

Goliad County Groundwater Conservation District has taken exception to GAM Run 03-01 because it uses the assumption that pumping in the Evangeline aquifer only occurs in the upper part of the Evangeline Aquifer.

GAM Run 03-01

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Texas Water Development Board
Groundwater Availability Modeling Section
(512) 936-2415
May 20, 2005

REQUESTOR:

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

DESCRIPTION OF REQUEST:

A baseline run of the central part of the Gulf Coast aquifer Groundwater Availability Model (GAM) using pumping projections for Goliad County provided by Mr. Dohmann with normal recharge during the 60-year simulation.

METHODS:

We used the GAM for the central part of the Gulf Coast aquifer (Chowdhury and others, 2004) to determine the water levels in Goliad County for selected years in the predictive period (2000 through 2060). We ran the model for the period 2000 through 2060 under average recharge conditions. We adjusted an existing predictive pumpage dataset to match the pumpage values provided by Mr. Dohmann for Goliad County in 2005. We distributed the pumpage values to well locations supplied by Mr. Dohmann for all categories except Rural Domestic, Livestock (part), and Mining (oil and gas operations). Rural Domestic and Livestock pumpage were distributed to previously established model cells and layers using standard population and land-use techniques. Large capacity Livestock users were assigned to specific well locations provided by Mr. Dohmann. No information on the locations of oil and gas operations was available, so the pumpage for Mining was distributed broadly across the county in rural areas. We then applied the same ratios to the pumpage values in Goliad County for all remaining years of the predictive period. For the model area outside of Goliad County, we used pumpage estimates based on an analysis that compared the 2002 State Water plan demands to the Board approved demands for the 2006 regional water plans.

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 part of the Gulf Coast aquifer model is up to 46 feet (Chowdhury and others, 2004).
- We used average recharge conditions for this model simulation.

- We used drains to simulate wetlands that occur throughout the Gulf Coast region. In the model, groundwater discharges only when water levels rise above specified drain elevations.
- The four layers in the model represent the Chicot aquifer, Evangeline aquifer, Burkeville confining unit, and the Jasper aquifer, respectively.
- The pumping scenario used in this model does not include the Lower Guadalupe Water Supply Project (LGWSP).
- The GAM assumes that pumping in the Evangeline aquifer only occurs in the upper part of the Evangeline aquifer (see http://www.twdb.state.tx.us/gam/glfc_c/glfc_c_TWDB_SummaryReport.pdf for additional information).
- The pumpage in the surrounding counties are estimates and assumes the pumpage categories, spatial locations, and vertical assignments per aquifer layer, as were assigned from the 2002 State Water Plan data, are reasonable. Using 4,304 acre-feet of pumpage in 2005 as the target year in Goliad County, pumpage was reduced to 87 percent of this value in 2000 (3,745 acre-feet) and gradually increased up to 1.55 percent in 2060 (6,671 acre-feet).

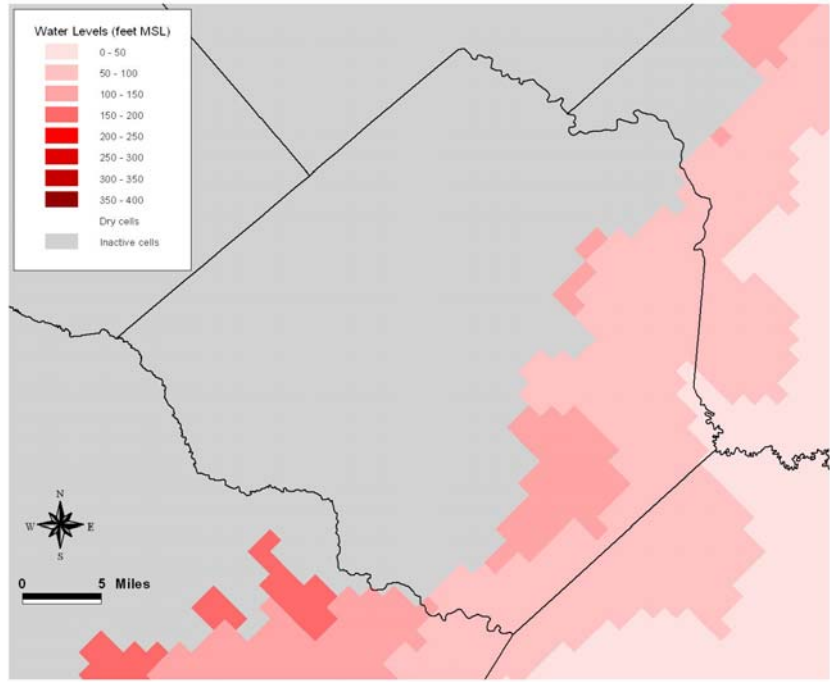
RESULTS:

Simulated water levels for each of the four model layers in Goliad County are reported for the years 2000, 2005, 2010, 2020, 2030, 2040, 2050, and 2060 (Figures 1 through 4). Water levels in the Chicot aquifer appear to rise and recover slightly in southeast Goliad County from 2000 to 2005 then water levels stabilize for the remainder of the simulation through 2060. Water levels in the Evangeline aquifer appear to rise and recover slightly throughout Goliad County from 2000 to 2005 then water levels stabilize for the rest of the simulation through 2060. Water levels in the Burkeville confining unit decline gradually throughout Goliad County from 2000 to 2060 and begin to show the formation of two small cones of depression in northwest Goliad County. Water levels in the Jasper aquifer rise and recover throughout Goliad County from 2000 to about 2030 and then stabilize for the remainder of the simulation through 2060. Generally, the pumping projections for Goliad County provided by Mr. Dohmann for the 60-year simulation show minimal effects upon water levels in Goliad County under average recharge conditions.

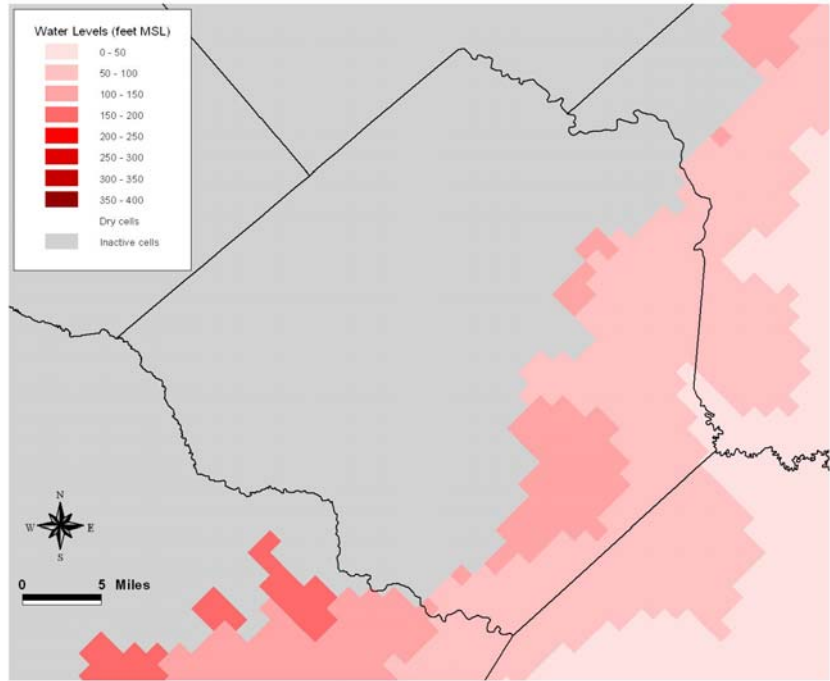
REFERENCES:

- 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.

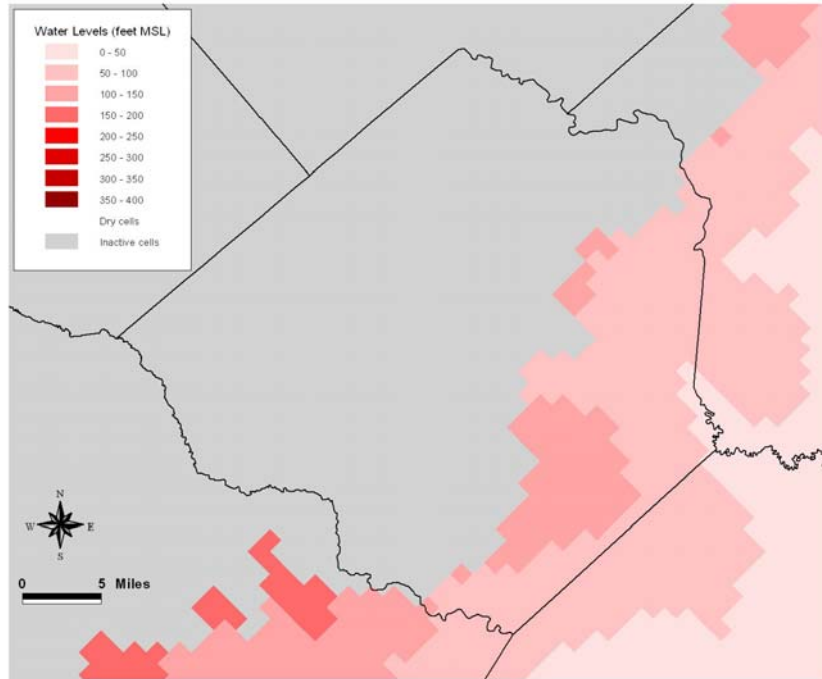


2000

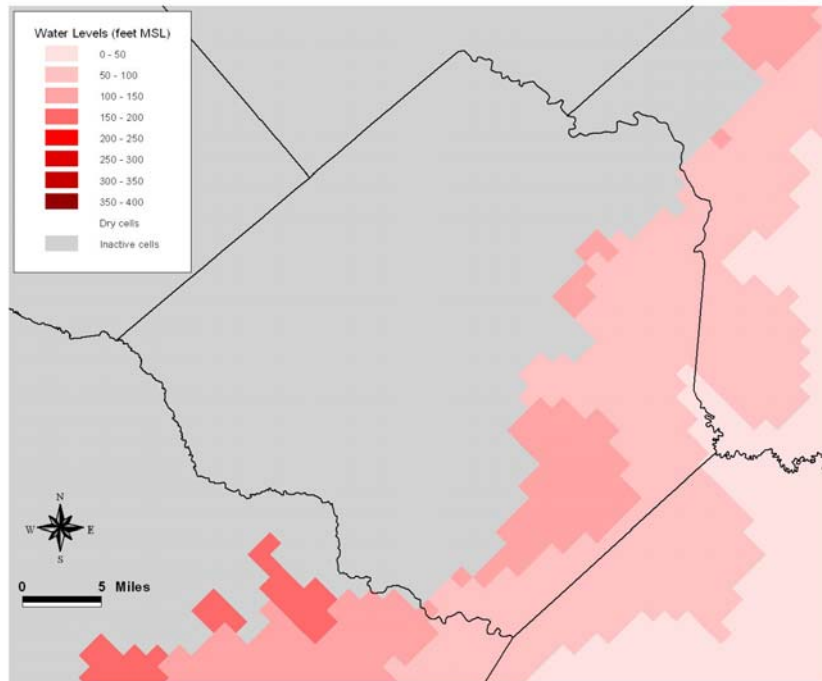


2005

Figure 1. Projected water levels in Goliad and surrounding counties in the Chicot aquifer for the years 2000, 2005, 2010, 2020, 2030, 2040, 2050, and 2060.

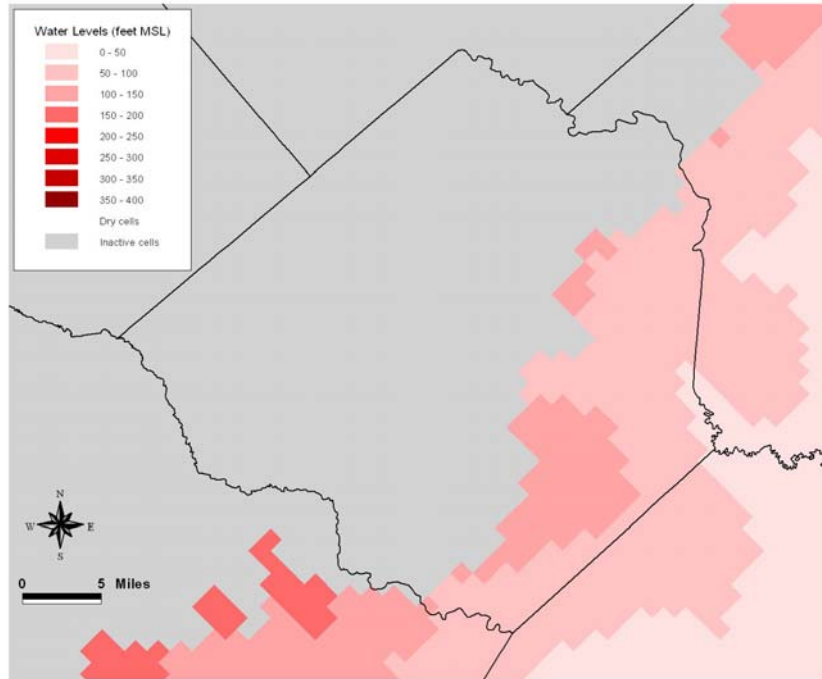


2010

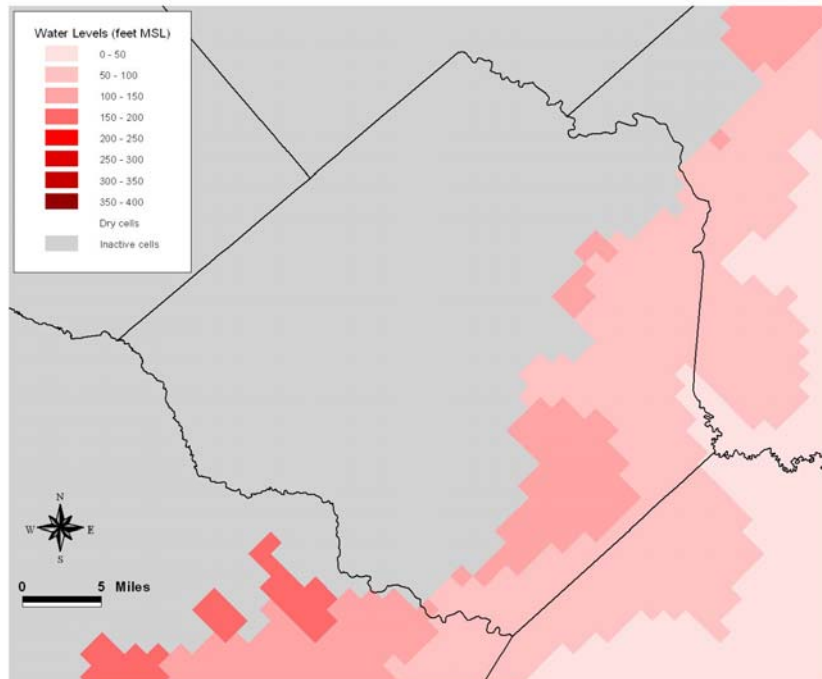


2020

Figure 1. (Continued)

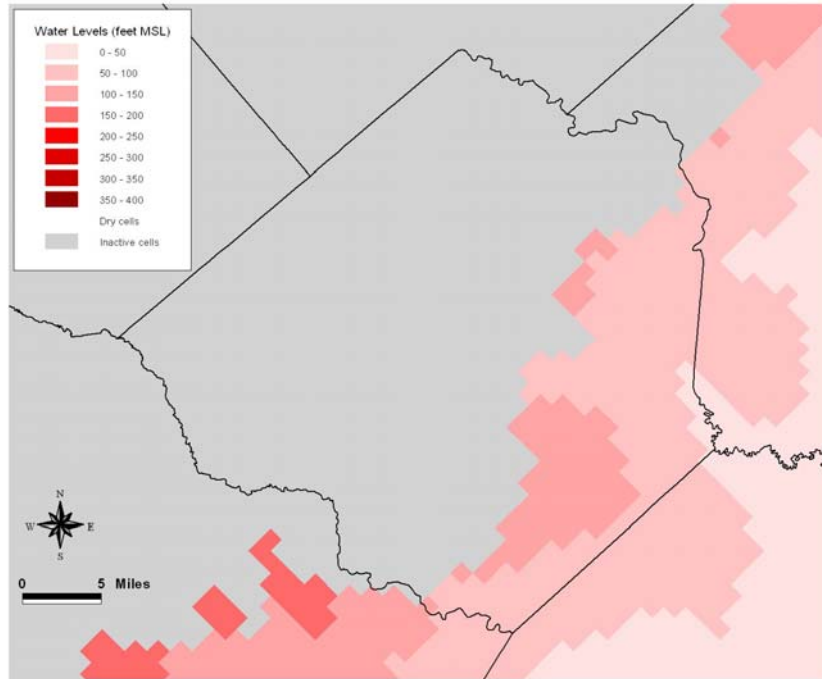


2030

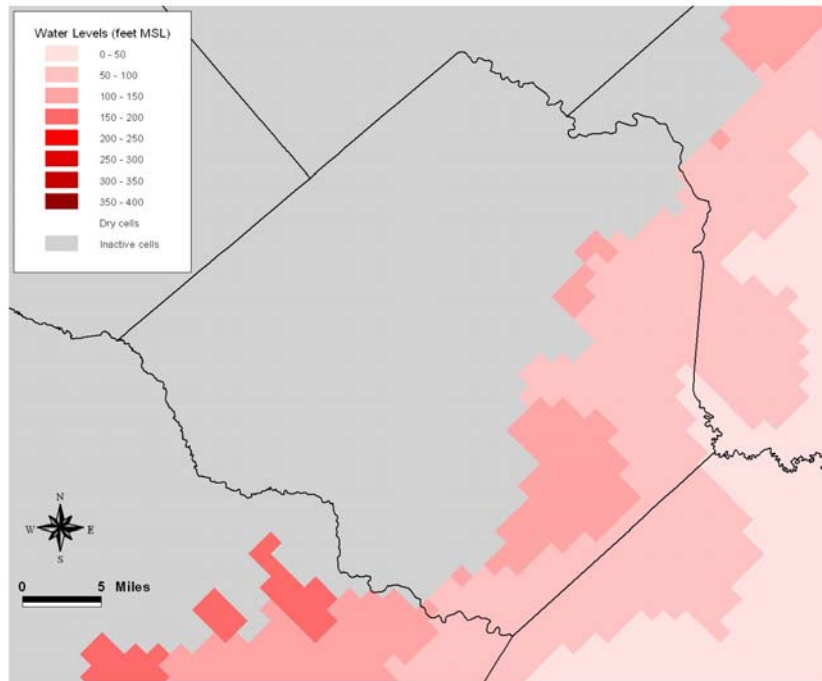


2040

Figure 1. (Continued)

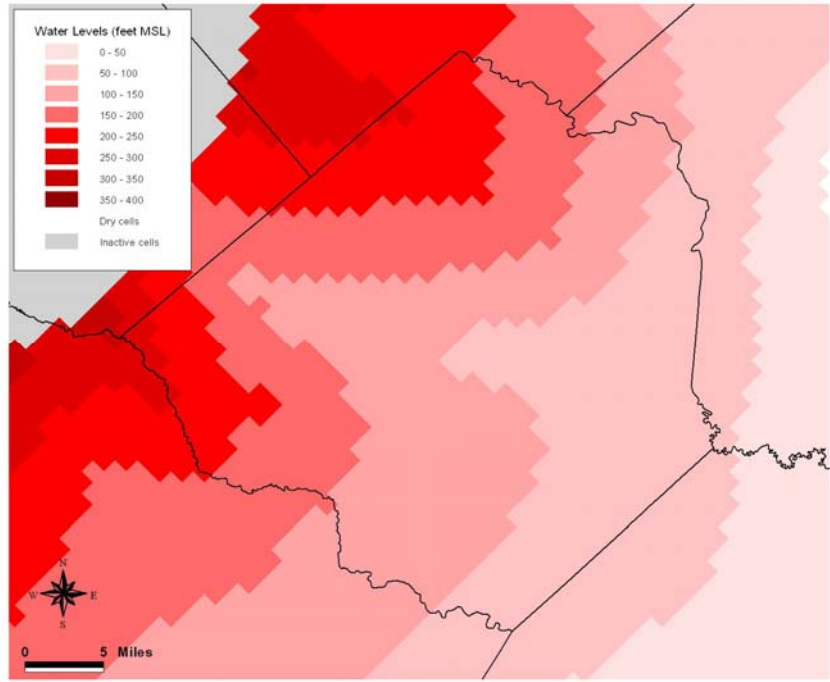


2050

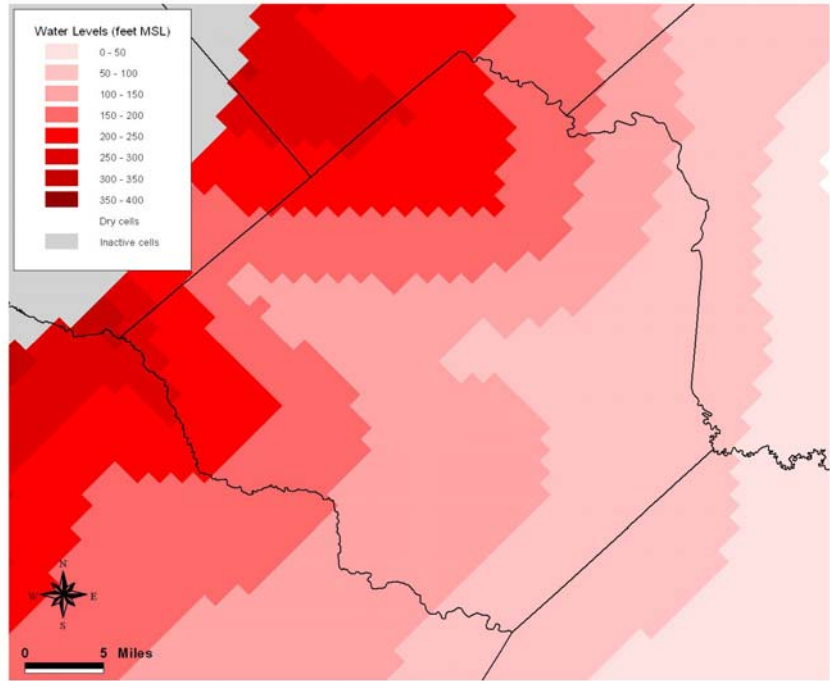


2060

Figure 1. (Continued)

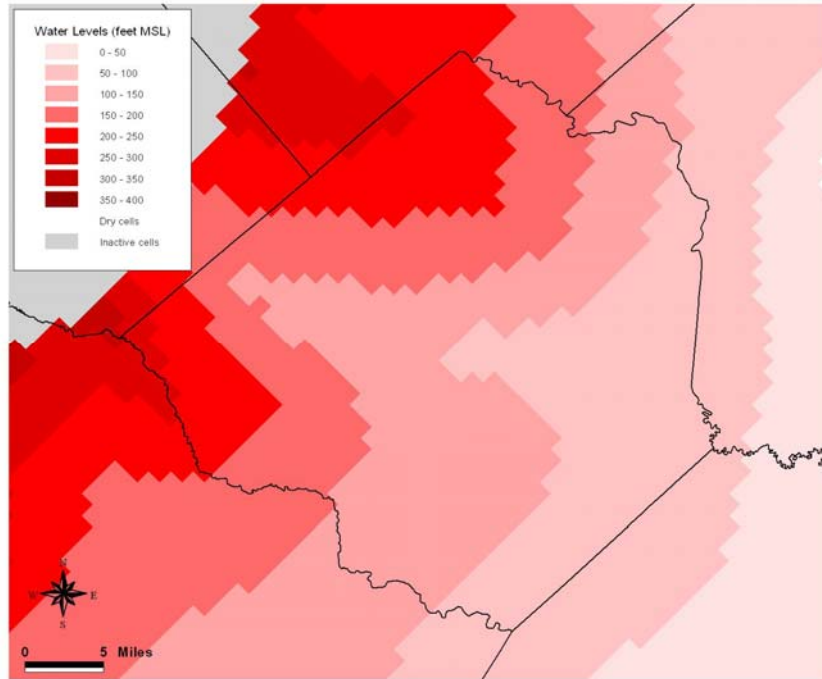


2000

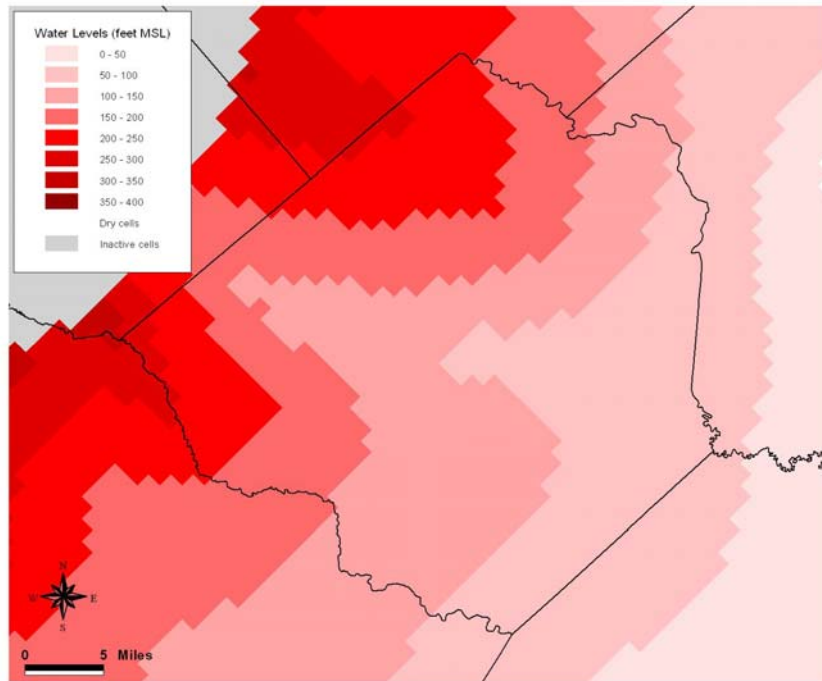


2005

Figure 2. Projected water levels in Goliad and surrounding counties in the Evangeline aquifer for the years 2000, 2005, 2010, 2020, 2030, 2040, 2050, and 2060.

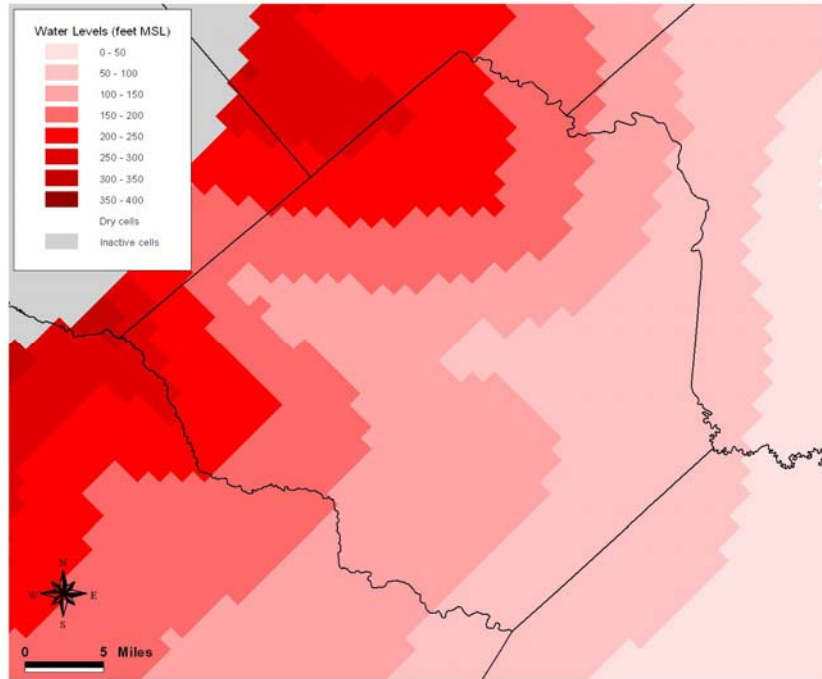


2010

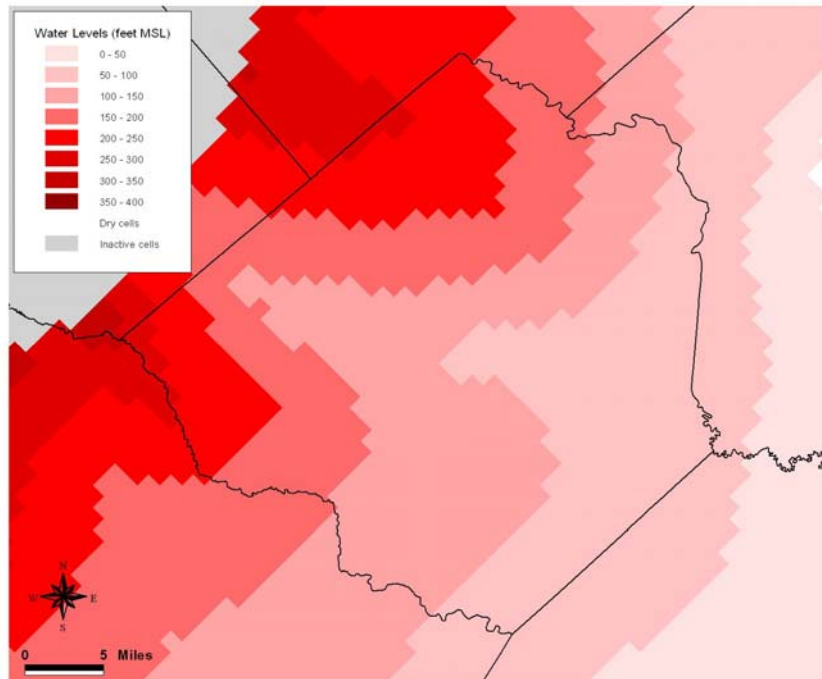


2020

Figure 2. (Continued)

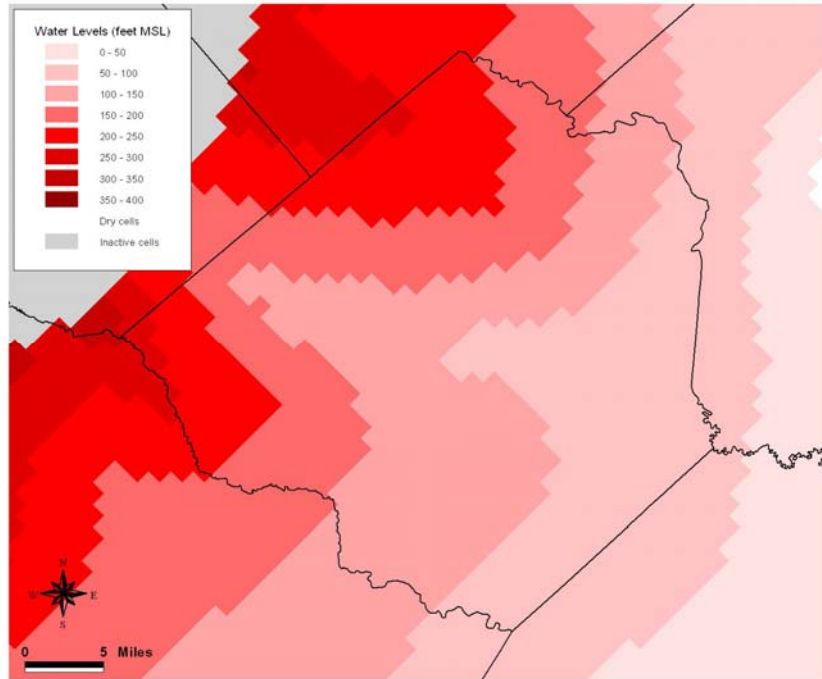


2030

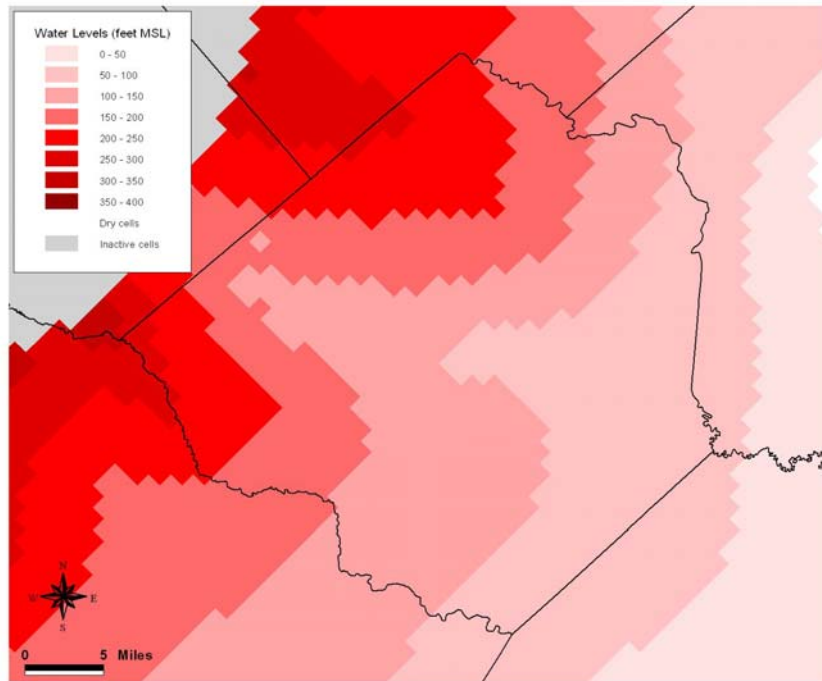


2040

Figure 2. (Continued)

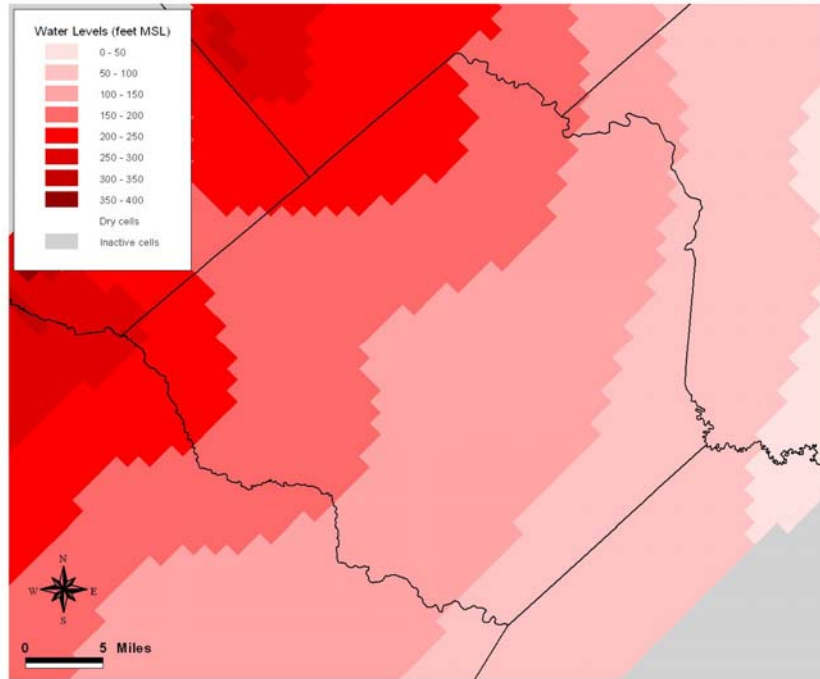


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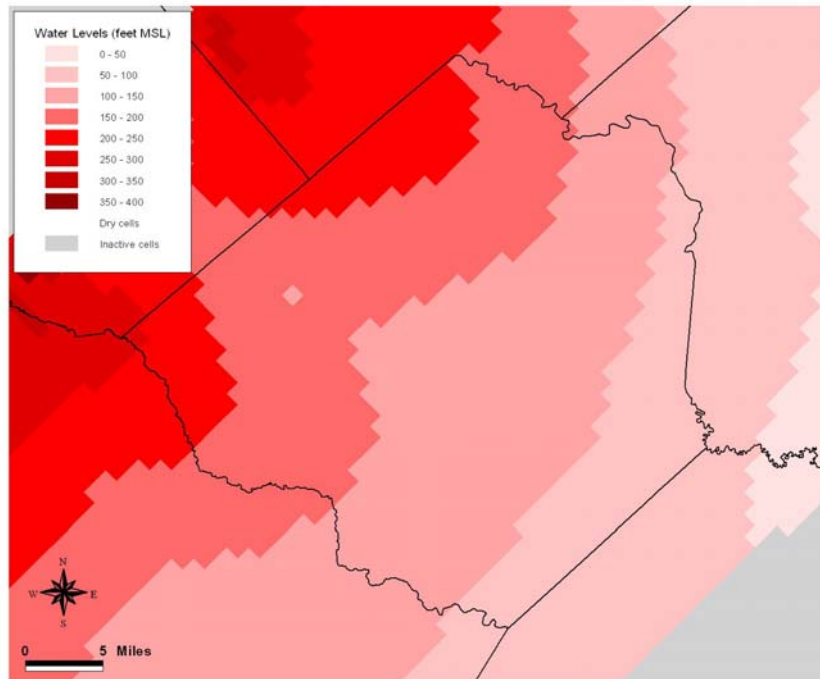


2060

Figure 2. (Continued)

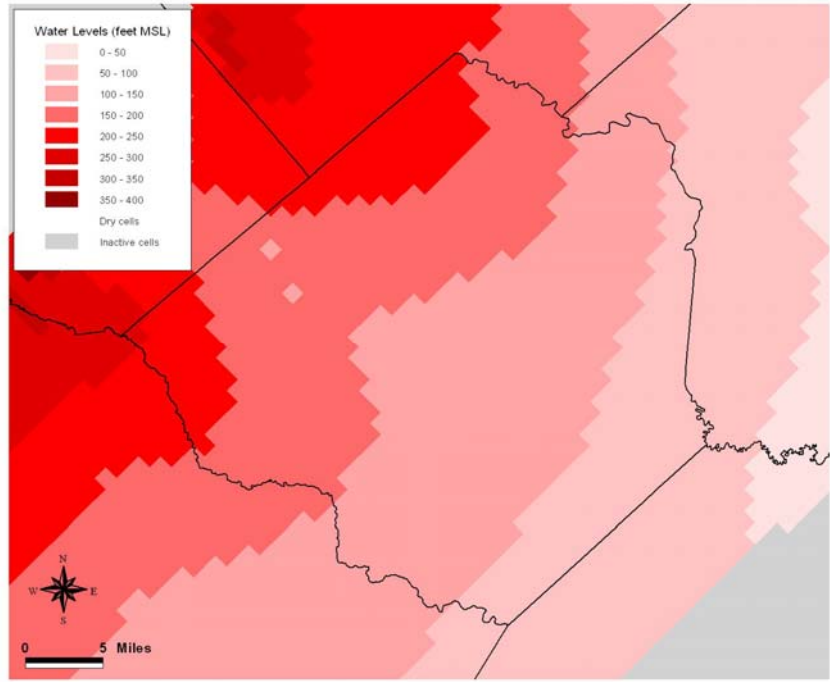


2000

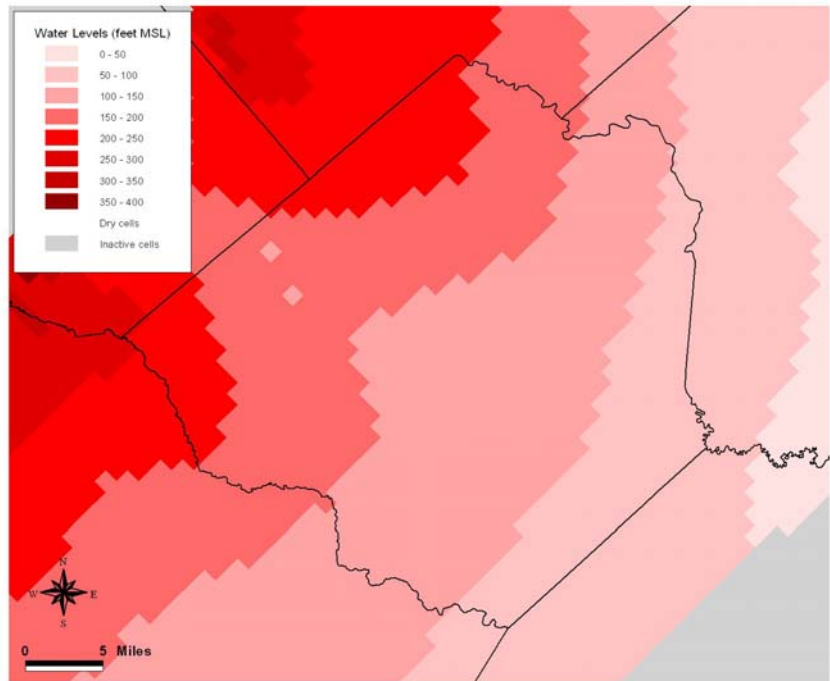


2005

Figure 3. Projected water levels in Goliad and surrounding counties in the Burkeville confining unit for the years 2000, 2005, 2010, 2020, 2030, 2040, 2050, and 2060.

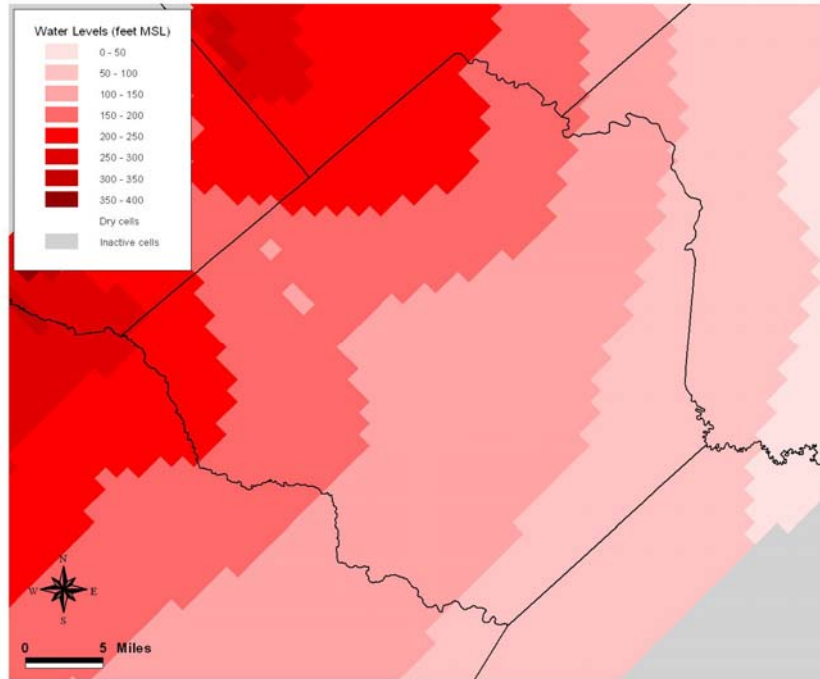


2010

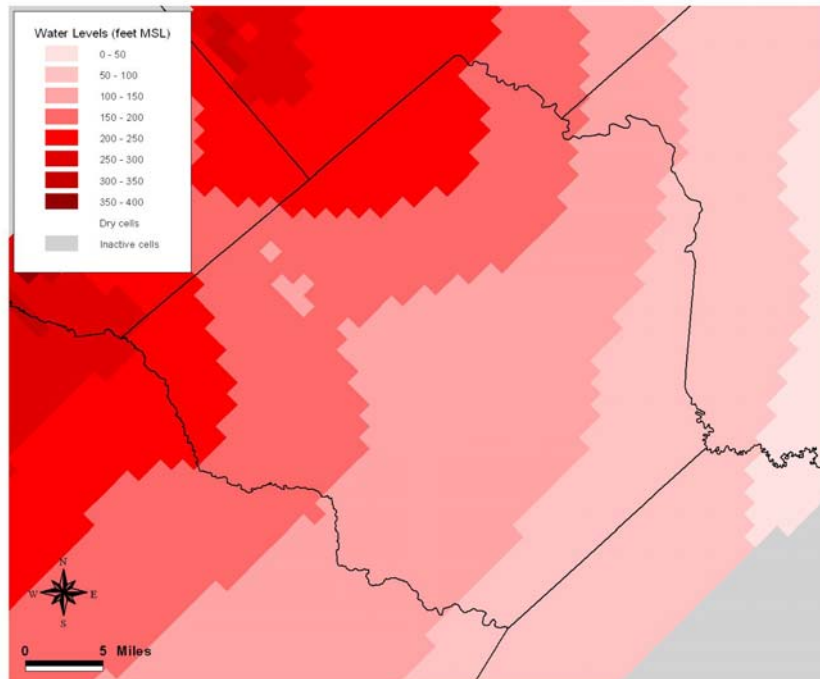


2020

Figure 3. (Continued)

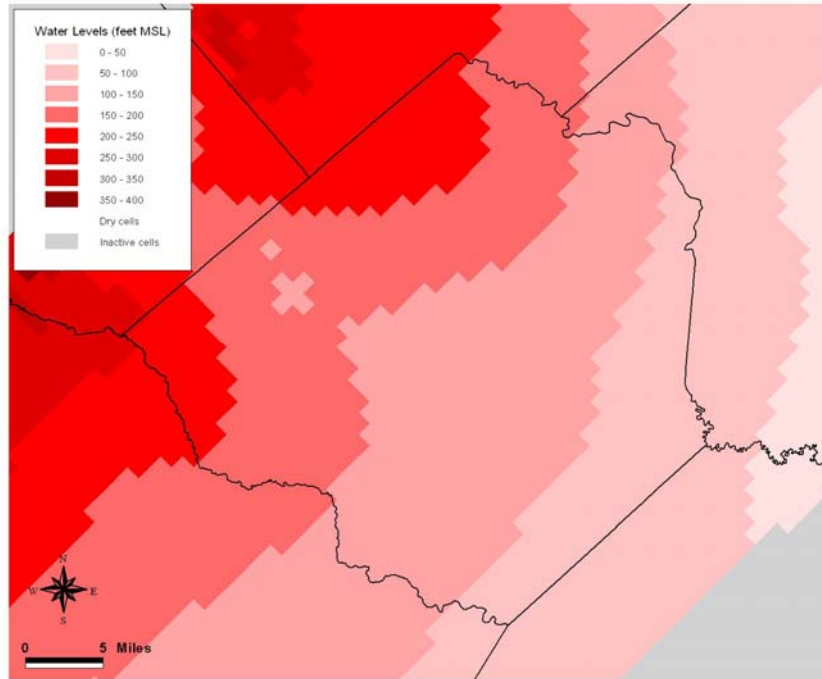


2030

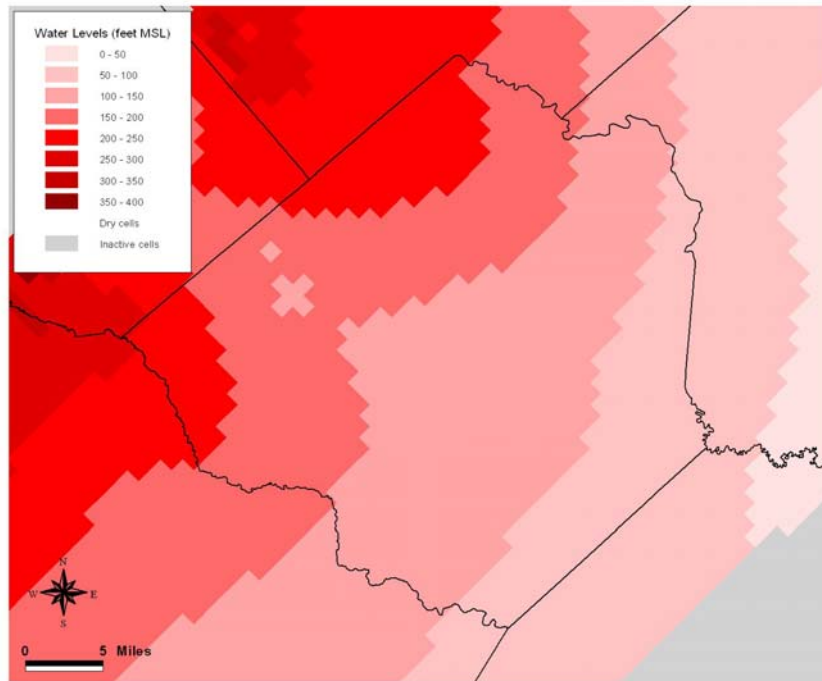


2040

Figure 3. (Continued)

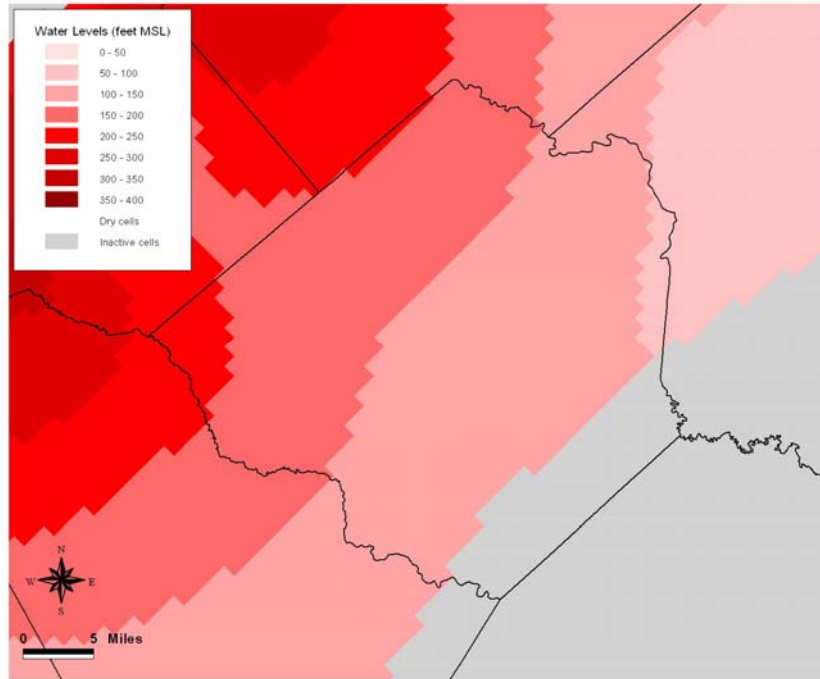


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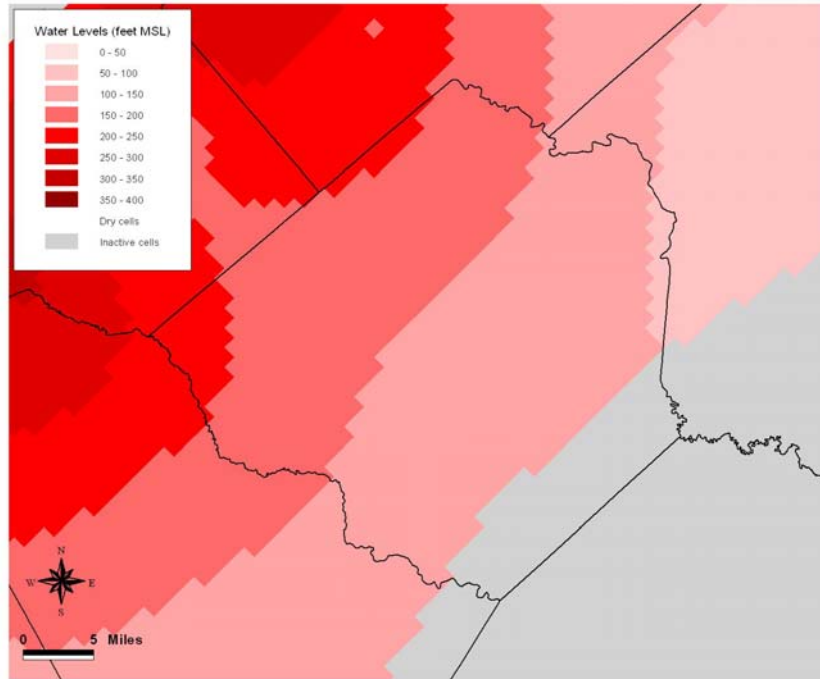


2060

Figure 3. (Continued)

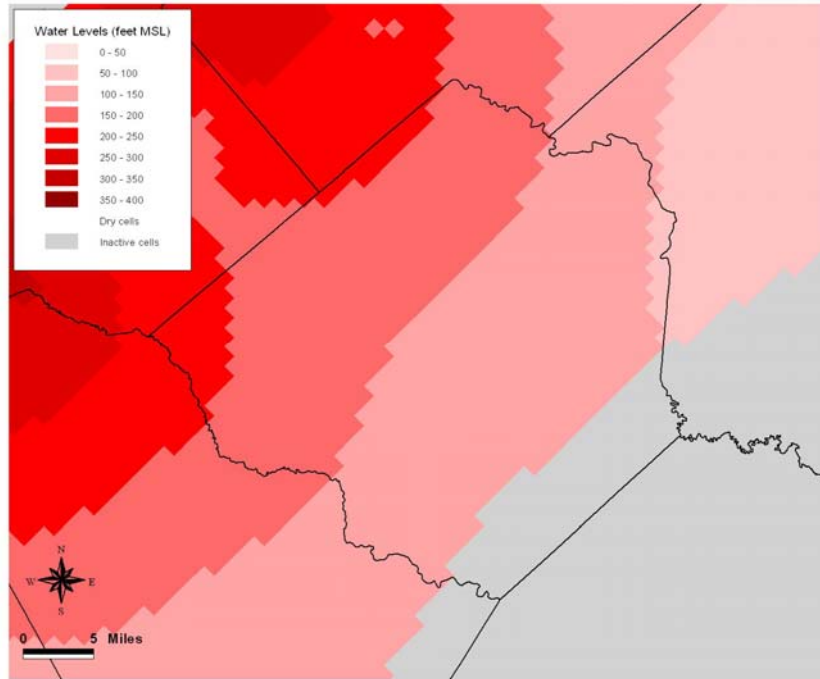


2000

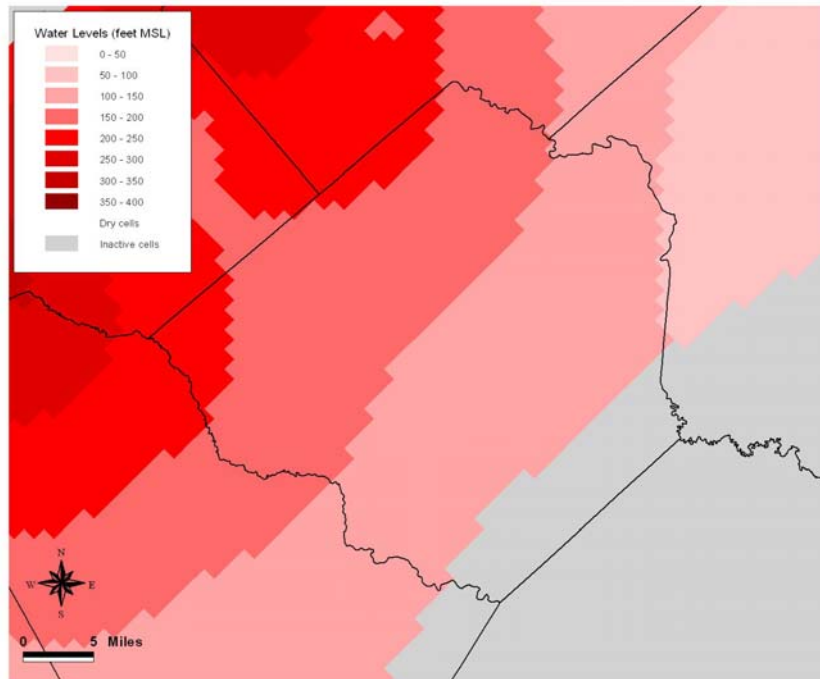


2005

Figure 4. Projected water levels in Goliad and surrounding counties in the Jasper aquifer for the years 2000, 2005, 2010, 2020, 2030, 2040, 2050, and 2060.

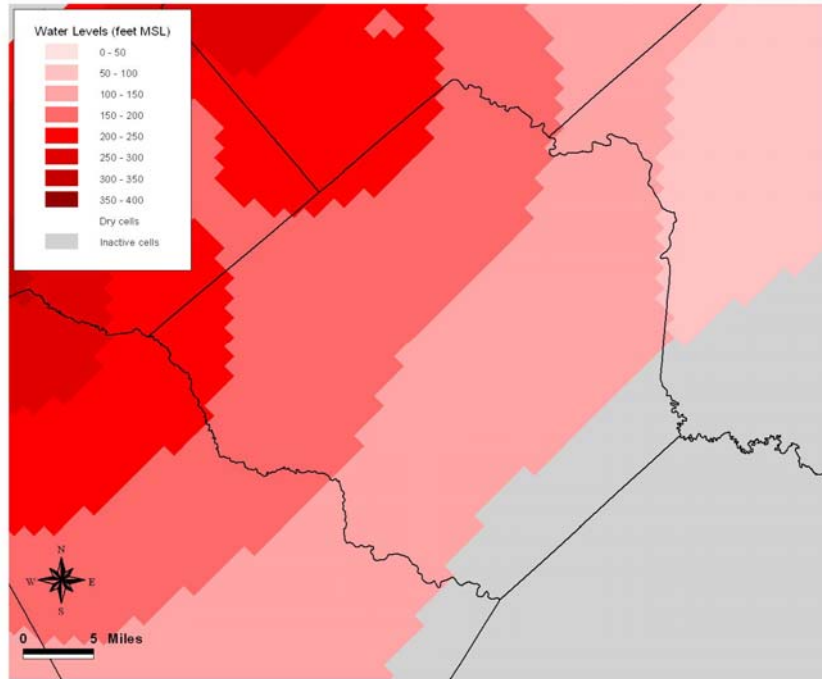


2010

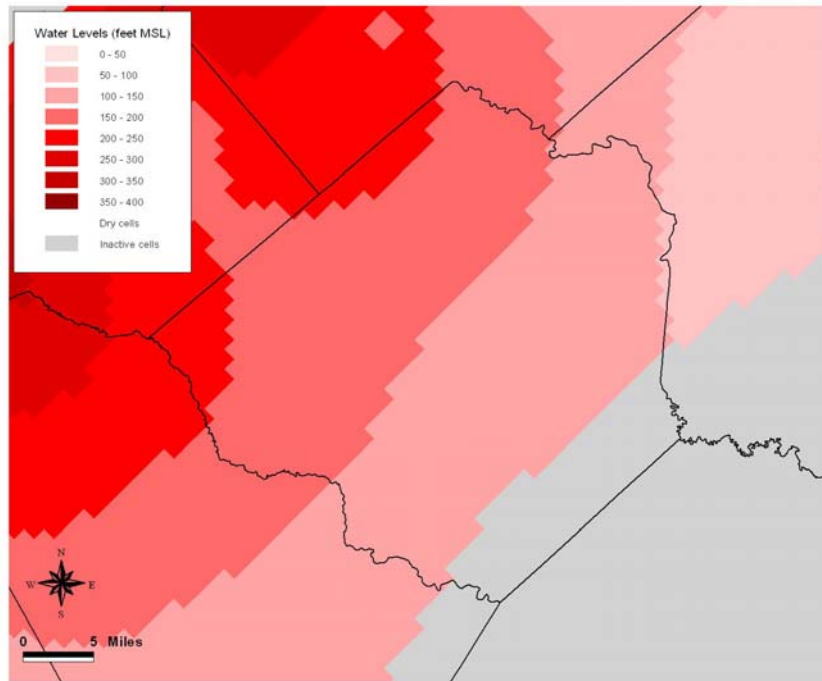


2020

Figure 4. (Continued)

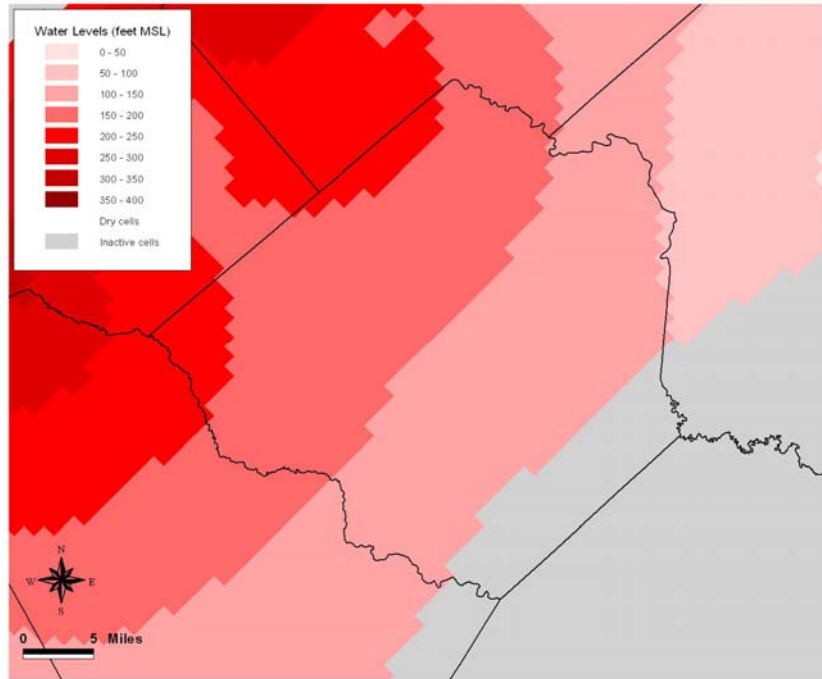


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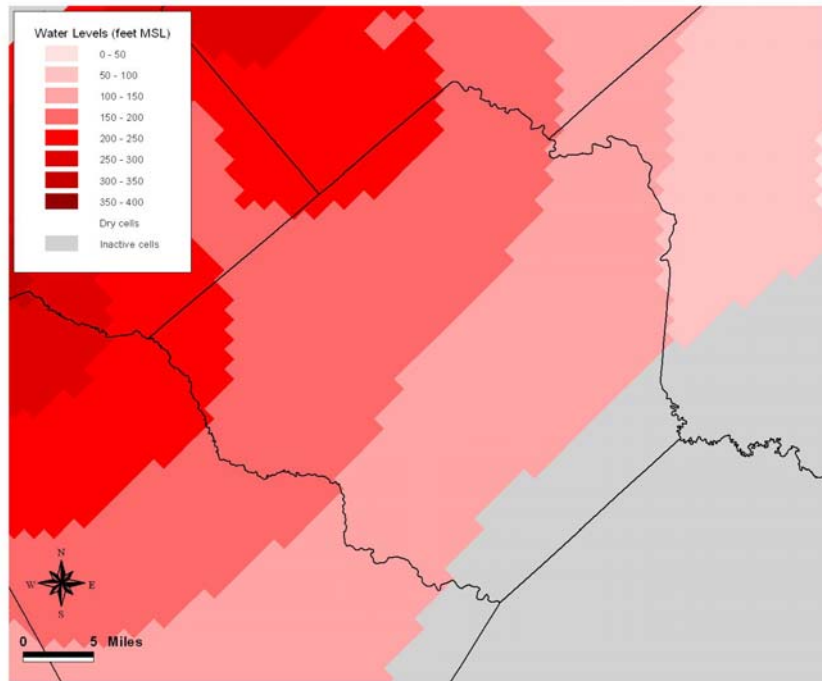


2040

Figure 4. (Continued)



2050



2060

Figure 4. (Continued)