# TWDB GROUNDWATER-SURFACE WATER INTERACTION STUDY

Rebecca Batchelder

Senior Engineer, Water Resources Management

Feb. 14, 2019

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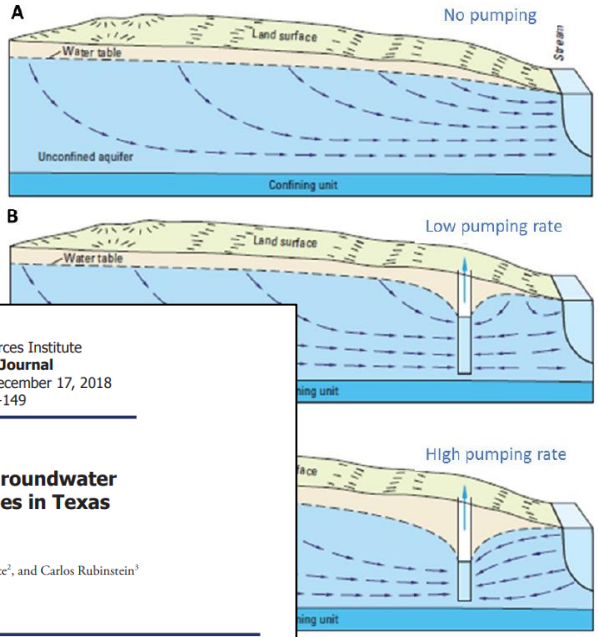
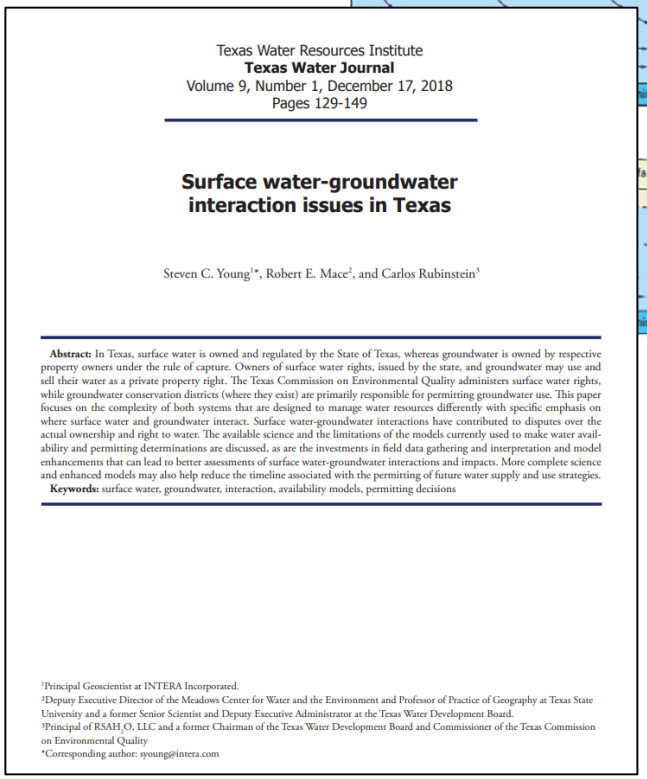
# Why Study Groundwater-Surface Water Interactions?

There is currently lack of data AND established data collection/analysis approach

Science of these interactions impacts understanding of:

- Surface water rights
- Groundwater pumping
- Environmental flows
- Bed and banks permits



Texas Water Resources Institute
**Texas Water Journal**
Volume 9, Number 1, December 17, 2018
Pages 129-149

**Surface water-groundwater interaction issues in Texas**

Steven C. Young[1]*, Robert E. Mace[2], and Carlos Rubinstein[3]

**Abstract:** In Texas, surface water is owned and regulated by the State of Texas, whereas groundwater is owned by respective property owners under the rule of capture. Owners of surface water rights, issued by the state, and groundwater may use and sell their water as a private property right. The Texas Commission on Environmental Quality administers surface water rights, while groundwater conservation districts (where they exist) are primarily responsible for permitting groundwater use. This paper focuses on the complexity of both systems that are designed to manage water resources differently with specific emphasis on where surface water and groundwater interact. Surface water-groundwater interactions have contributed to disputes over the actual ownership and right to water. The available science and the limitations of the models currently used to make water availability and permitting determinations are discussed, as are the investments in field data gathering and interpretation and model enhancements that can lead to better assessments of surface water-groundwater interactions and impacts. More complete science and enhanced models may also help reduce the timeline associated with the permitting of future water supply and use strategies.
**Keywords:** surface water, groundwater, interaction, availability models, permitting decisions

[1]Principal Geoscientist at INTERA Incorporated.
[2]Deputy Executive Director of the Meadows Center for Water and the Environment and Professor of Practice of Geography at Texas State University and a former Senior Scientist and Deputy Executive Administrator at the Texas Water Development Board.
[3]Principal of RSAH$_2$O, LLC and a former Chairman of the Texas Water Development Board and Commissioner of the Texas Commission on Environmental Quality
*Corresponding author: syoung@intera.com

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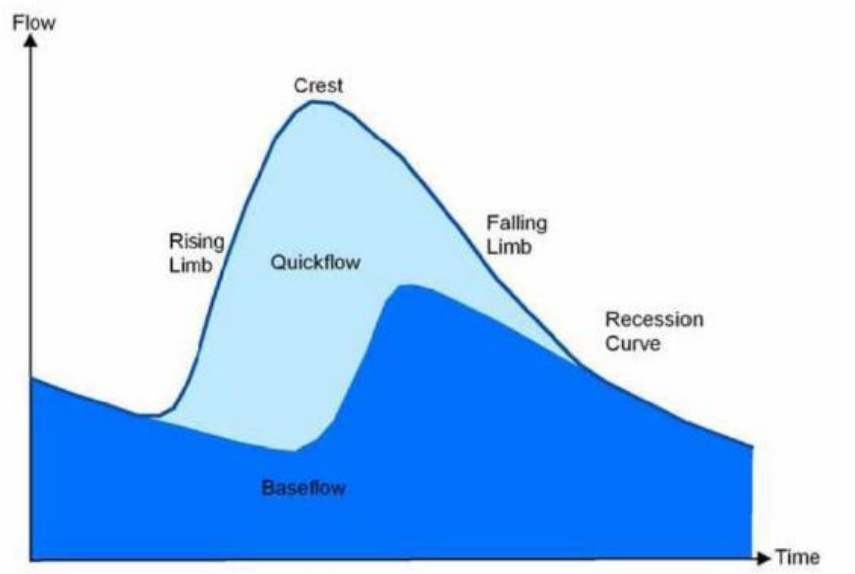
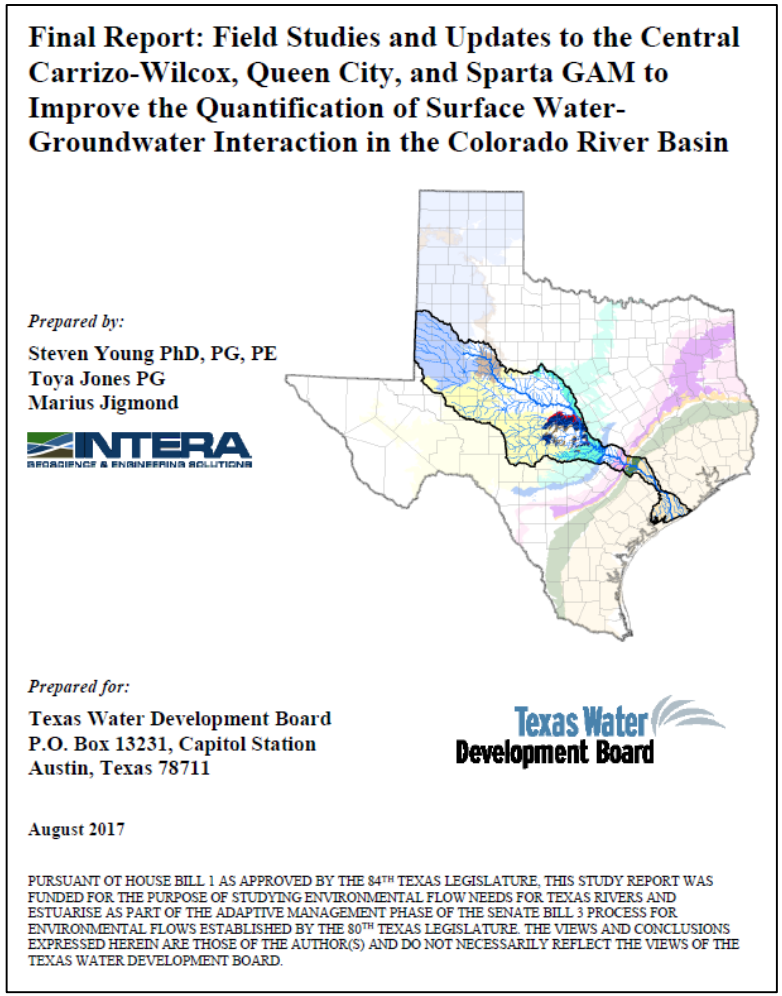
# Project Benefits

- Improve estimates of river gains and losses
- Improve understanding of relationship between alluvium and rivers
- Inform strategies to help achieve instream flow requirements
- Establish methodology for data collection and analysis
- Demonstrate regional cooperation



# Project Background

- Project need and scope identified during update to the Central Carrizo-Wilcox, Queen City and Sparta GAM
- Funded by TWDB through Senate Bill 3 to support adaptive management efforts of Basin Bay Area Stakeholder Committee
- TWDB initially funded project at $75,000
- TWDB approached LCRA to implement the project
- Initial scoping after site identification indicated required budget of at least $160,000



**Final Report: Field Studies and Updates to the Central Carrizo-Wilcox, Queen City, and Sparta GAM to Improve the Quantification of Surface Water-Groundwater Interaction in the Colorado River Basin**

*Prepared by:*

Steven Young PhD, PG, PE
Toya Jones PG
Marius Jigmond

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

*Prepared for:*

Texas Water Development Board
P.O. Box 13231, Capitol Station
Austin, Texas 78711

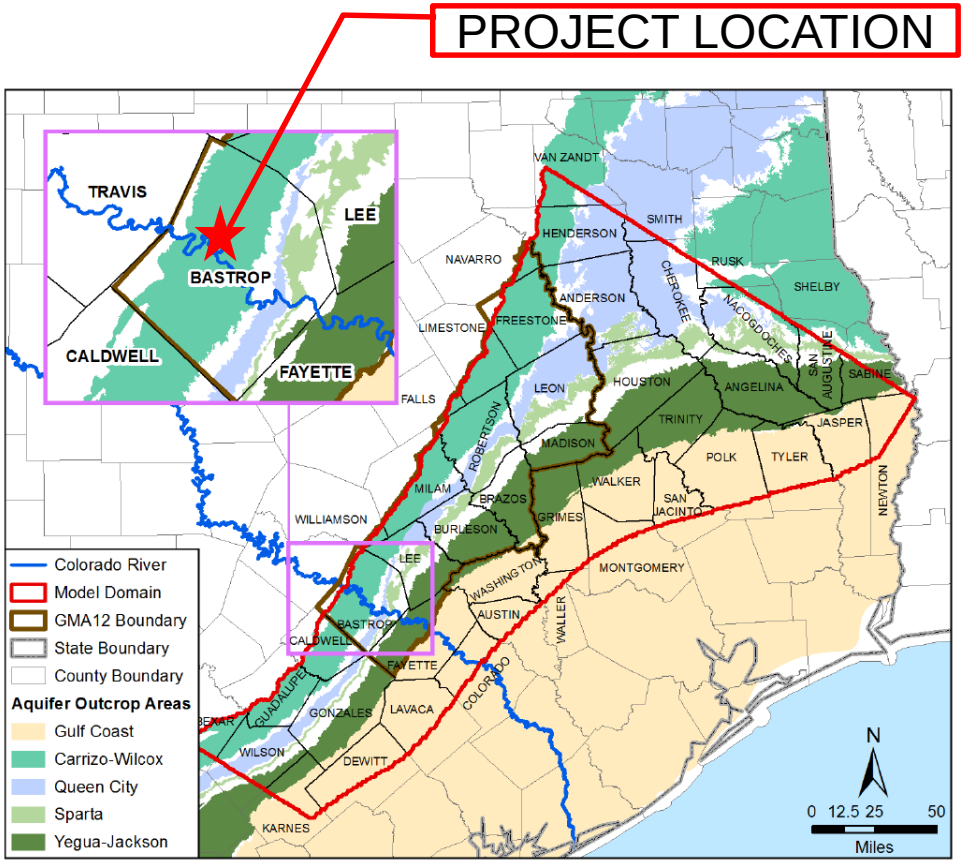
Texas Water Development Board

August 2017

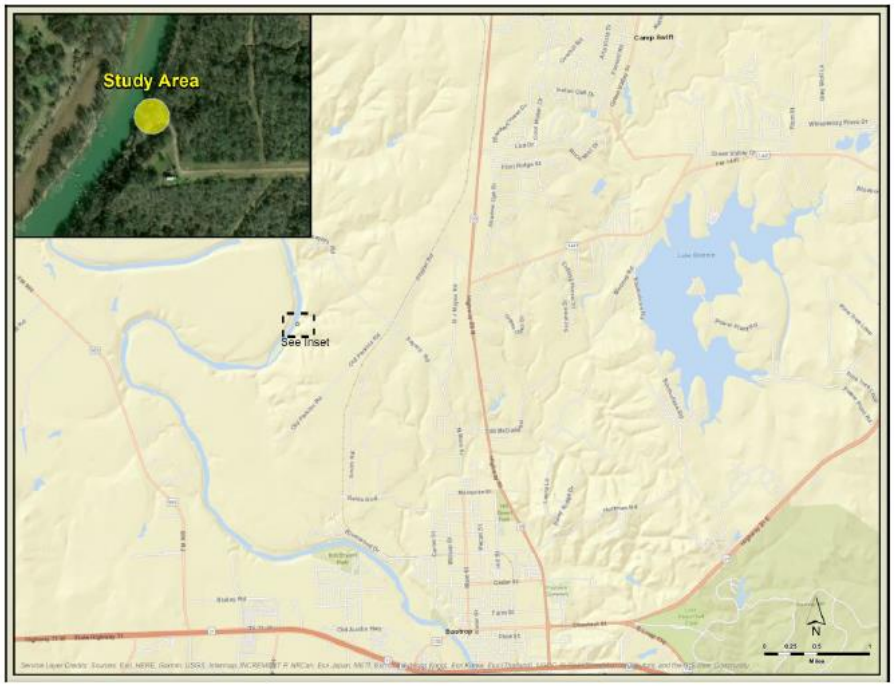
PURSUANT OT HOUSE BILL 1 AS APPROVED BY THE 84TH TEXAS LEGISLATURE, THIS STUDY REPORT WAS FUNDED FOR THE PURPOSE OF STUDYING ENVIRONMENTAL FLOW NEEDS FOR TEXAS RIVERS AND ESTUARISE AS PART OF THE ADAPTIVE MANAGEMENT PHASE OF THE SENATE BILL 3 PROCESS FOR ENVIRONMENTAL FLOWS ESTABLISHED BY THE 80TH TEXAS LEGISLATURE. THE VIEWS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE AUTHOR(S) AND DO NOT NECESSARILY REFLECT THE VIEWS OF THE TEXAS WATER DEVELOPMENT BOARD.

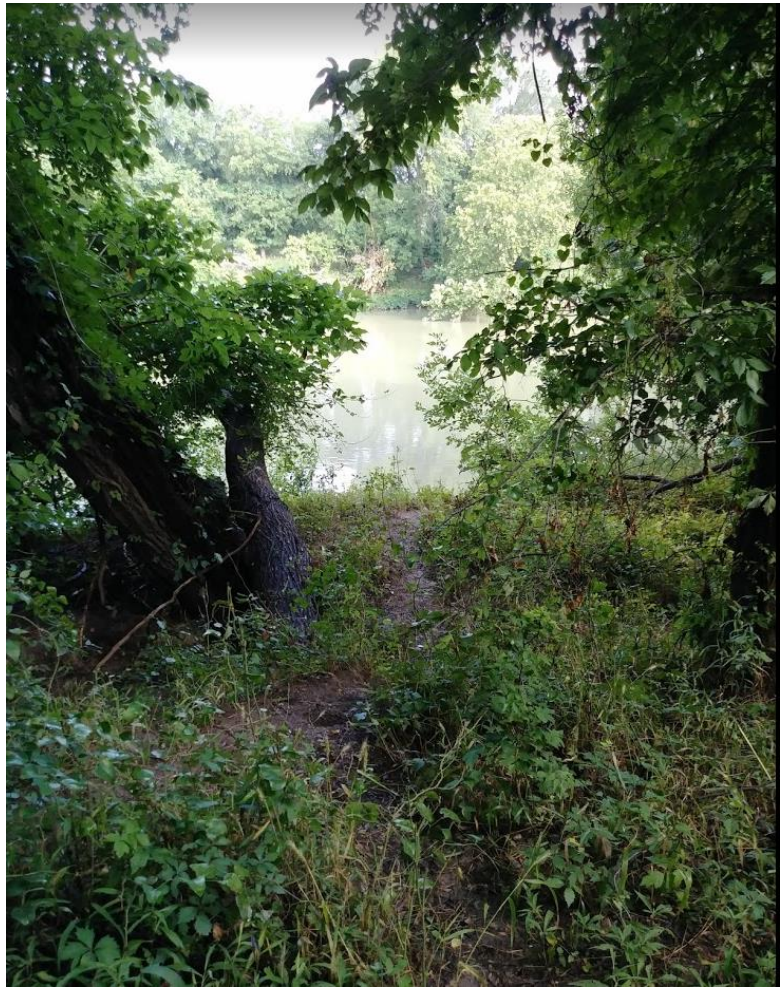
# Project Goals

- Establish data-based hydraulic parameters to be used in groundwater and surface water models
- Develop method and technologies to measure GW-SW interaction



# Project Approach



# Project Approach

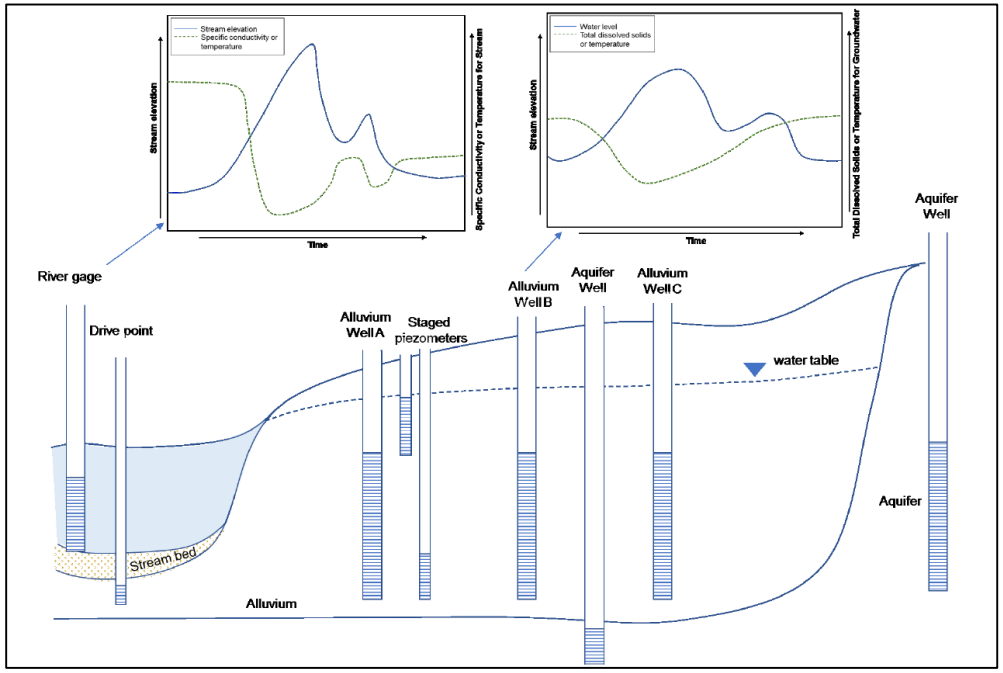
Monitoring equipment:

- Three monitoring wells screened in distinct zones (water surface elevation, electrical conductivity, barometric pressure and temperature)
- Water data logger in Colorado River (surface water elevation, electrical conductivity and temperature)

# Project Approach

Data analysis:

- Characterize water exchange between river and alluvium
- Quantify importance of bank storage as source of water to river
- Provide information that can be used in computer models (underflow, hyporheic zone, baseflow)



# Project Partners

Texas Water Development Board

POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT

Brazos RIVER AUTHORITY

LCRA ENERGY • WATER • COMMUNITY SERVICES

# Draft Schedule

- Currently contracting with TWDB and project partners
- March-June 2019: Site prep and equipment installation
- June 2019-June 2020: Data collection
- June 2020: Presentation of preliminary results to project partners
- November 2020: Presentation of final results to project partners
- January 2021: Final project report