

Goliad County Groundwater Conservation District approves the release of GAM run 05-15 with the statement that we agree with the general drawdown that is shown. We have been advised that parameters used in the model allow no vertical leakage from the Chicot to the Evangeline Aquifer. These parameters were necessary to achieve an acceptable calibrated model. Empirical data and the South Texas Regional GAM verify that extensive vertical leakage occurs between the Chicot and Evangeline Aquifers, therefore we do not agree with results shown for the Chicot Aquifer.

GAM Run 05-15

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Groundwater Availability Modeling Section
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REQUESTOR:

Mr. Art Dohmann on behalf of the Goliad County Groundwater Conservation District.

DESCRIPTION OF REQUEST:

Mr. Dohmann requested a baseline run of the Groundwater Availability Model (GAM) for the central part of the Gulf Coast aquifer using pumping projections for Goliad County provided by Mr. Dohmann. The purpose of this model run is to determine the impacts of the Lower Guadalupe Water Supply Project (LGWSP) and the City of Victoria well field.

METHODS:

We used the GAM for the central part of the Gulf Coast aquifer (see GAM run 05-04) to determine water-level differences in Goliad County for selected years in the predictive period, comparing scenarios with and without the LGWSP and the City of Victoria well fields. We ran the model for the period 2000 through 2060 using pumping in Goliad County adjusted to match data to 2004 pumpage estimates provided by Mr. Dohmann (see GAM runs 03-01 and 05-14) and pumping estimates for the LGWSP and the City of Victoria well fields that HDR developed for the South Central Texas Regional Water Plan (Figure 1). We based pumping rates in the rest of the model on an analysis that compared demands from the 2002 State Water Plan to Texas Water Development Board-approved demands for the 2006 regional water plans.

We determined the impacts of LGWSP and the City of Victoria well field in the years 2022 and 2027. The year 2022 has the highest pumping rates in the LGWSP and City of Victoria well field, whereas the year 2027 has relatively low pumping rates in both projects. This pumping decrease allowed us to investigate recovery of water levels following peak pumping in 2022 (Figure 1). In addition we determined water-level differences between the scenario that includes the LGWSP and City of Victoria well fields and the scenario that does not include these projects.

PARAMETERS AND ASSUMPTIONS:

- See Waterstone and Parsons (2003) and Chowdhury and others (2004) for assumptions and limitations of the GAM. Root mean squared error for the entire central Gulf Coast aquifer model is up to 51 feet (See GAM run 05-04).

- We used a variation of the GAM that assumes pumping in the Evangeline aquifer occurs throughout the entire thickness of the Evangeline aquifer (See GAM run 05-04).
- Model results reflect average recharge rates throughout the most of the predictive period (2000 through 2060), except 2017 through 2022 which is characterized by drought-of-record recharge.
- Baseline pumpage in Goliad County was initially calculated using an analysis that compared demands from the 2002 State Water Plan to Texas Water Development Board-approved demands for the 2006 regional water plans. Pumpage in 2004 was adjusted from this initial dataset to match data provided by Mr. Dohmann for 2004. The annual percentages per pumpage category to meet the target pumpage in 2004 were then applied to the remainder of the baseline pumpage dataset. This approach assumes the trends from the baseline pumpage dataset used, which does not account for annual variations in pumpage due to climate and other factors, was suitable.

RESULTS:

Water-level differences between pumping scenarios with and without the LGWSP and City of Victoria well fields in Goliad and surrounding counties are reported in Figures 2 through 5 for each of the four layers in the model. In the Chicot aquifer, Burkeville confining unit, and Jasper aquifer the impact of the LGWSP and City of Victoria well fields is negligible with water-level differences less than 20 feet in both 2022 and 2027 (Figures 2, 4, and 5). In 2022 when pumping from LGWSP and the City of Victoria wells are at a maximum, water levels decline up to 100 feet in the Evangeline aquifer in Goliad County (Figure 3). By 2027 when pumping from LGWSP and the City of Victoria wells are at a minimum, water-level declines are less than 20 feet (Figure 3). This suggests that the Evangeline aquifer recovers rapidly when combined pumping rates in the LGWSP and City of Victoria well fields are reduced from about 70,000 acre-feet per year in 2022 to about 5,000 acre-feet per year in 2027 (Figures 1 and 3).

REFERENCES:

- Chowdhury, A. H., Wade, S., Mace, R. E., and Ridgeway, C., 2004, Groundwater availability model of the Central Gulf Coast aquifer system: Numerical simulations through 1999: Texas Water Development Board, draft report, 108 p.
- Waterstone Environmental Hydrology and Engineering, Inc., and Parsons Engineering Science, Inc., 2003, Groundwater availability of the central Gulf Coast aquifer: numerical simulations to 2050 central Gulf Coast, Texas: Prepared for the Texas Water Development Board, unpublished report, 156 p.

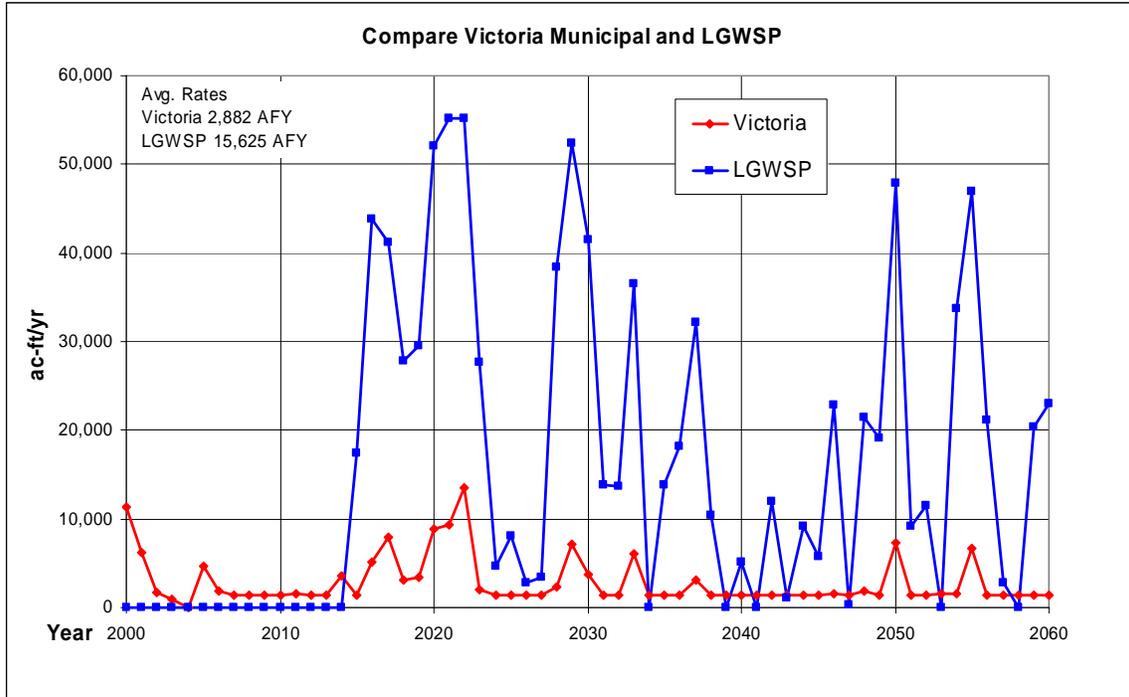
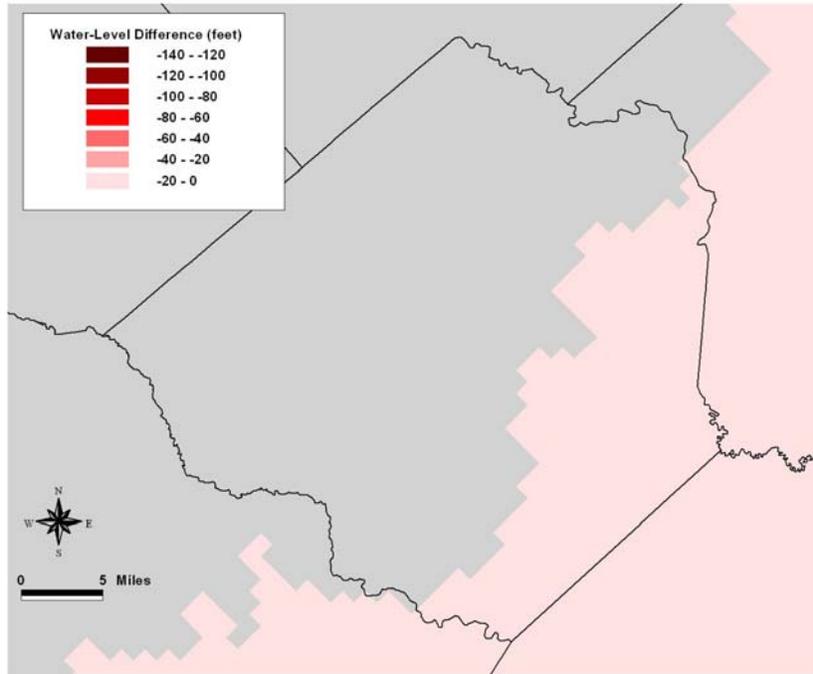
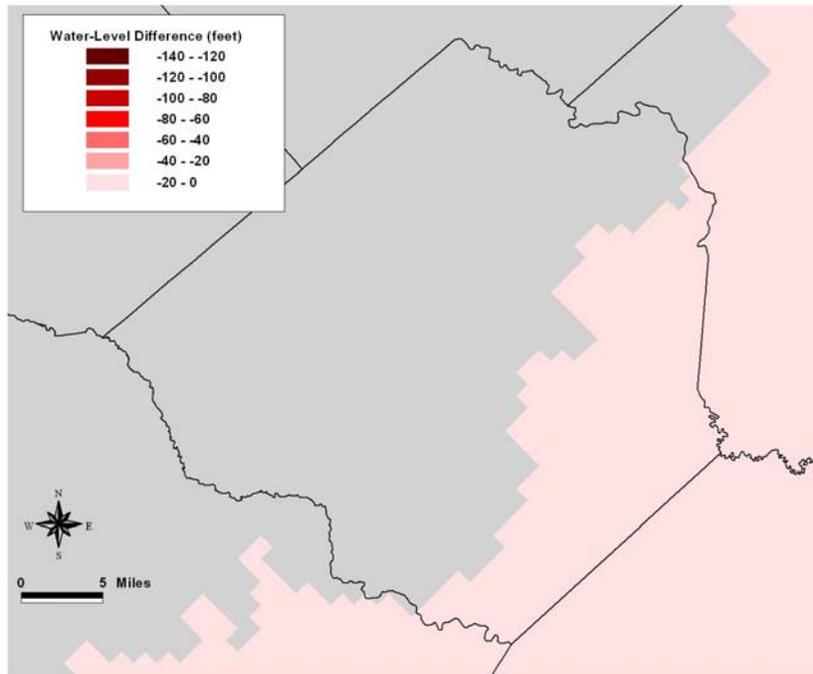


Figure 1. Projected pumping from the Lower Guadalupe Water Supply Project (LGWSP) and City of Victoria well fields as developed by HDR for the South Central Texas Regional Water Planning Group.

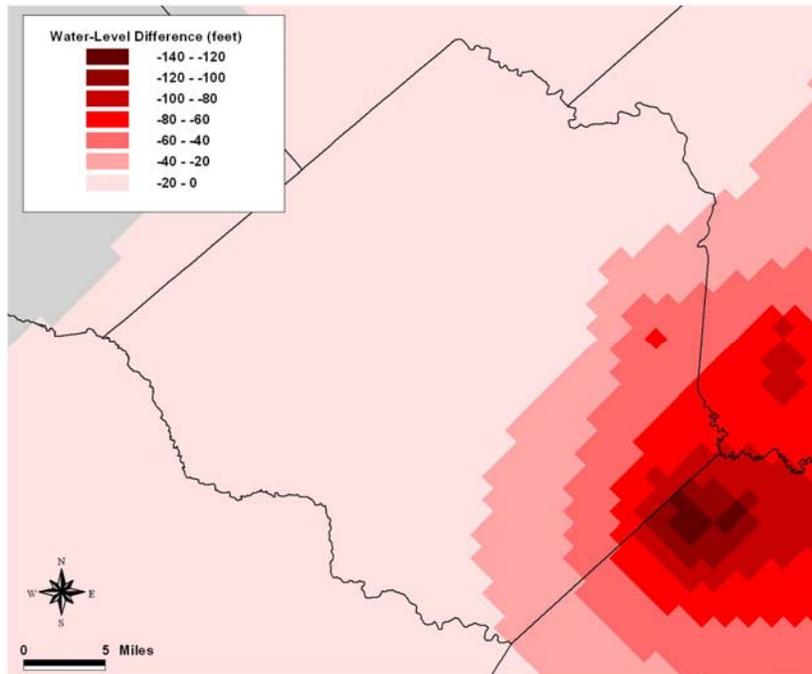


Chicot aquifer: 2022

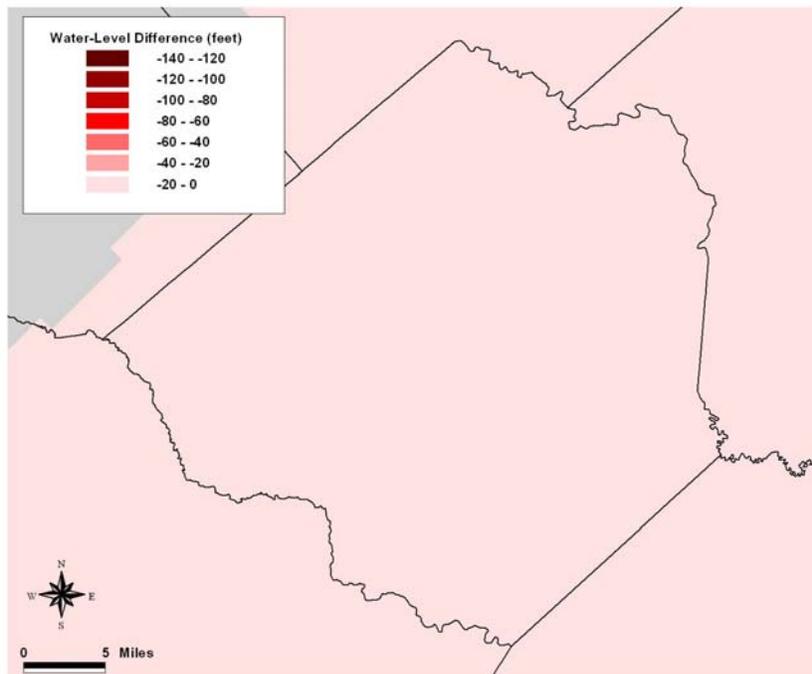


Chicot aquifer: 2027

Figure 2. Water-level differences in the Chicot aquifer between pumping scenarios with and without the Lower Guadalupe Water Supply Project and the City of Victoria well fields.

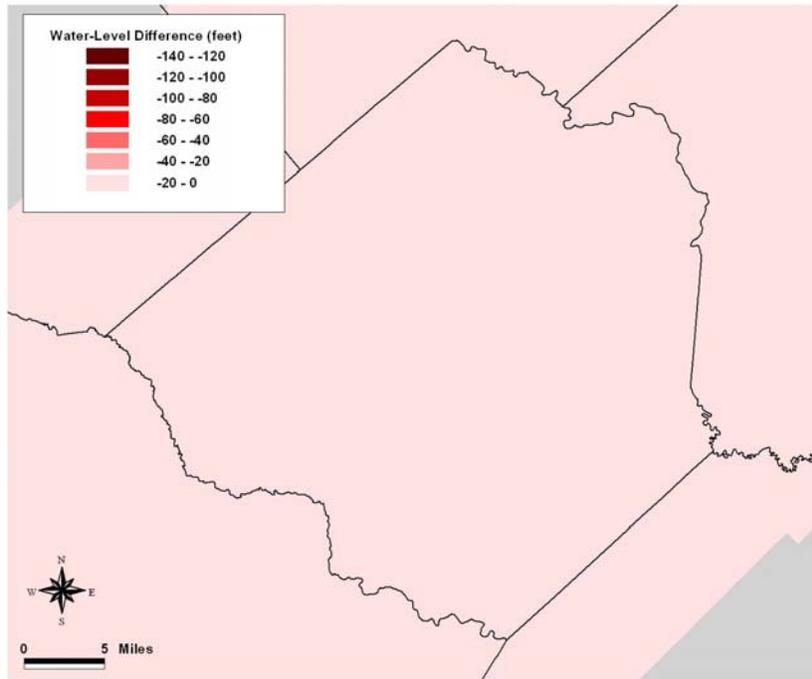


Evangeline aquifer: 2022

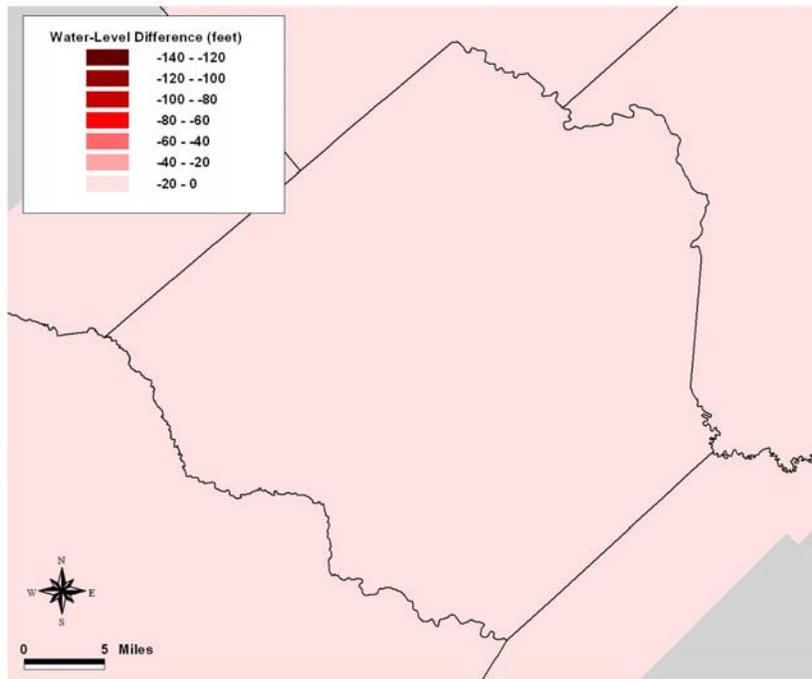


Evangeline aquifer: 2027

Figure 3. Water-level differences in the Evangeline aquifer between pumping scenarios with and without the Lower Guadalupe Water Supply Project and the City of Victoria well fields.

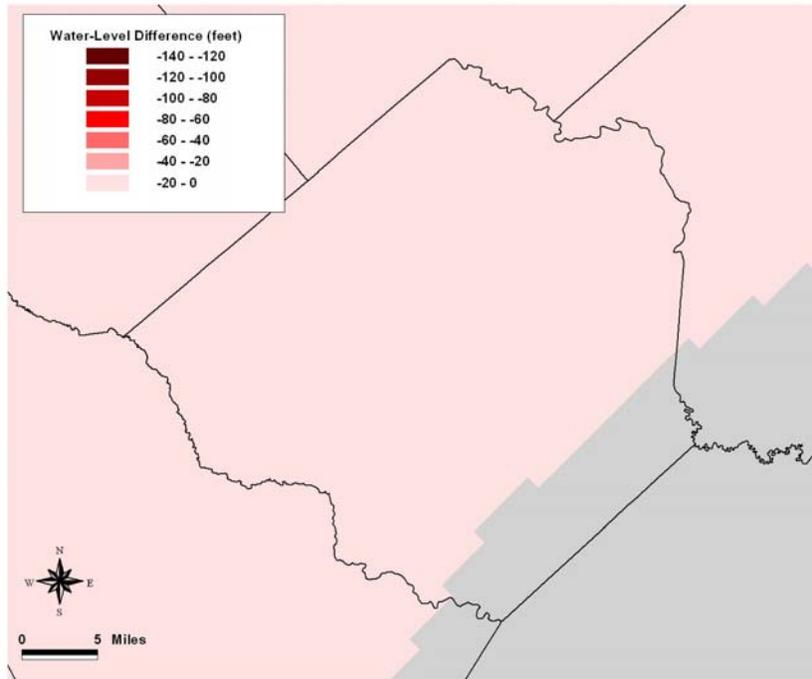


Burkeville confining unit: 2022

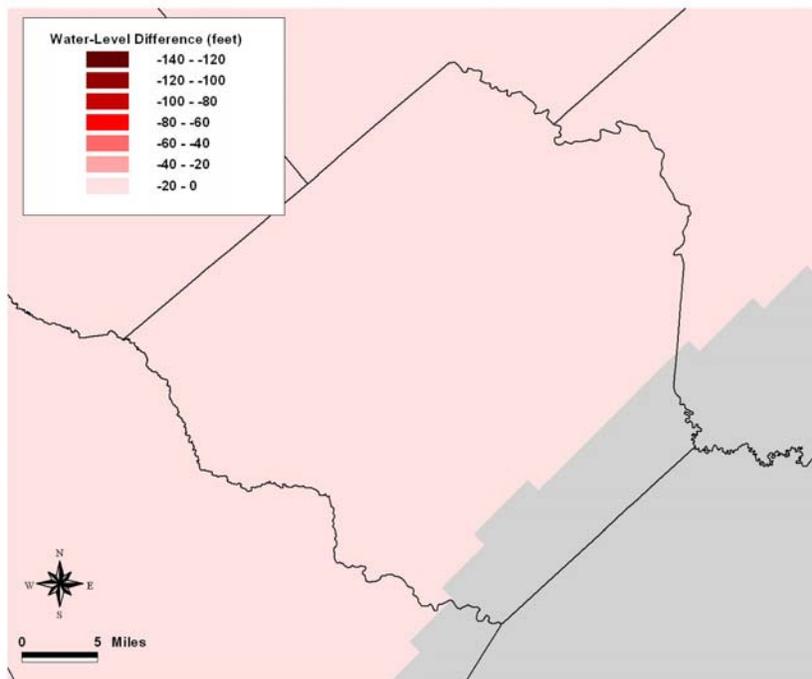


Burkeville confining unit: 2027

Figure 4. Water-level differences in the Burkeville confining unit between pumping scenarios with and without the Lower Guadalupe Water Supply Project and the City of Victoria well fields.



Jasper aquifer: 2022



Jasper aquifer: 2027

Figure 5. Water-level differences in the Jasper aquifer between pumping scenarios with and without the Lower Guadalupe Water Supply Project and the City of Victoria well fields.