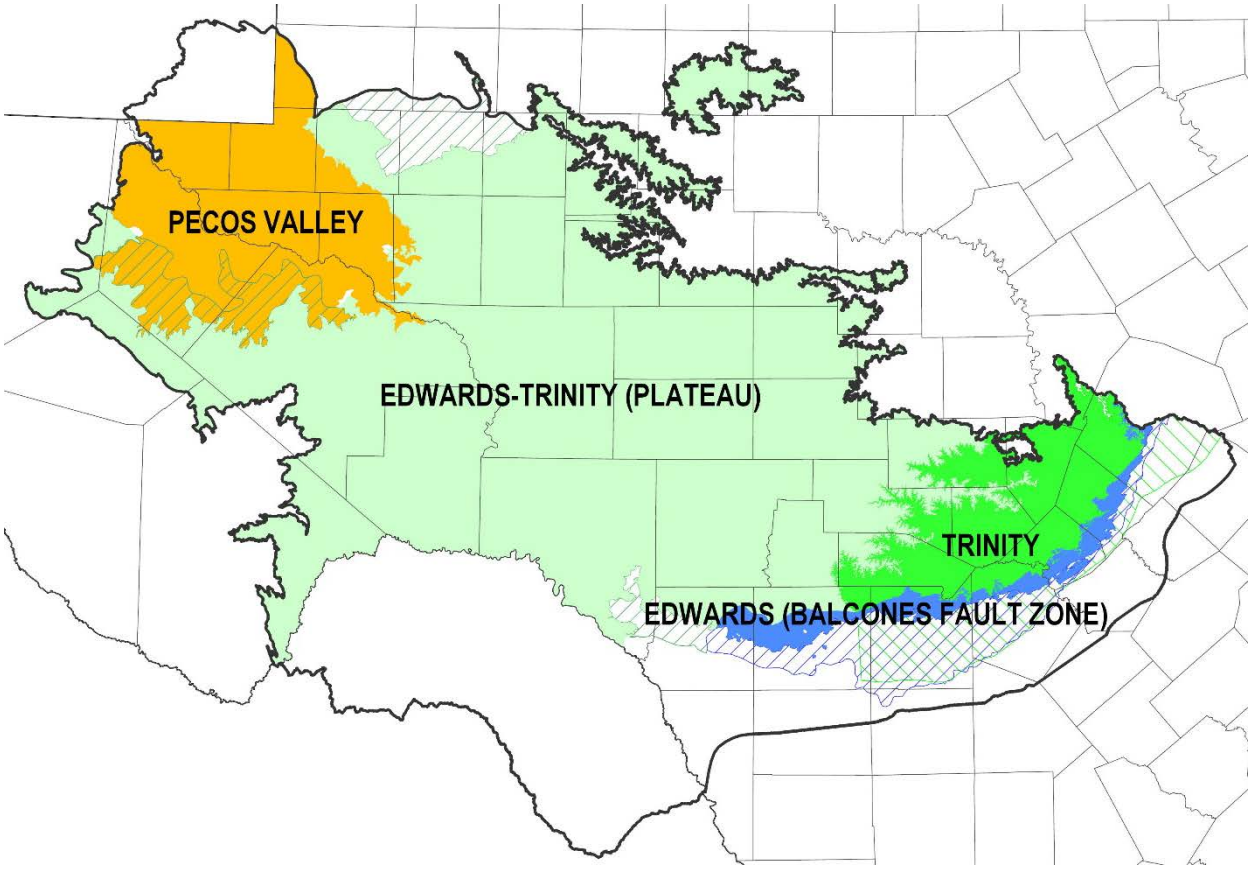
- Program Overview
- Project Team
- Proposed study area
- Data needs/schedule

Introduction to the TWDB Springs Program

Question and Answer

Stakeholders Advisory Forum

Edwards and Trinity Regional Groundwater Availability Model



Presented by

Cindy Ridgeway, P.G. Manager, Groundwater Availability Modeling

Ki Cha, Ph.D. Lead Modeler, Groundwater Availability Modeling

Texas Water Development Board

Update on Edwards and Trinity Regional Model

Program Overview

GAM Program Overview

Aim: Develop groundwater flow models for the major and minor aquifers of Texas.

Purpose: Tools that can be used to aid in groundwater resources management by stakeholders.

Public process: Stakeholder involvement during model development process.

Models: Freely available, standardized, thoroughly documented. Reports available over the internet.

Living tools: Periodically updated.

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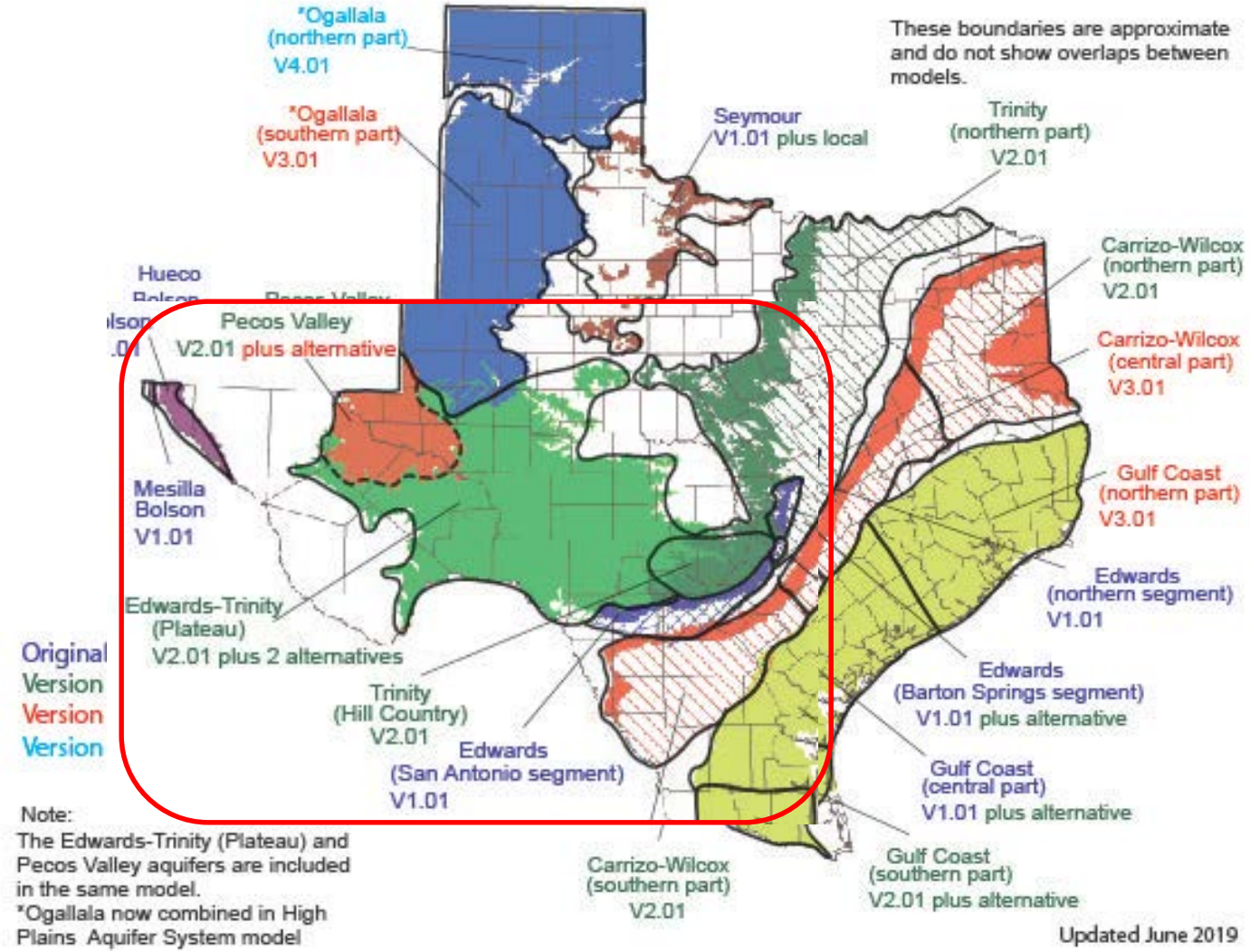


Why Stakeholder Advisory Forums?

- Keep stakeholders updated about progress of the model
- Inform how the groundwater model can, should, and should not be used
- Provide stakeholders with the opportunity to provide input and data to assist with model development

Update on Edwards and Trinity Regional Model

Project Team

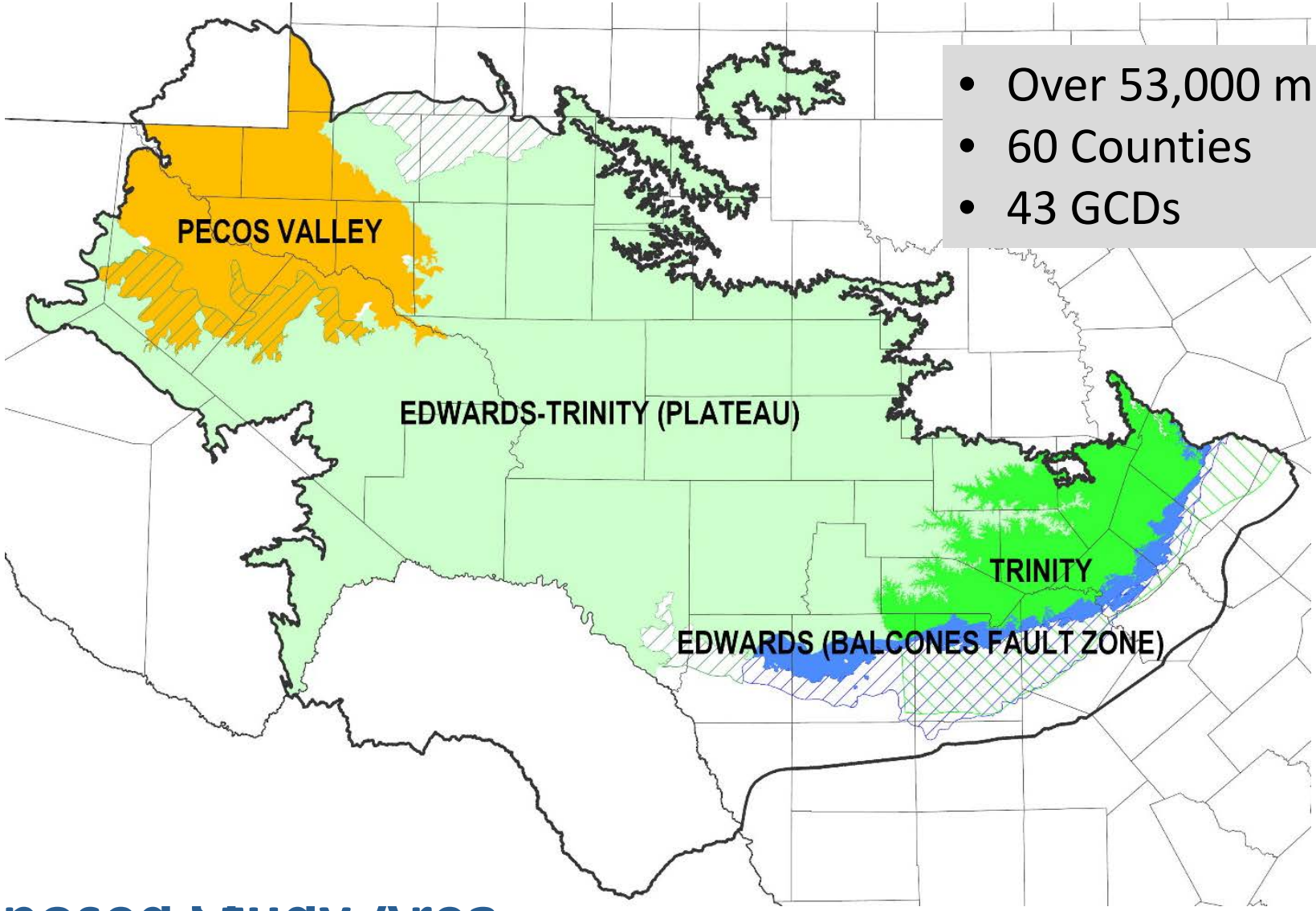
Project Team

Ki Cha	Project management and Model development
Stephen Bond, Grayson Dowlearn and Daryn Hardwick	GIS Support, Data collection and analysis, Geodatabase and 3D framework
Roberto Anaya, Ian Jones and Radu Boghici	Senior support
Cindy Ridgeway and Larry French	Management oversight

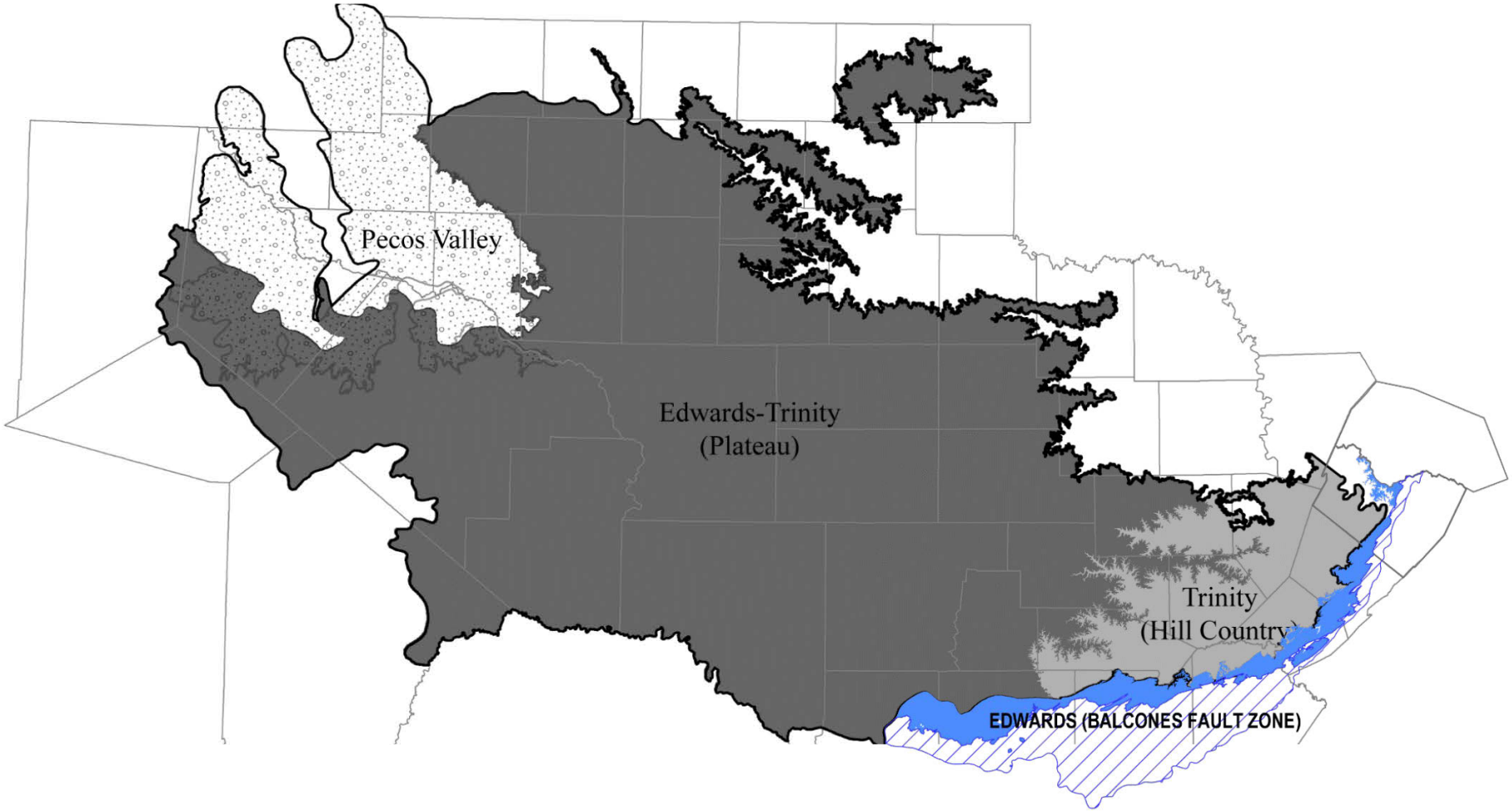
Update on Edwards and Trinity Regional Model

Proposed Study Area

Proposed Study Area



- Over 53,000 mi^2
- 60 Counties
- 43 GCDs

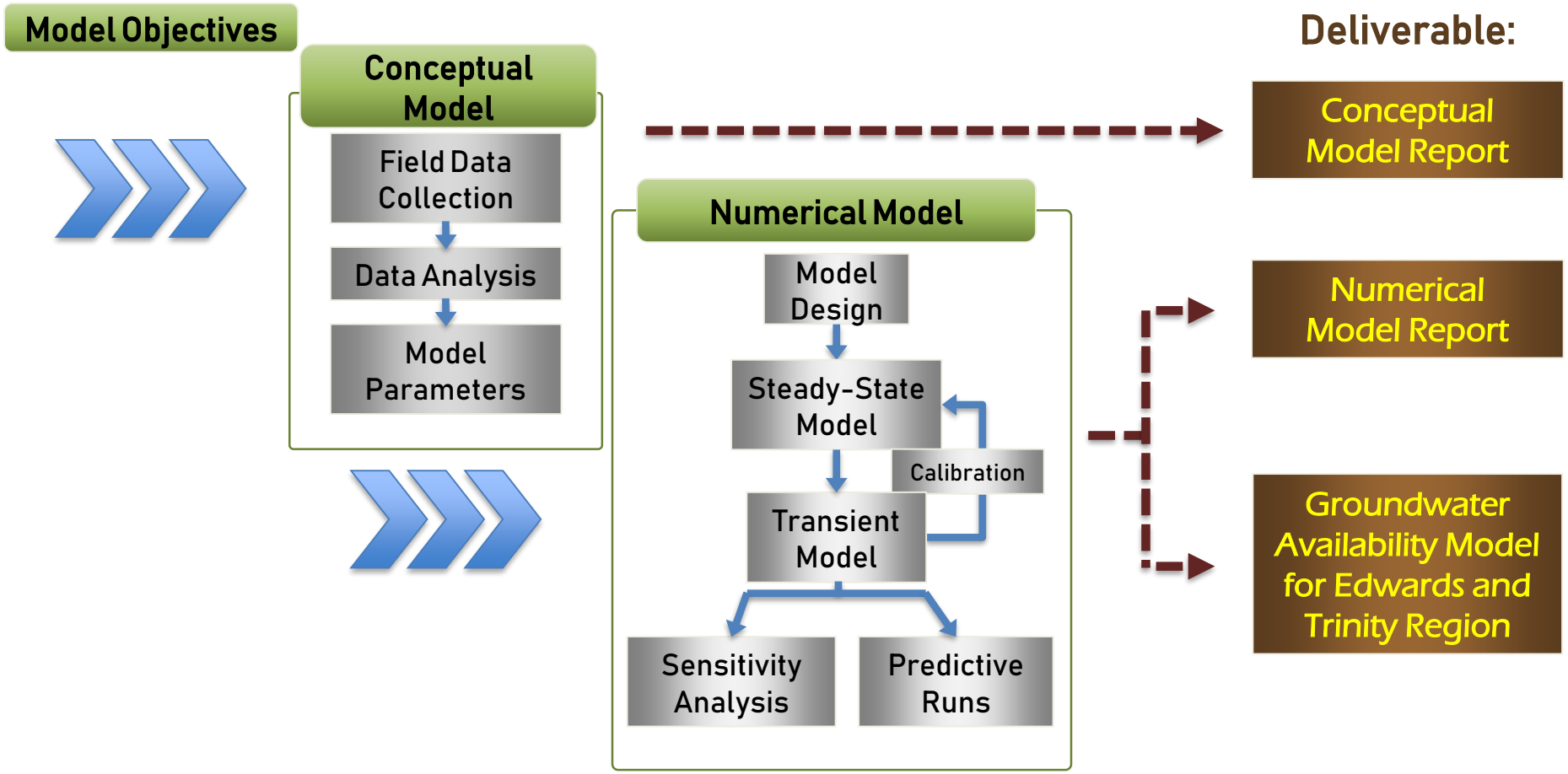


Edwards-Trinity Plateau and Pecos Valley aquifers

Objectives/Goals

Update the MODFLOW code	**Original Models developed in older MODFLOW code**
Better understand Intraformational Flow	**Important for updates to local models**
Explore better ways to model surface water/groundwater interactions	
Provide updates on local models	**Newer MODFLOW is more robust, easier to link models or refine areas of interest.**

Flow Chart


Model Objectives
Conceptual Model
Field Data Collection
Data Analysis
Model Parameters
Numerical Model
Model Design
Steady-State Model
Calibration
Transient Model
Sensitivity Analysis
Predictive Runs
Deliverable:
Conceptual Model Report
Numerical Model Report
Groundwater Availability Model for Edwards and Trinity Region

Update on Edwards and Trinity Regional Model

Data needs and schedule

We need data

Well information - log/location/construction

Groundwater data - level/pumping/water quality

Aquifer data - testing/study

Surface water information – Groundwater Diversion/Interaction

Not currently publicly available/
May be a great study we need to consider.

When do we need data?

- No later the day before **Thanksgiving (Nov. 25, 2020)**

Modeling Timeline

- Conceptual Model
  - Gather data & Construct the Framework
  - Gather data & Develop Conceptual model
- Numerical Model
  - Model code
    - MODFLOW Un-Structured Grid (USG)/6
    - Variable Grid Sizes (Quadtree)
  - Start updates to localized models;
    - Trinity – (Hill Country portion)
    - Edwards (Balcones Fault Zone) – Barton Springs segment

Project Schedule*

Project Start

(Jan. 2020)

SAF Meeting
Apr. 2020

Conceptual Model

(Jan. 2020 ~ Nov. 2021)

Conceptual Model Report
Oct. 2021

SAF Meeting
Oct. 2021

Numerical Model

(Sep. 2021 ~ Dec. 2022)

Steady-State Model
Sep. 2021~Mar. 2022

Transient Model
Apr. 2022~ Nov. 2022

SAF Meeting
Dec. 2022

Numerical Model Report (Draft)
Dec. 2022

Completion

(Feb. 2023)

Numerical Model Report (Final)
~Feb. 2023

Groundwater Model For Edwards and Trinity Region
~Feb. 2023

***Schedule is Tentative**

Additional Information

Web information:

http://www.twdb.texas.gov/groundwater/models/gam/eddt_p/eddt_r.asp

Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711-3231

Spring Monitoring Program and Data Needs for Groundwater Availability Modeling

Edwards Trinity Regional GAM Stakeholder Advisory Forum

April 28, 2020

Presented by Cody Bjornson and Donald Karr

TWDB Spring Monitoring History

No permanent monitoring program

Some water quality samples

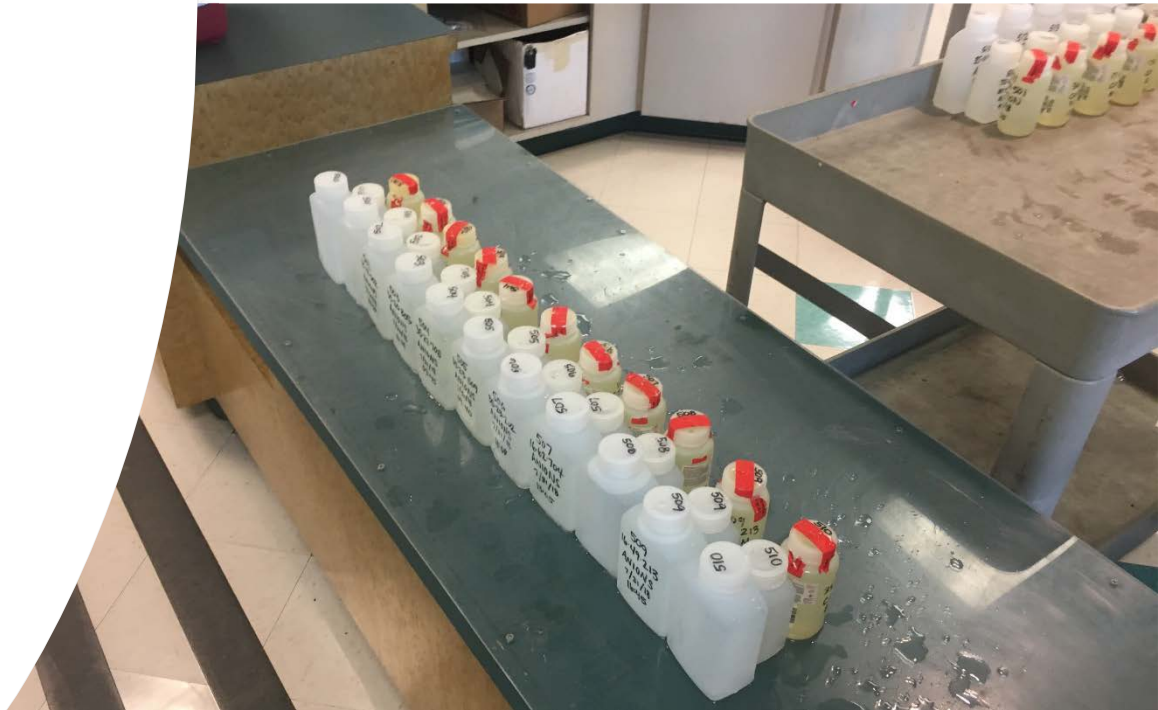
Few flow measurements

TWDB Spring Monitoring Data

Field measurements

WQ analyses by lab

Atrazine (TCEQ)



TWDB Spring Monitoring Program

Systematically implement routine data collection, inventory and analysis on the springs of Texas.

Current goals:

16-20 springs sampled with flow rates in March & April (TWDB water quality season). Repeat on annual basis

Future goals:

Monitor 30+ springs per year

TWDB Spring Monitoring Program: Selection Criteria

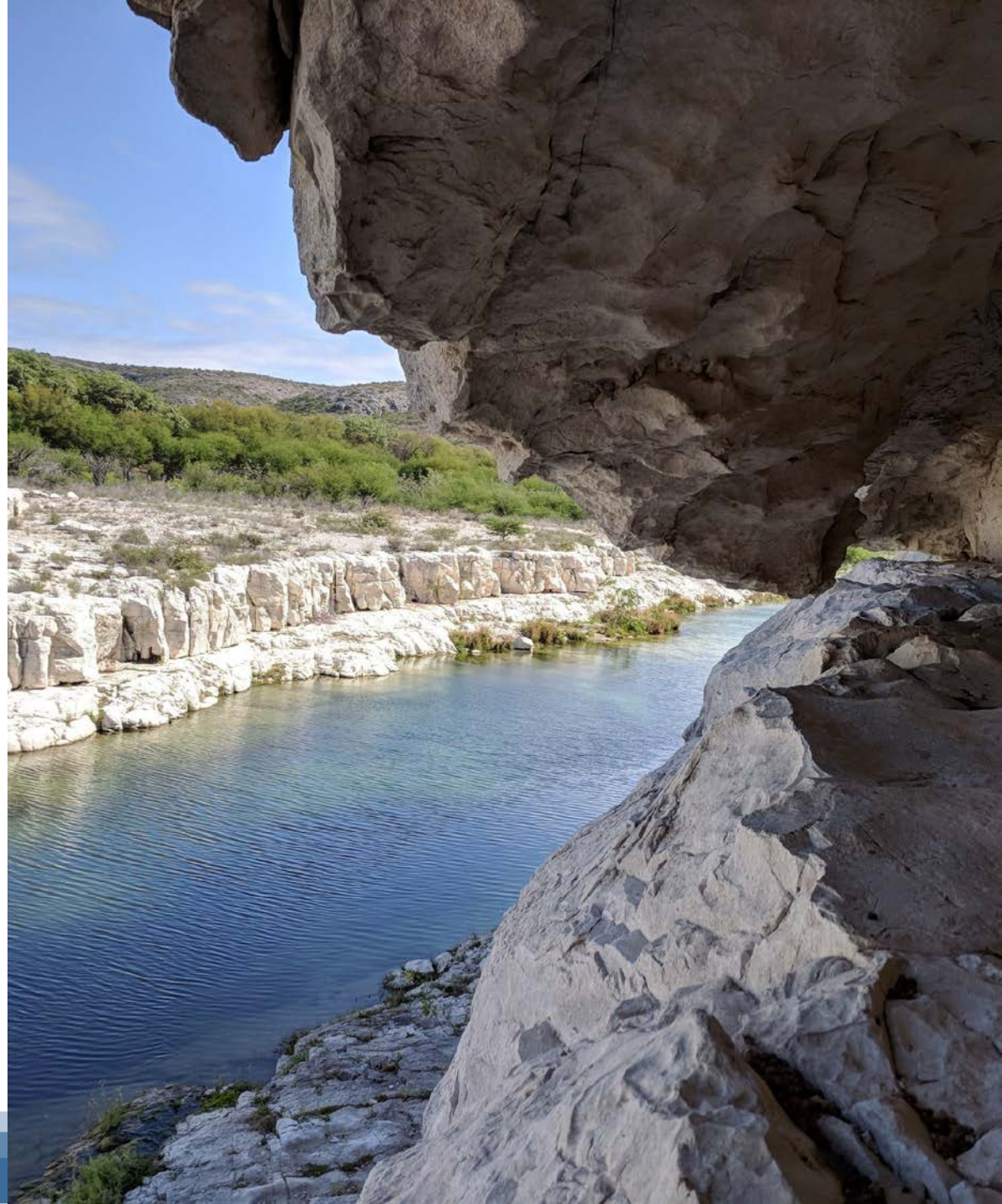
Springs are added to the program based on several criteria

Selection Criteria: Significance to Ground/Surface Water Interaction Studies

Devils River – Big Satan Canyon and Dolan Creek are prime examples.

Nueces and Frio Rivers.

Other sites to be determined.



Selection Criteria: Endangered Species Habitat

Diamond Y Draw – Pecos Co.

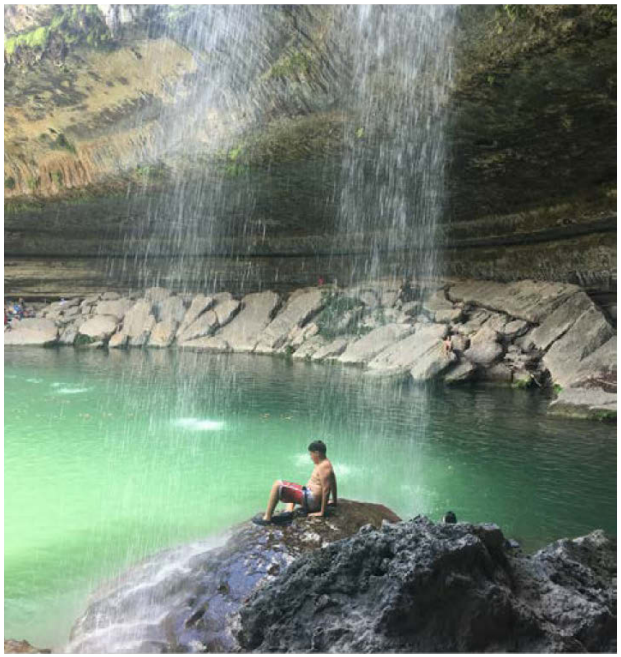
Habitat for critically endangered pupfish

Caroline Spring – Terrell Co.

Habitat for endangered Darter species, adds significant flow to lower Pecos River

Selection Criteria: Areas of Cultural/Other Significance

Springs threatened by population growth, increased drilling activities, or that have cultural or recreational significance will also be considered for the program.



TWDB Spring Monitoring Program

Measuring Flow Rate

To measure the flow rate of a large spring, such as Gorman Spring, a flow meter is used to determine the rate in Cubic Feet/Second

TWDB Spring Monitoring Program

Measuring Flow Rate

To measure the flow rate of small springs the Bag and Cylinder Method is used.

Discharge is gathered in a large plastic bag over a period of time and then measured in a graduated cylinder.

Convert from Cubic Centimeters/Second to Cubic Feet/Second.

Spring Data and Groundwater Availability Modeling

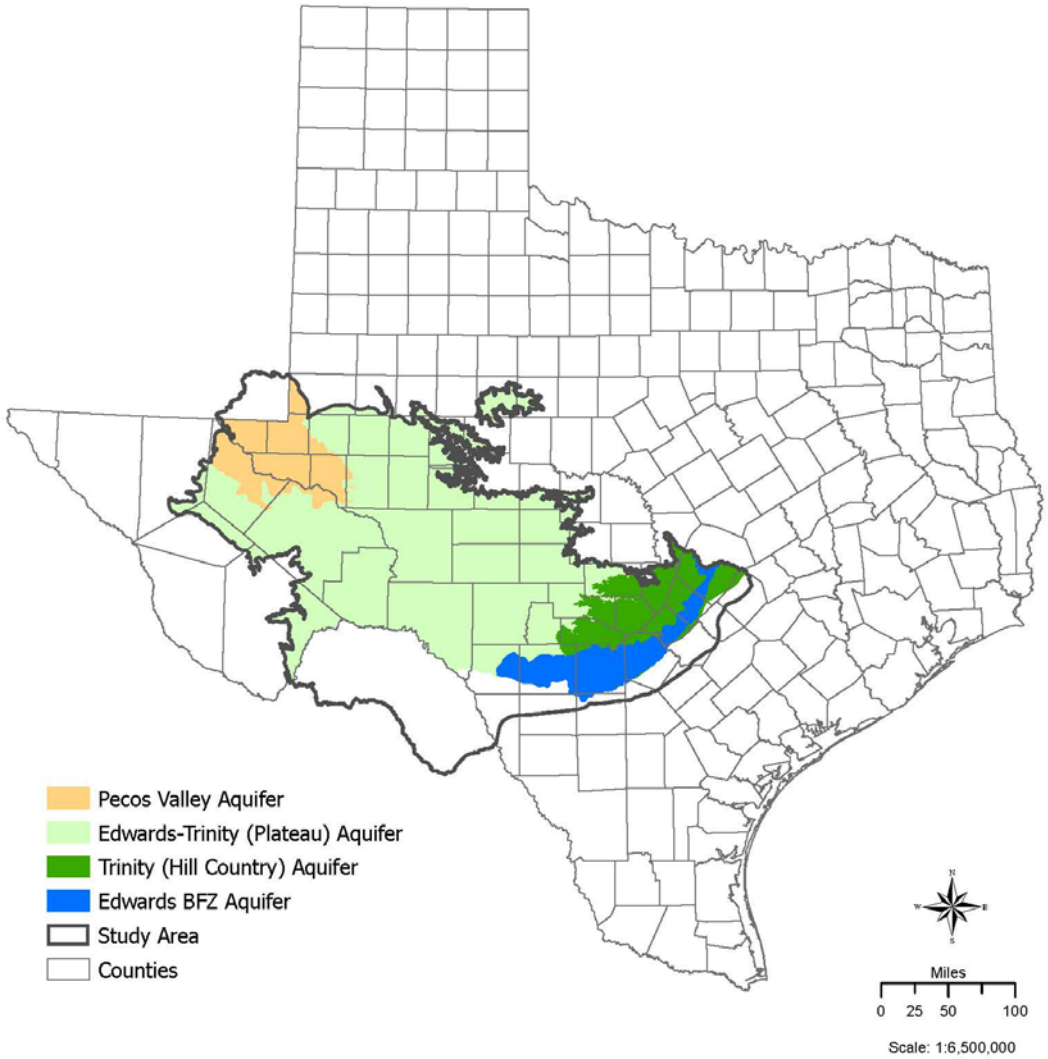
Flow rate: Estimating aquifer discharge

Water quality: Aquifer boundaries and fresh/salt water divides

Isotopes: Groundwater age, source, flow paths

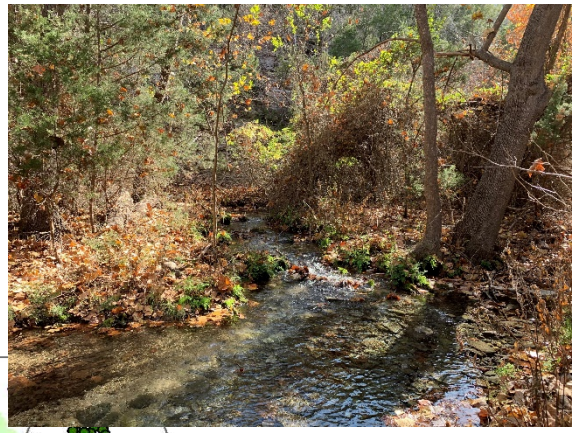
Edwards Trinity Regional Groundwater Availability Model (GAM) Study Area

The study area for this model includes the Edwards-Trinity (Plateau), Pecos Valley, Trinity (Hill Country), and Edwards BFZ Aquifers



Inventoried Springs in the Edwards Trinity Regional Groundwater Availability Model (GAM) Study Area

The study area for this mod *teau), Pecos Valley, Trinity (Hill Country), and Edwards BFZ Aquifers*



- Springs
- Proposed spring network 2020
- Study Area
- Counties

N
W E
S

Miles

0 15 30 60

Scale: 1:3,750,000

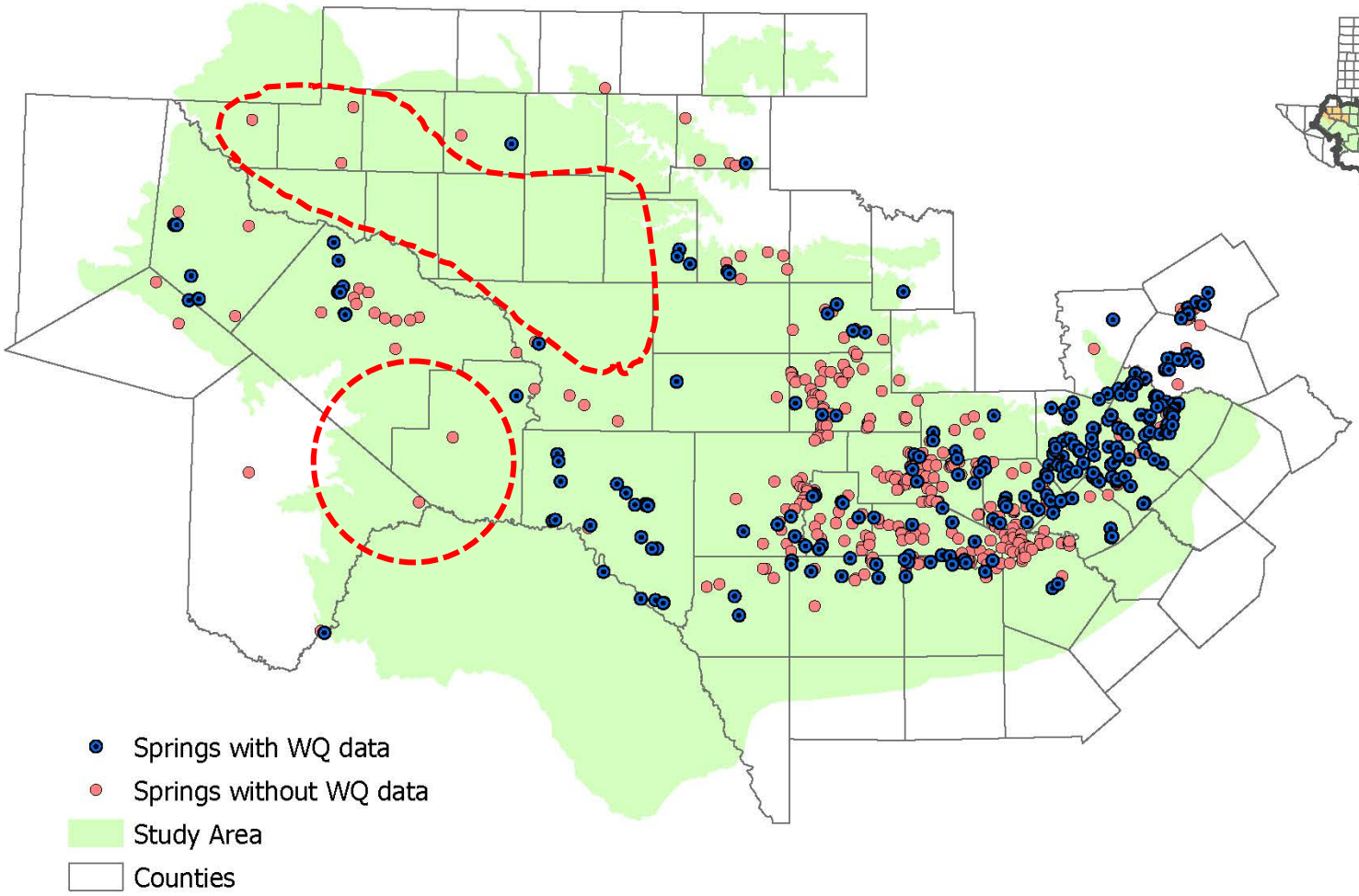
Data Gaps and Needs

Areas where springs are less common or lacking data

Data specific to modeling needs

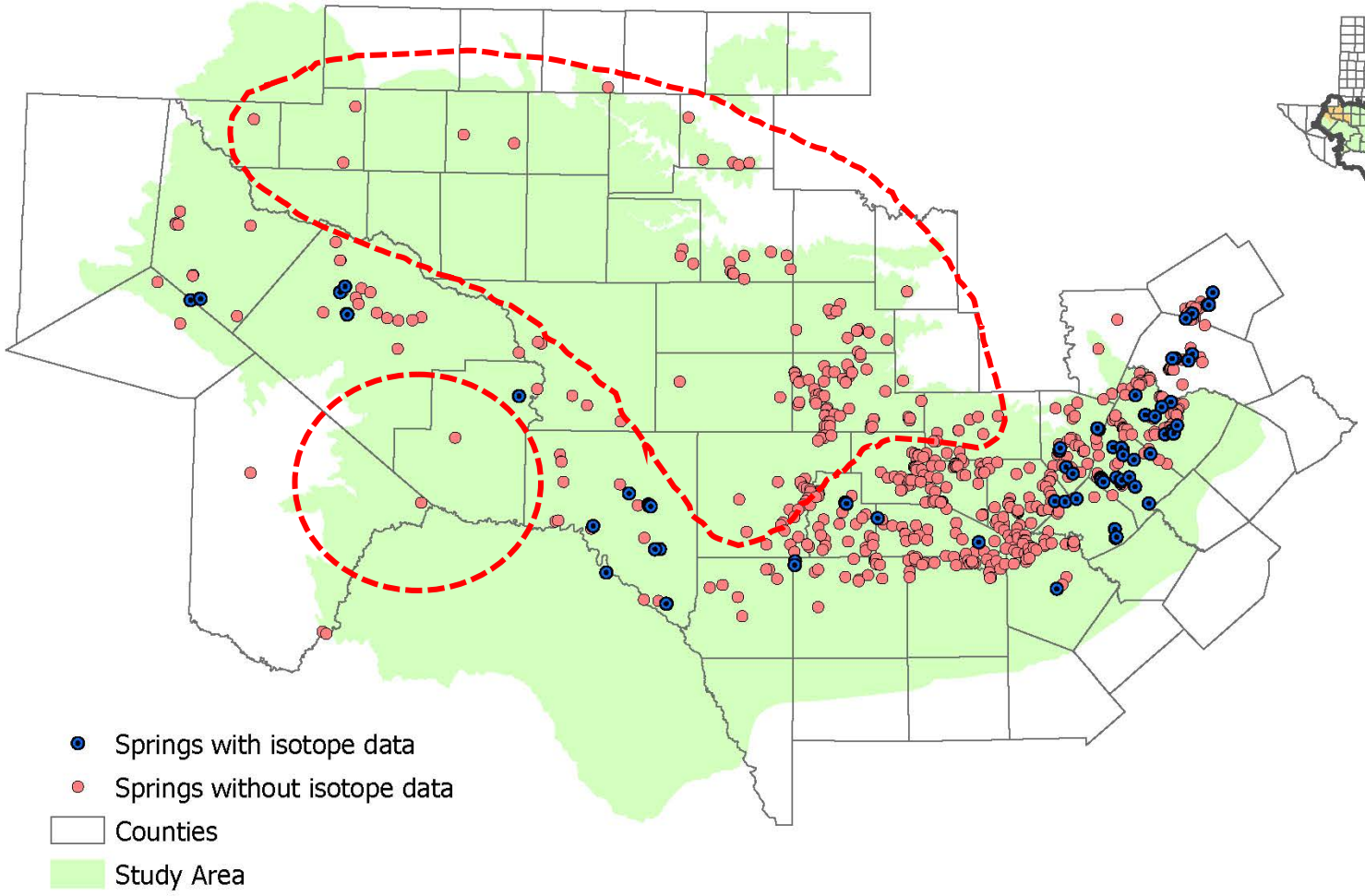
Inventoried Springs with Water Quality Data in the Edwards Trinity Regional Groundwater Availability Model (GAM) Study Area

The study area for this model includes springs from the Edwards-Trinity (Plateau), Pecos Valley, Trinity (Hill Country), and Edwards BFZ Aquifers



Inventoried Springs with Isotope Data in the Edwards Trinity Regional Groundwater Availability Model (GAM) Study Area

The study area for this model includes springs from the Edwards-Trinity (Plateau), Pecos Valley, Trinity (Hill Country), and Edwards BFZ Aquifers



Modeling Project Contacts

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Ki Cha, Ph.D.

Lead modeler for Edwards and Trinity Regional Aquifer Model Project
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Springs Program Contacts

Cody Bjornson

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512-936-0842

Donald Karr

Groundwater Monitoring
donald.karr@twdb.texas.gov
512-463-7839

Q&A

Questions?

Q&A

- Question #1: How do you handle the boundary/domain in Mexico and New Mexico?
- Answer #1: The boundaries in Mexico and New Mexico will be no-flow boundaries. During the model calibration process those area could be clipped out for better matching.

- Question #2: What is the smallest grid size you anticipate having?
- Answer #2: We have not set the smallest grid size for this model. We will keep investigating and studying the best number to make the model perform well with reasonable simulation time.

- Question #3: The webpage for the project says that this model will replace the current GAM for ETP and PV aquifers. It appears that this updated regional GAM will not replace the Hill Country GAM or the BFZ GAM. Will those two be updated after this regional GAM is completed?
- Answer #3: Yes. The regional model will better handle the flow between Edwards-Trinity (Plateau), Trinity (Hill Country) and Edwards (Balcones Fault Zones). Then local model will be updated with consistent flow boundary.

- Question #4: Are you covering the flowing wells in far West Texas, some of them creates artificial "springs or ponds"?
- Answer #4: We have not looked into that. We will to follow up to discuss more with the person who questioned.

List of Attendees

Name	Affiliation	Name	Affiliation	Name	Affiliation
Alex Mayer	UTEP	Diana Thomas	Sterling County Underground Water Conservation District	Jordan Furnans	LREWater
Ashley Jackson	N/A	Donald Karr	TWDB	Joseph duMenil	TGR GCD
Bill Hutchison	TEXASGW	Donnelly, Andrew	Geo-Logic	Juli Hennings	SWTCGCD
Brian Hunt	BSEACD	Feather Wilson	Strata Geological Services	Kelly Close	LRE Water
changbing yang	EAA	Grayson Dowlearn	TWDB	Kendall	BSEACD
Cindy Ridgeway	TWDB	Ian Jones	TWDB	Ki Young Cha	TWDB
Cody Bjornson	TWDB	James Beach	WSP	Larry French	TWDB
Dan Mueller	Environmental Defense Fund	Jerry Shi	TWDB	Leah Martinsson	Texas Groundwater
Daryn Hardwick	TWDB	Jim McCord	Irpwater	Marcus Gary	EAA
David Wheelock	LCRA	Jim Winterle	EAA	Mike Keester	LRE Water

List of Attendees (Cont'd)

Name	Affiliation	Name	Affiliation	Name	Affiliation
Natalie Ballew	TWDB	Ronald Green	N/A	N/A	N/A
Paige Najvar	U.S. Fish and Wildlife Service	Ryan Smith	The Nature Conservancy of Texas	N/A	N/A
Paul	N/A	Shirley Wade	TWDB	N/A	N/A
Paul Bertetti	EAA	Stephanie Moore	Geo-logic	N/A	N/A
Philip Webster	N/A	Stephen Bond	TWDB	N/A	N/A
Radu Boghici	TWDB	Ty	N/A	N/A	N/A
Rebecca Nunu	SWRI	uvashree mohandass	WSP	N/A	N/A
Rebecca Storms	TWDB	VanessaEscobar	BSEACD	N/A	N/A
Robert Bradley	TWDB	Zhuping Sheng	TAMU	N/A	N/A
Rohit Goswami	WSP	N/A	N/A	N/A	N/A