Item 4 | Consideration of Funding a Groundwater/Surface Water Interaction Study of the Brazos River Alluvium Aquifer

Groundwater/Surface Water (GW/SW) interaction has become an important issue within the groundwater world. Current studies are limited in number and have done little to properly address the matter. GMA 12 updated the Groundwater Availability Model in 2018 and included a segment addressing GW/SW interaction along both the Brazos and Colorado rivers. The update primarily addressed faulting and connection (leakage) between confined aquifers and not the GW/SW interaction aspect.

HB 3990 by Kacal was filed this legislative session and instructing the TWDB to compile and review all GW/SW interaction studies conducted in Texas. HB 3990 has since died, but GW/SW interaction will be a recurring matter is future legislative sessions.

HB 3990 was heard in the House Natural Resources Committee (HNR) heard in committee on March 28, 2023. During testimony before the committee, the subject of the San Saba River Alluvium came up resurrecting an issue raised three sessions ago basically attempting to classify all alluvial deposits the same.

During the 85th Legislative Interim, I had extended conversations with then HNR Chairman Lyle Larson enlightening him that the Brazos River Alluvium Aquifer (BRAA) is the only alluvial deposit designated as an aquifer and should not be lumped in with alluvial deposits directly connected to a river. Any bills filed that session and in subsequent sessions addressing this issue failed to pass.

Dr. Joe Yelderman, Professor & Chair, Department of Geosciences at Baylor University, mentored a master's student, Erin Noonan, through a salinity study of the Brazos River in the river segment in southern McLennan/northern Falls counties. Ms. Noonan provided a presentation of thesis to the BVGCD board in 2019 which concluded that GW/SW interaction over a 37-day high bank event penetrated the alluvium no more than 88 feet.

With so much attention to GW/SW interaction at the GMA level and around the state, it is prudent for the District to engage in a study of GW/SW interaction along the segment of the Brazos River adjacent to the District. I reached out to Dr. Joe and queried his interest in performing/overseeing a GW/SW interaction study along our segment of the Brazos River. He jumped at the possible opportunity indicating that a master's student has been recruited. Dr. Joe estimates the study expense to be $80,350 under a 15% cap for "indirect" costs charged by Baylor University. There will be variables that will likely present themselves during the study. If approved, the study will begin August 2023 and conclude by June 2025. Payment for work performed will encompassed budget years 2023, 2024, and 2025.

James Beach, John Siefert, Dr. Joe Yelderman, and I met Friday, May 19, 2023 to discuss and finalize the scope of work for the study. Post Oak Savannah GCD had expressed an interest in being a partner in the study but has since pulled back.

It is the recommendation of the General Manager the District enter into a contract with Dr. Joe Yelderman and Baylor University to conduct a groundwater/surface water interaction study of Brazos River and the Brazos River Alluvium Aquifer along the segment inclusive of Robertson, Milam, Brazos, and Burleson counties with an estimated study cost of $80,000. The General Manager further recommends that the total three (3) budget cycle cost not to exceed $100,000.

Proposal to Study Surface-Water/Groundwater Interactions in the Middle Segment of the Brazos River Alluvium Aquifer (BRAA)

Abstract

There have been a number of studies regarding individual aquifers within the general area of the Middle Segment of the Brazos River Alluvium Aquifer (BRAA). Several of the Groundwater Availability Models have estimated or modeled inter-aquifer flow among aquifers in this area but the regional models have difficulty including local hydrogeological details and few studies have addressed the specific surface-water/groundwater interactions among the BRAA, bedrock formation aquifers, and the Brazos River in this area. This study proposes to conduct research that may yield information appropriate to groundwater management in the Middle Segment of the BRAA. Questions or topics to be addressed regarding the river and the aquifers include groundwater flow directions (currently and historically), groundwater flow rates, and locations of stronger or weaker groundwater and surface water interactions.

Introduction

Purpose

The study will attempt to provide a better understanding of the surface-water/groundwater interactions to aid water management decisions in the Middle Segment of the BRAA.

Setting

The Middle Segment of the BRAA is defined to include the following counties: Brazos, Burleson, Milam, and Robertson.

Methods

Part of the information needed for this study will be found in the current literature and in public data bases such as the TWDB, TCEQ, USGS, and the local groundwater conservation districts. The data from the literature include water levels, ionic and isotopic chemistry, sediment descriptions, and stream gage readings (river flow).

Analysis of the data will include studying seasonal, historical, flood, and drought influenced patterns where possible.

Aquifer framework and stratigraphic lithologies will be determined from literature and careful examination of local well reports. Limited shallow borings with monitor well construction may be attempted in specific locations if they appear feasible and if they have the potential to provide critical information.

The current water level monitoring system will be evaluated, and additional monitoring devices may be deployed on certain wells or in specific locations if they appear helpful. New monitoring systems (sonic or pressure transducer data loggers) may be recommended to the sponsor.

Specific well pumping rates are unknown at this time, but approximations will aid this study significantly.

Current meteorological data are expected to be adequate but installing a few site-specific stations may be preferred.

The efforts for this study will be the primary responsibility of a master's level geoscience student at Baylor University aided by an undergraduate student who are both under the mentorship of Joe C. Yelderman Jr., PhD, PG.

Schedule and Deliverables

The funding needed would begin August 1, 2023, and end July 31, 2025.

Oral progress reports will be presented to the sponsor in November 2023, March 2024, Summer 2024.

A written preliminary report containing maps, tables, text, and sources will be furnished to the sponsor accompanied by an oral summary in October 2024.

The final report containing maps, tables, text, and sources will be furnished to the sponsor accompanied by an oral summary in April 2025.

A completed master's Thesis is expected to be available after June 2025.

Budget (estimate)

Graduate Stipend – 2 years of MS stipend approximately	$60,000.
Undergraduate field support Fall 2023 through Fall 2024	$2500.
Travel - 15 to 20 trips to collect data, present progress reports, and install items	$3000.
Isotope analyses twenty-five samples at $40 each	$2000.
Travel and registration for presentation to professional conference	$1000.
Piezometer supplies (PVC pipe, sand, bentonite, screen, and locking caps)	$1,500.
Subtotal	$69,000
Indirect (estimated at 15%)	$10,350
Total approximately	**$80,350**