

Goliad County Groundwater Conservation District has taken exception to GAM Run 05-14 because it uses the assumption that pumping in the Evangeline aquifer only occurs in the upper part of the Evangeline Aquifer.

GAM Run 05-14

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Texas Water Development Board
Groundwater Availability Modeling Section
(512) 936-0848
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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 drought-of-record recharge during the last six years of 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 using pumping based on water demand estimates for Goliad County provided by Mr. Dohmann.

We distributed the pumping 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 pumping were distributed to previously established cells and layers using standard population and land-use techniques. Large capacity livestock users were assigned specific well locations by Mr. Dohmann. No information on locations of oil and gas operations was available, so mining pumping was distributed broadly across the county in rural areas.

Using an existing predictive pumping dataset, we adjusted pumping for 2005 in Goliad County to match the values provided by Mr. Dohmann. We then applied the same ratios to all remaining years for Goliad County. We based the pumping rates in the counties outside of Goliad in the remainder of the model 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).

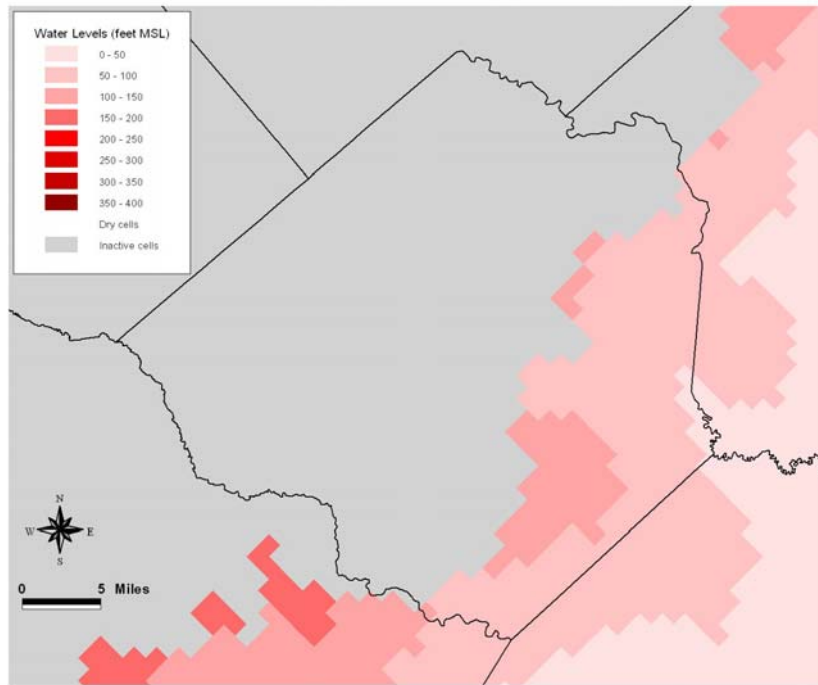
- The pumping scenario used in this model does not include the Lower Guadalupe Water Supply Project (LGWSP). The pumpage in the surrounding counties are estimates and assumes the pumpage categories, spatial locations, and vertical assignments per aquifer layer, as were assigned from the 2002 State Water 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).
- 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).
- Model results reflect average recharge rates throughout the most of the predictive period (2000 through 2054) and drought-of-record recharge during the last six years (2055 through 2060). Stream-flow is calculated by the model.
- We used drains to simulate wetlands that occur throughout the Gulf Coast region. In the model, groundwater discharges only when water levels rise above a set elevation.
- The four layers in the model represent the Chicot aquifer, Evangeline aquifer, Burkeville confining unit, and the Jasper aquifer.

RESULTS:

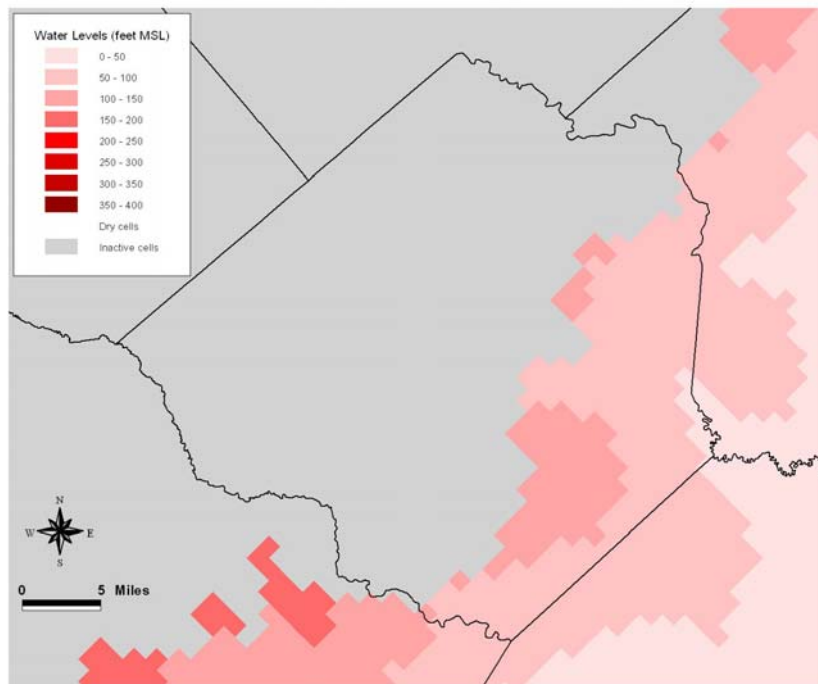
Water levels for the years 2000, 2005, 2010, 2020, 2030, 2040, 2050, and 2060 in Goliad and surrounding counties are reported in Figures 1 through 4 for each of the four layers in the model. The results of this model run indicate that over the 2000 through 2060 predictive period, water-level changes in the four model layers are minimal (Figures 1, 2, 3, and 4). This is especially evident in the Chicot, Evangeline, and Jasper aquifers. The 2055 through 2060 drought-of-record has little impact on water levels. The greatest water-level changes occur in the Burkeville confining unit, especially in northern Goliad County where effects of pumping are apparent (Figure 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.

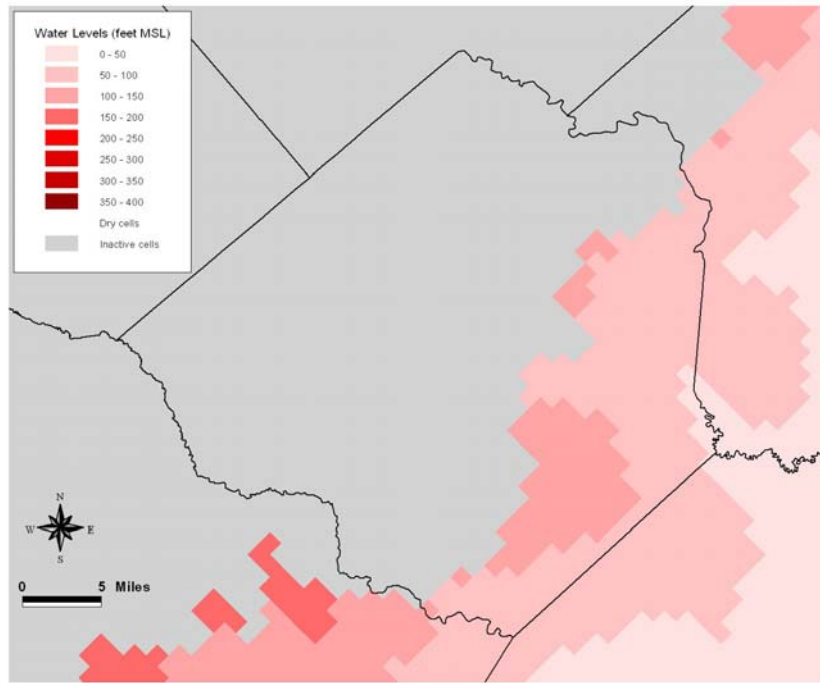


2000

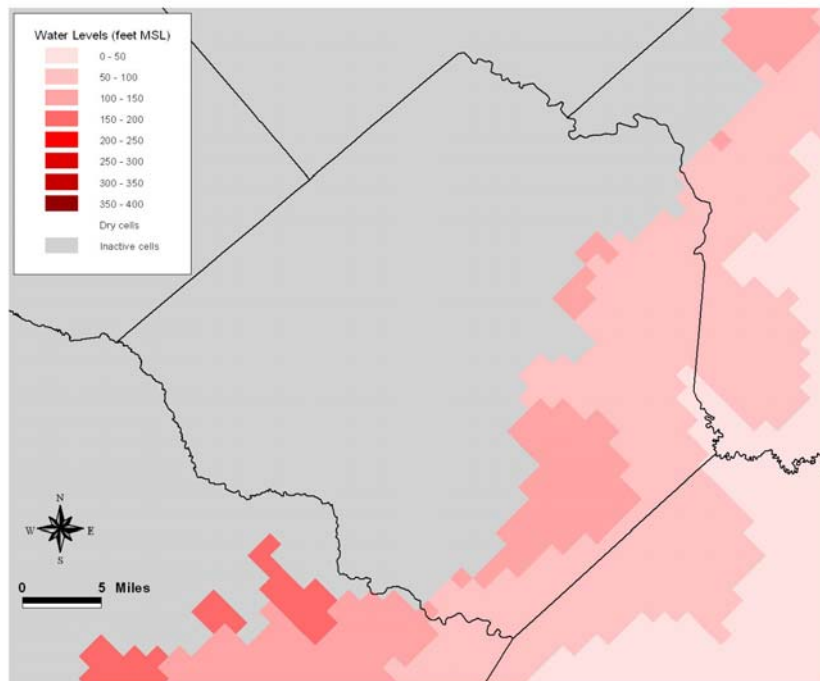


2005

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.

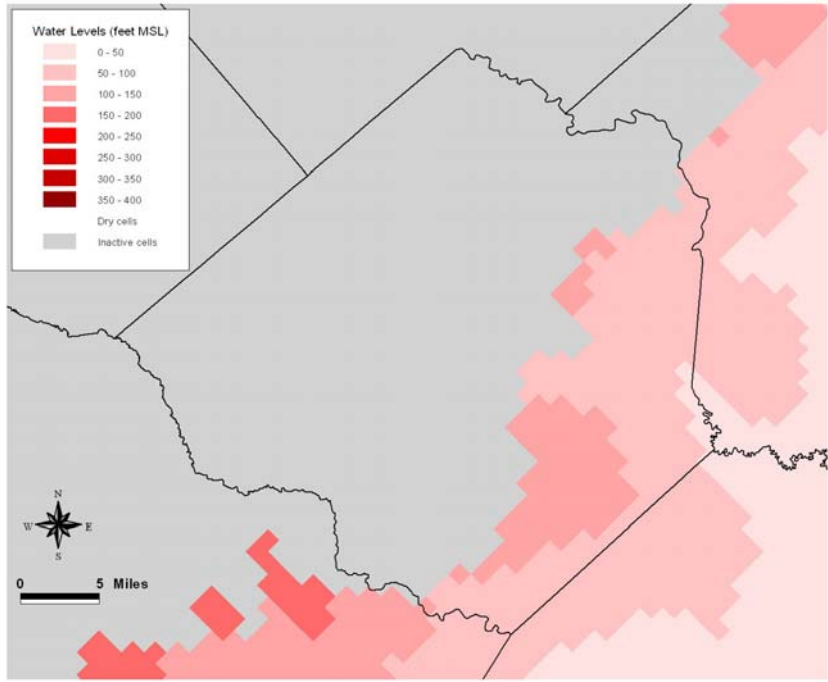


2010

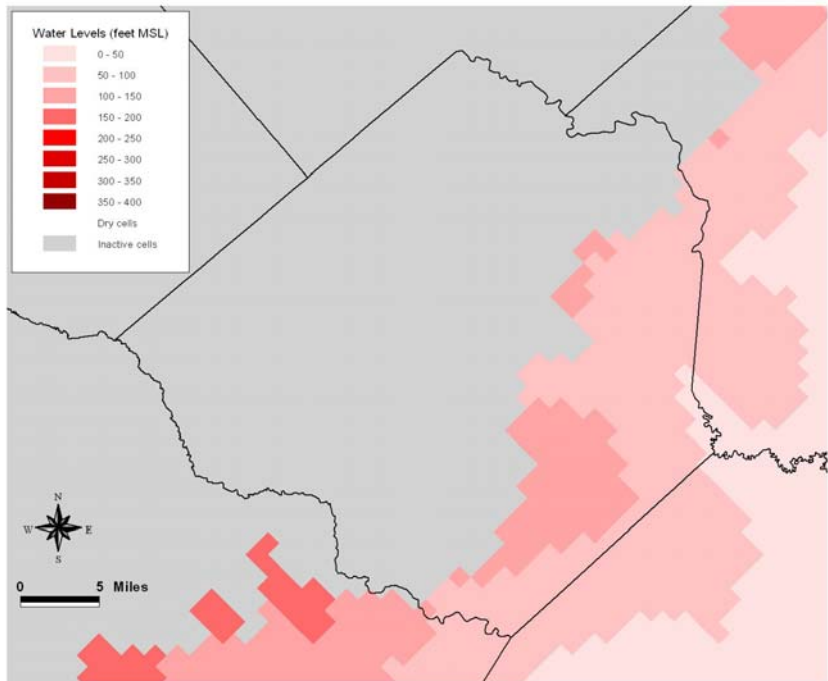


2020

Figure 1. (Continued)

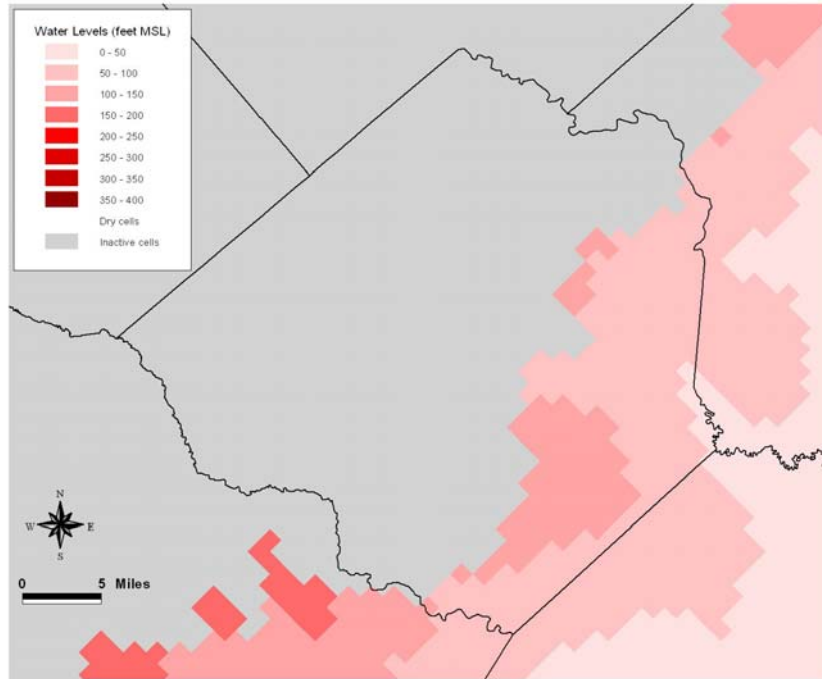


2030

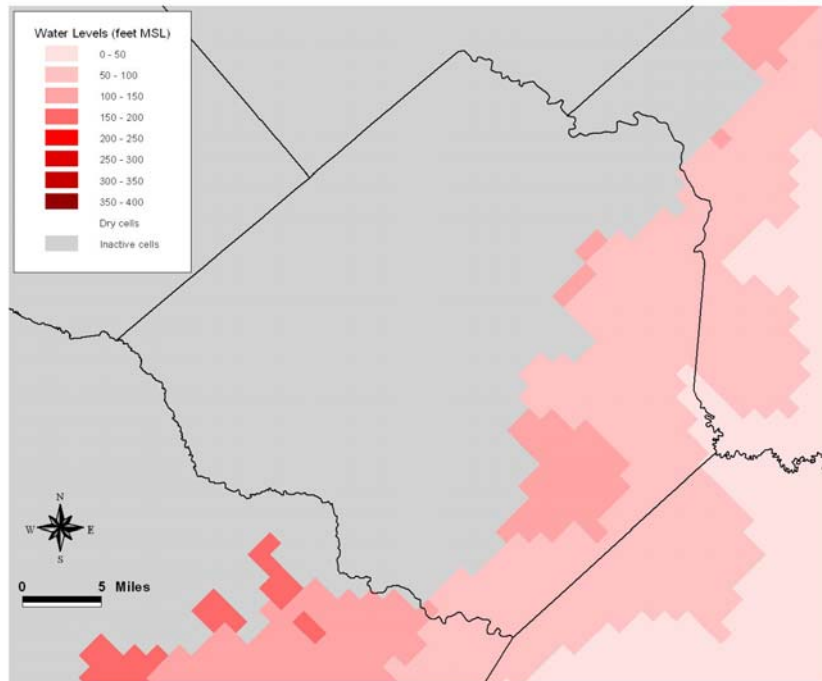


2040

Figure 1. (Continued)

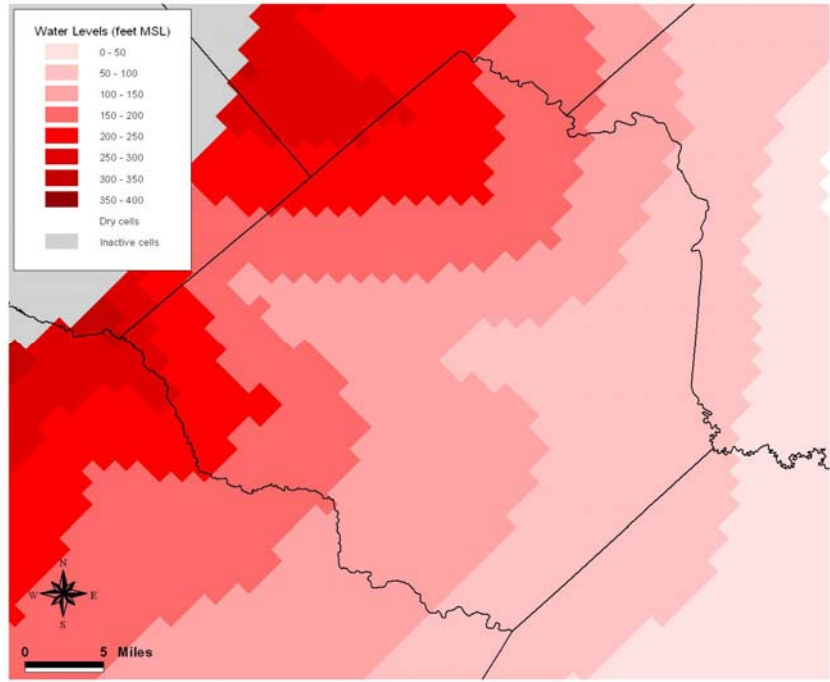


2050

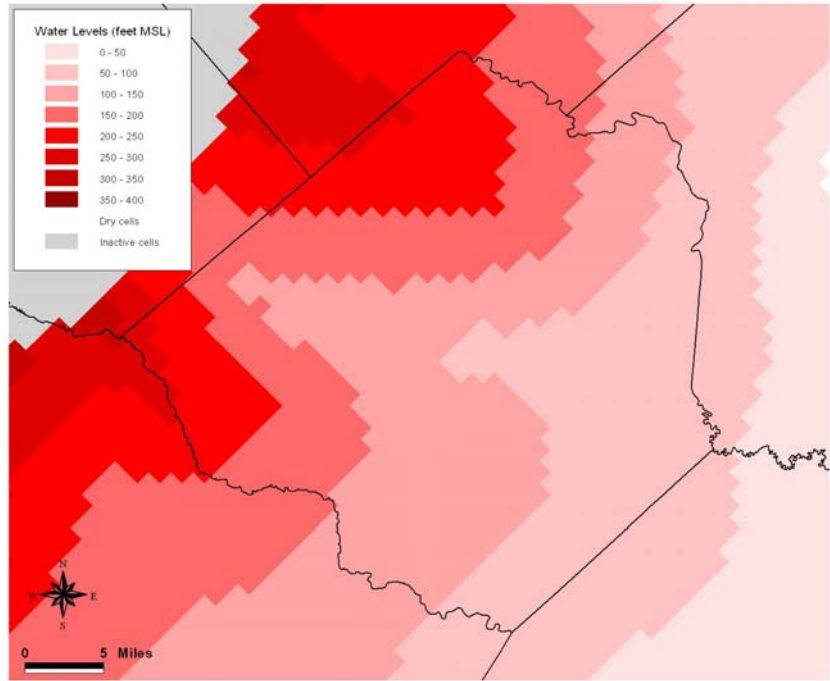


2060

Figure 1. (Continued)

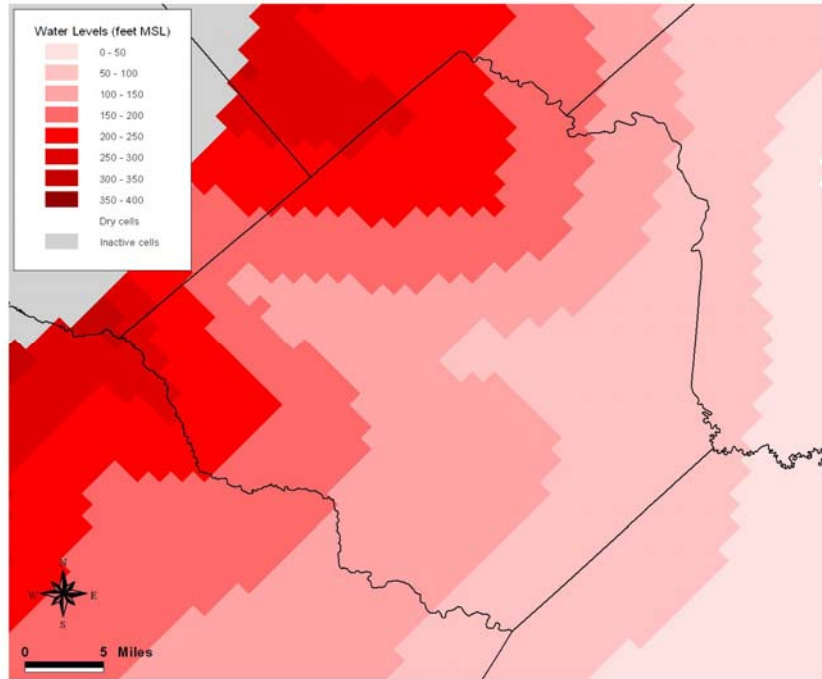


2000

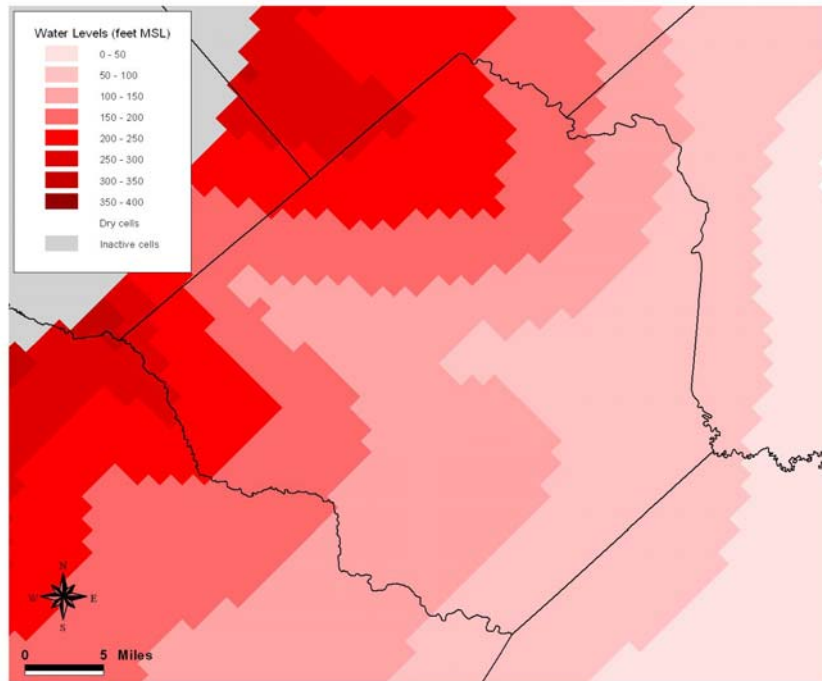


2005

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.

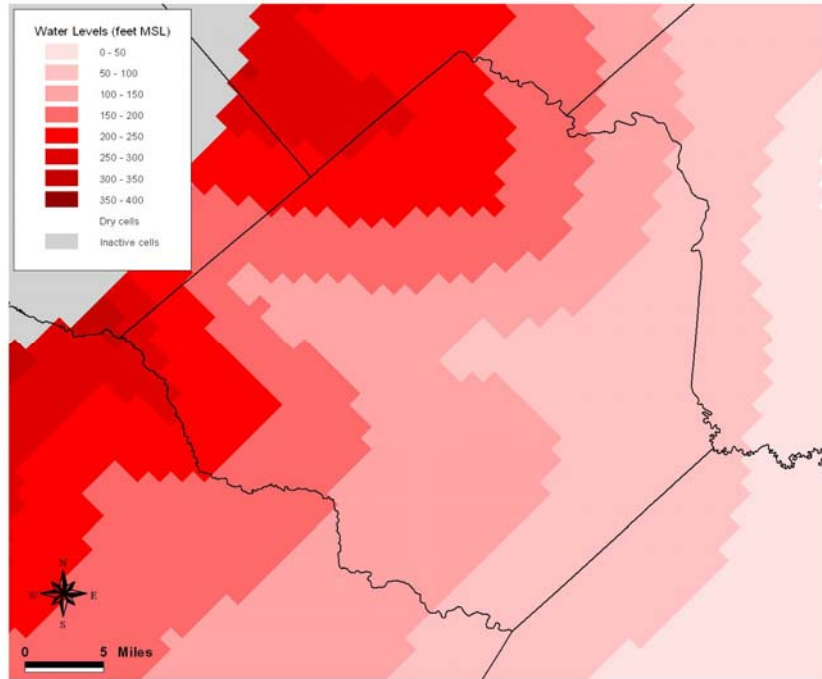


2010

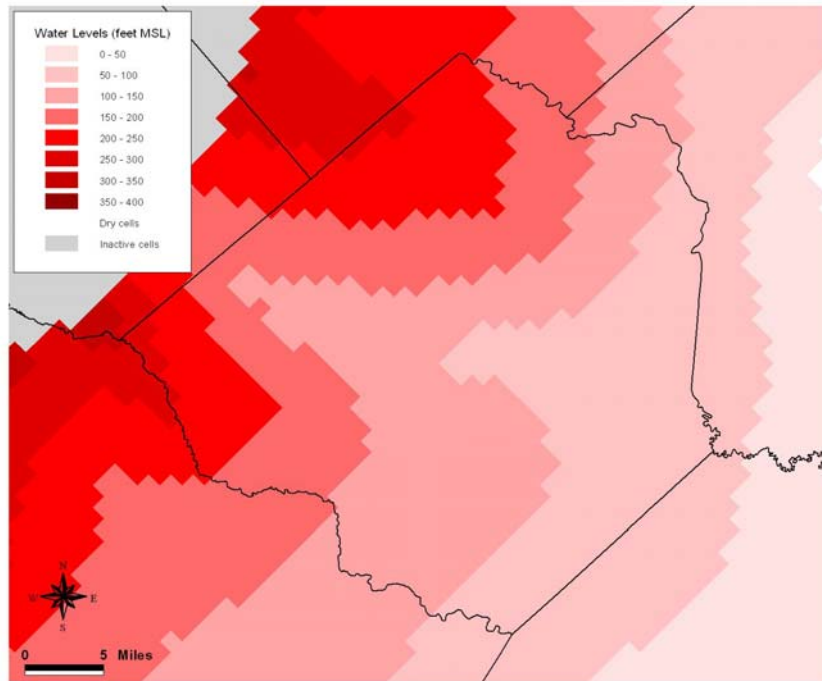


2020

Figure 2. (Continued)

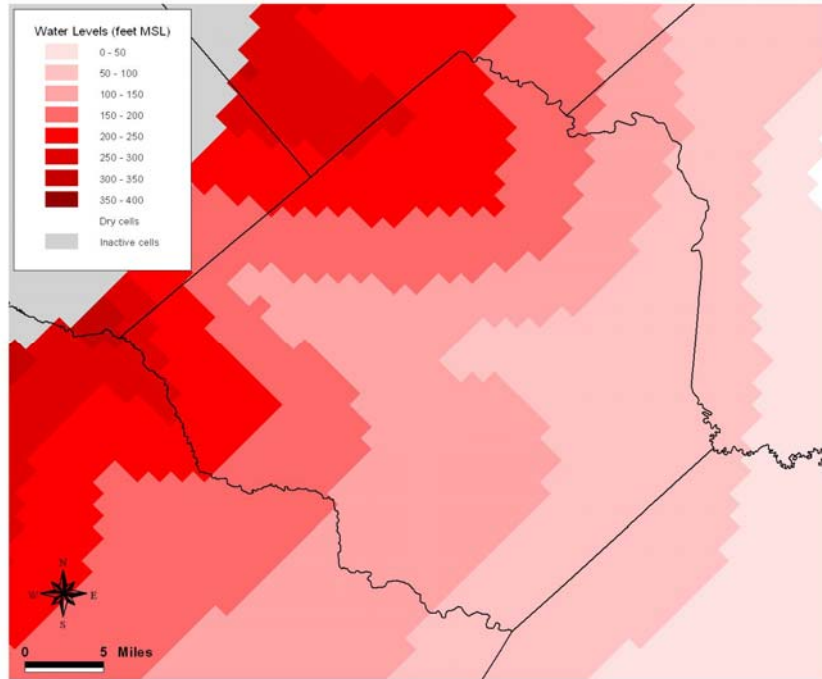


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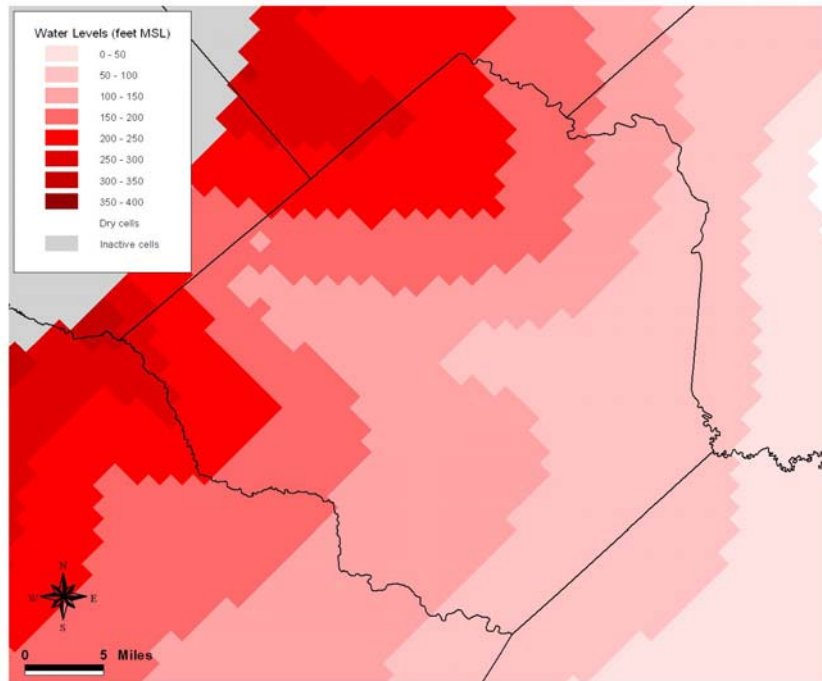


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Figure 2. (Continued)

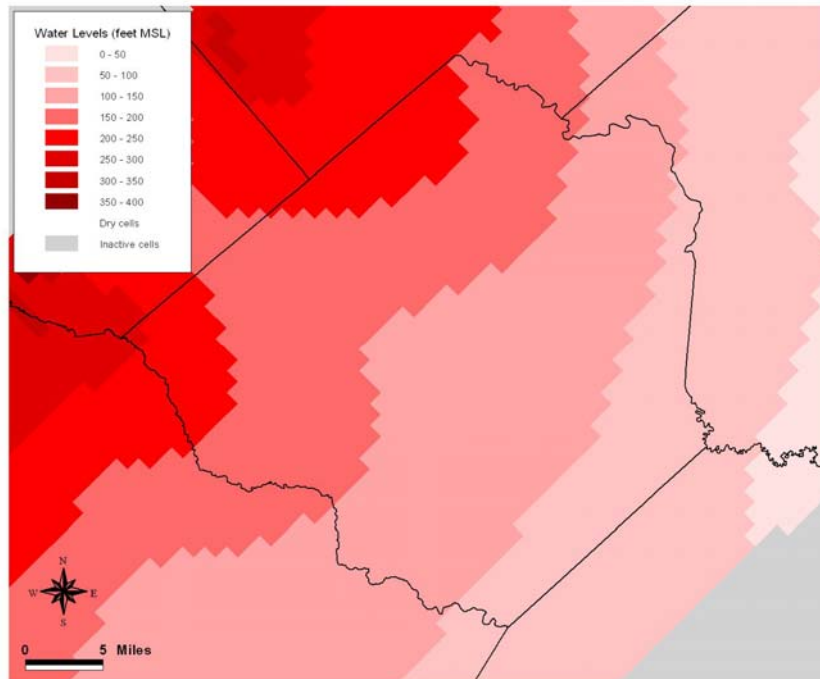


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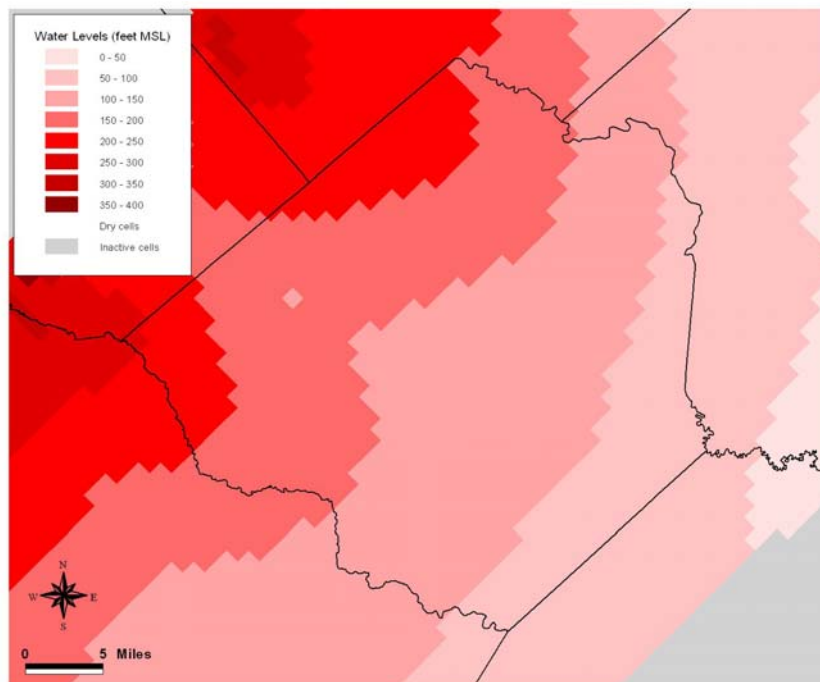


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Figure 2. (Continued)

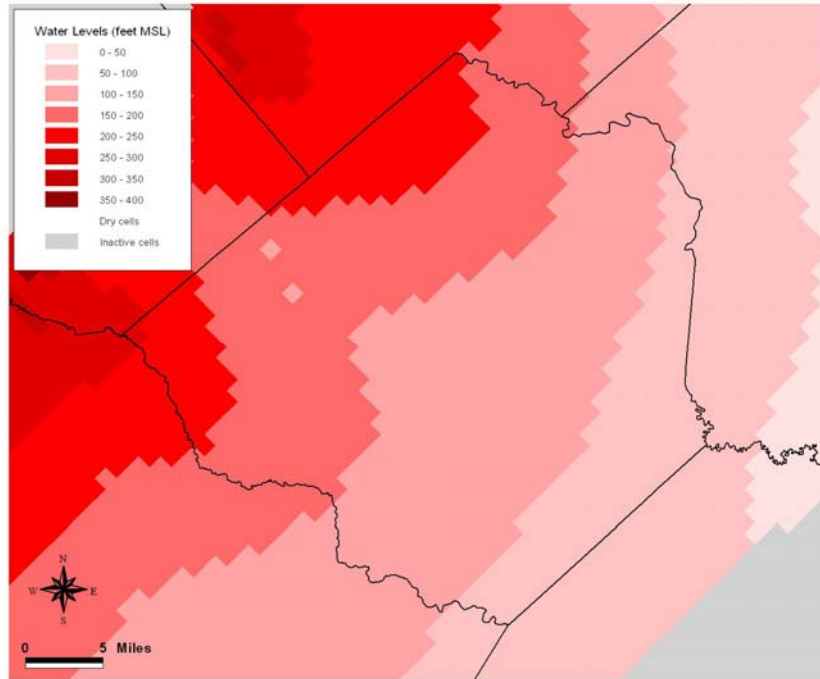


2000

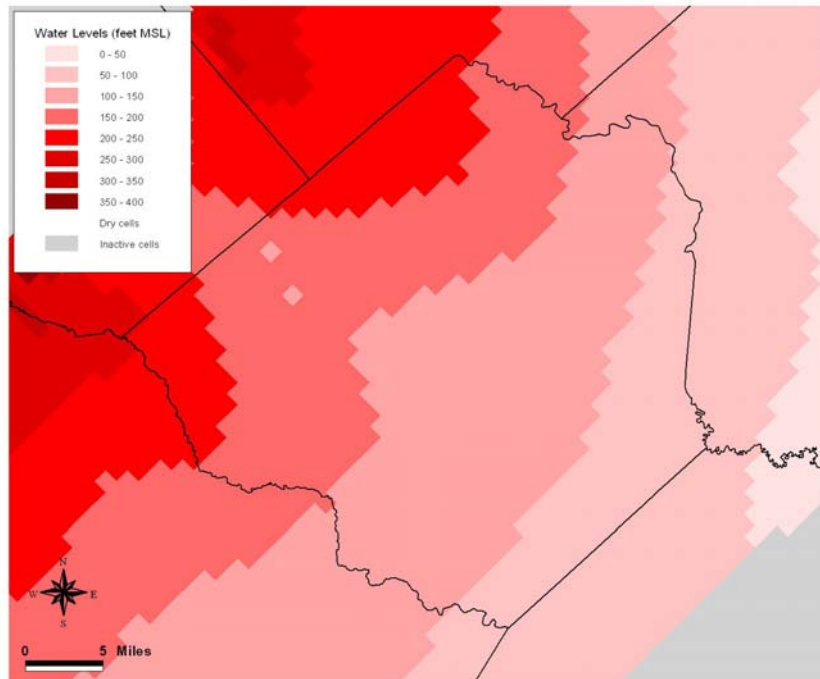


2005

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.

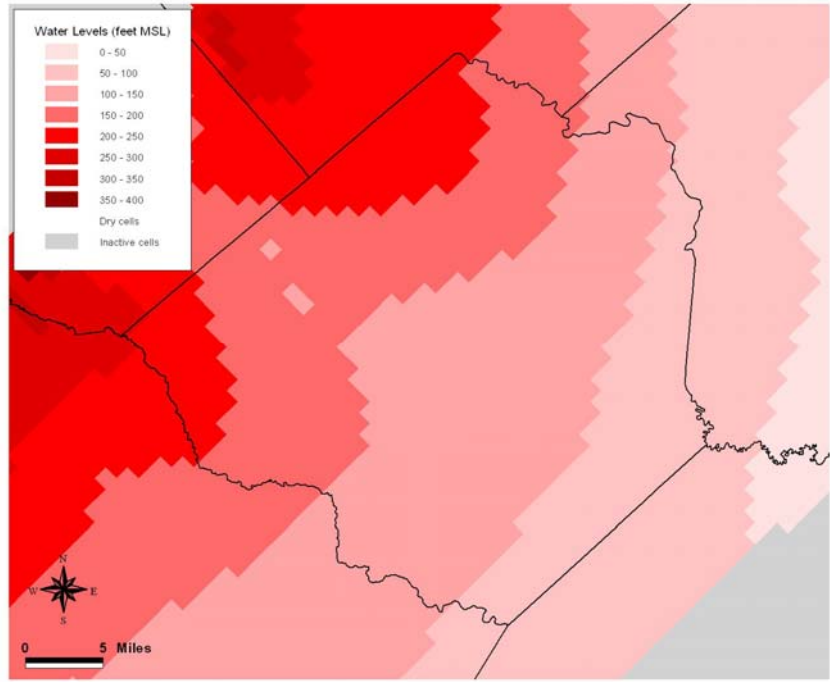


2010

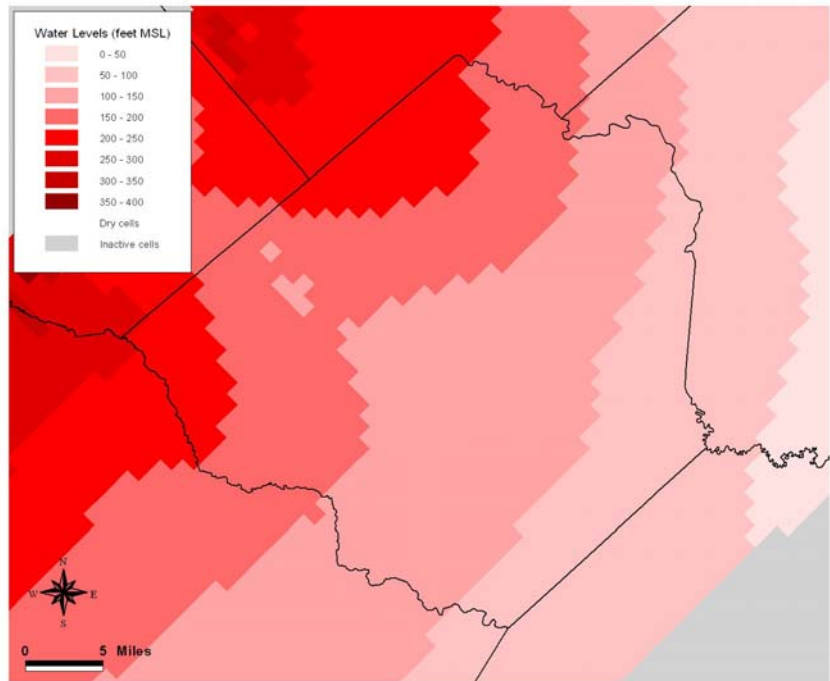


2020

Figure 3. (Continued)

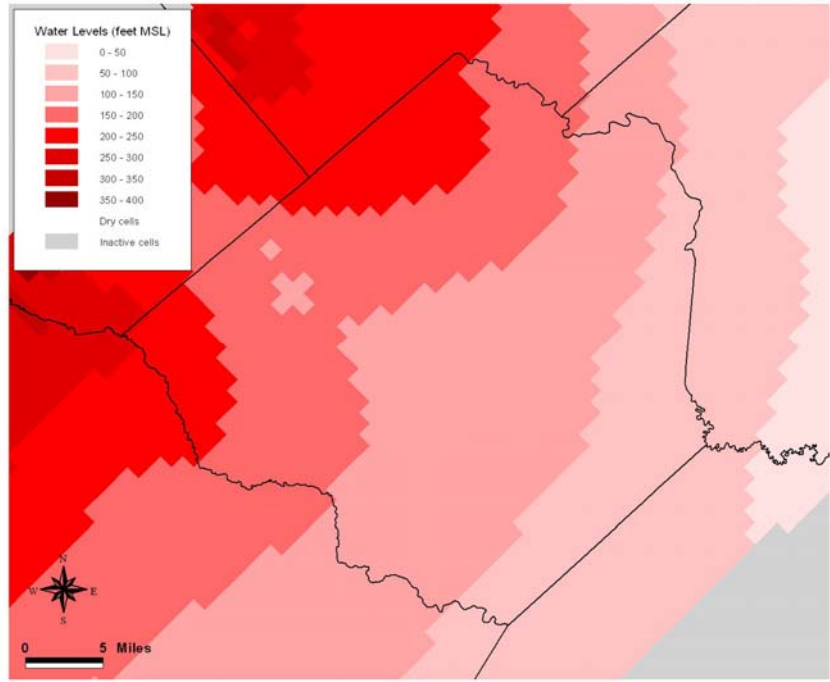


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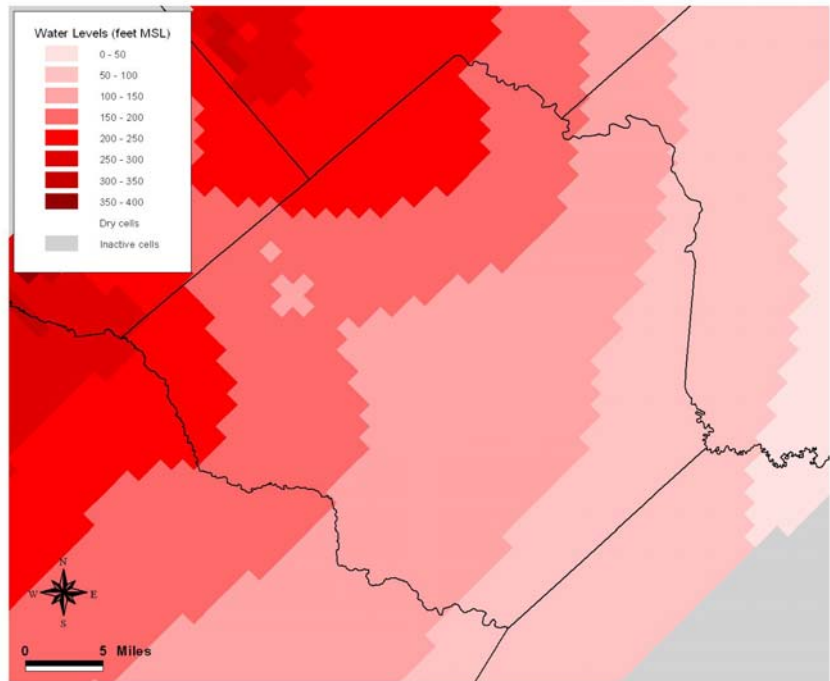


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Figure 3. (Continued)

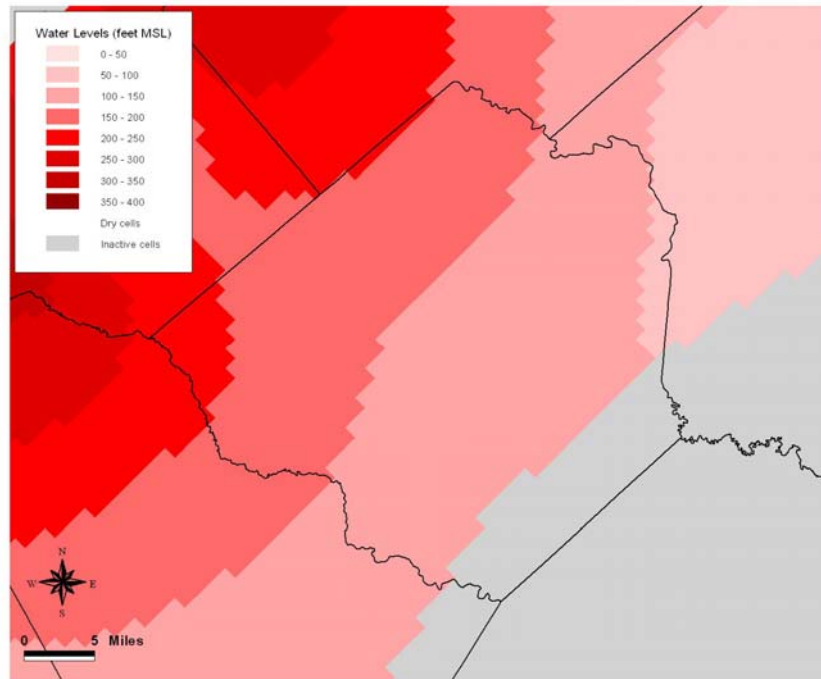


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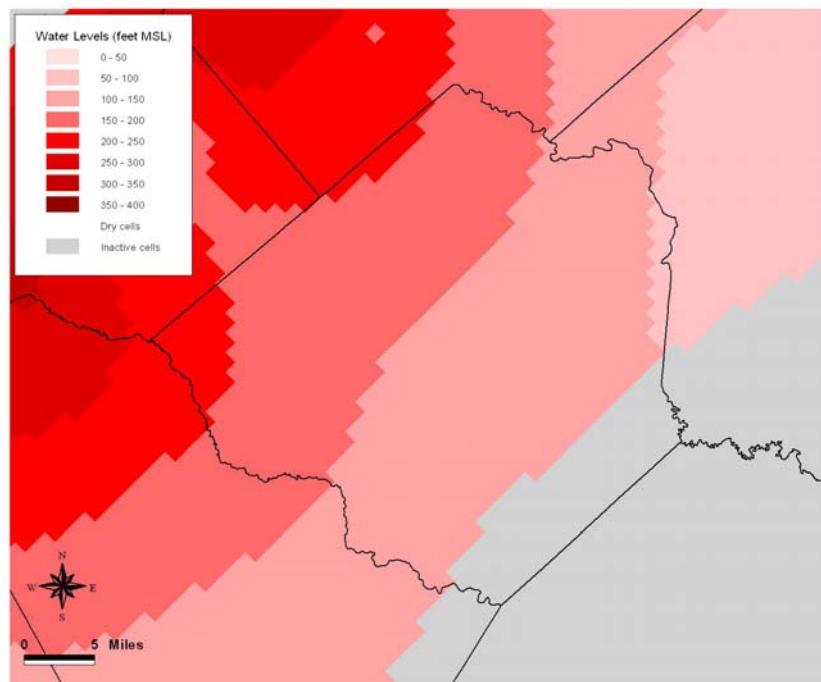


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Figure 3. (Continued)

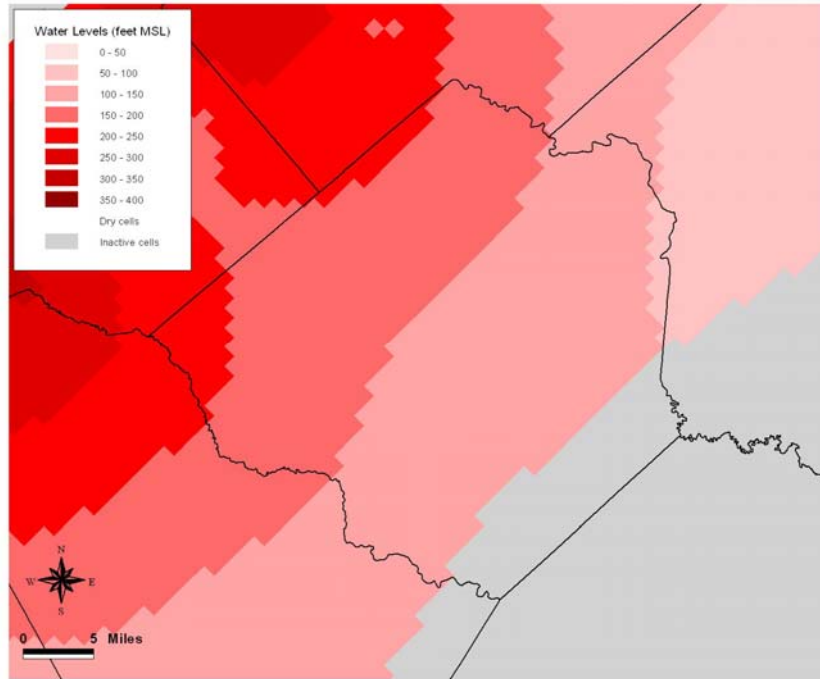


2000

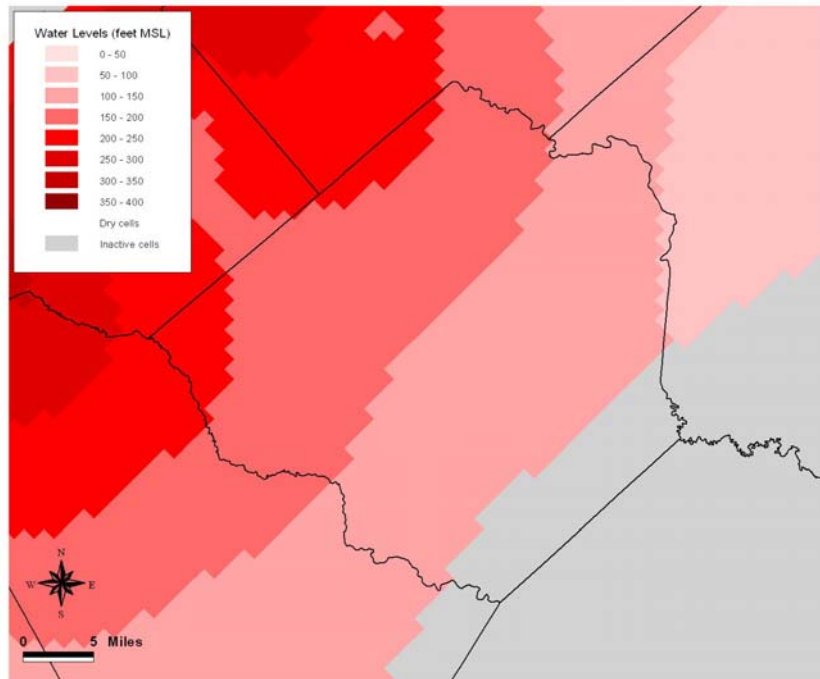


2005

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.

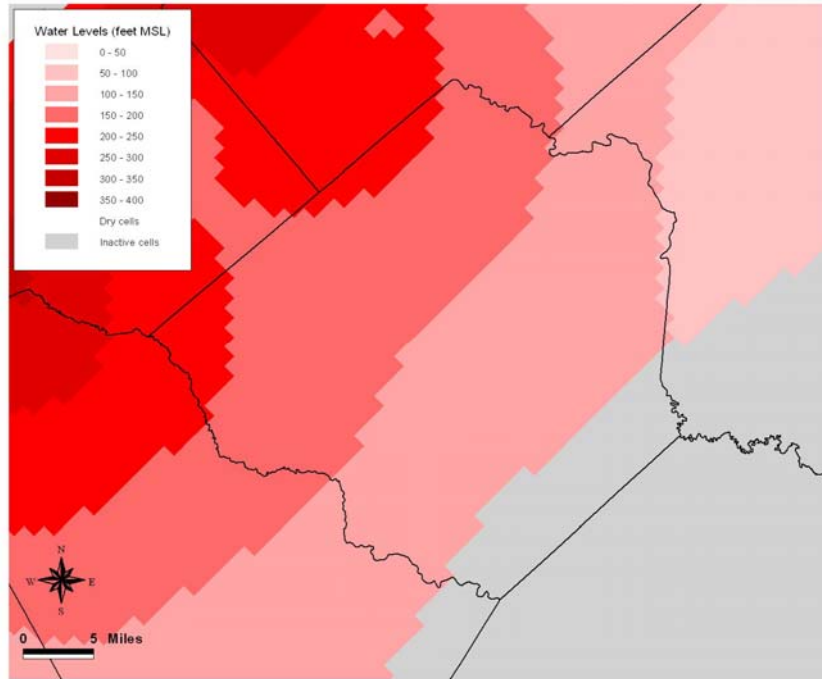


2010

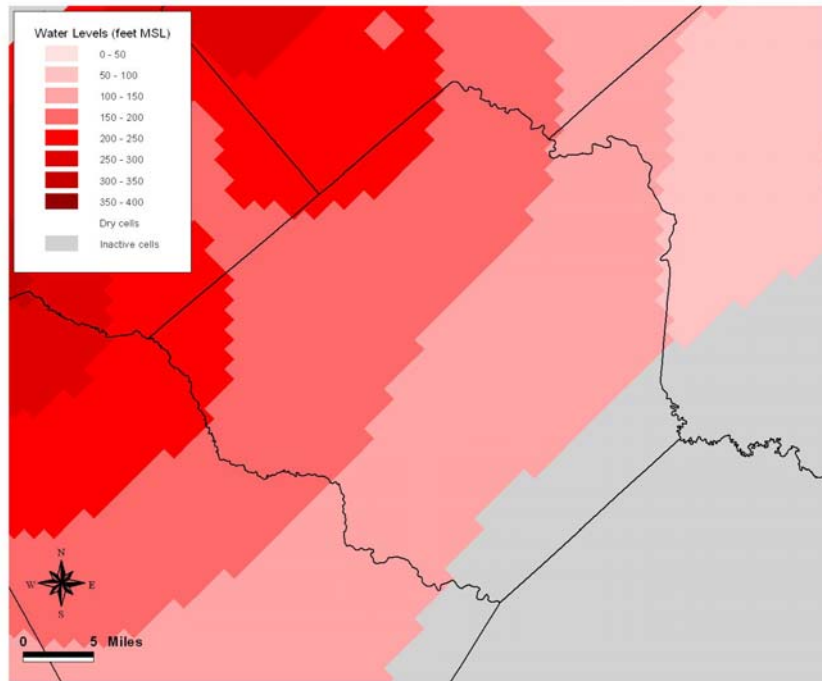


2020

Figure 4. (Continued)

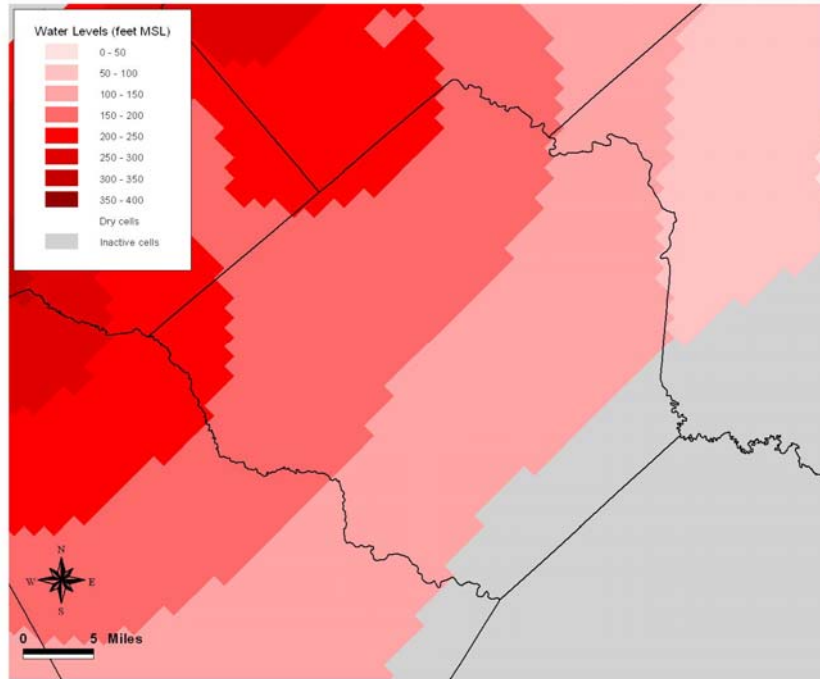


2030

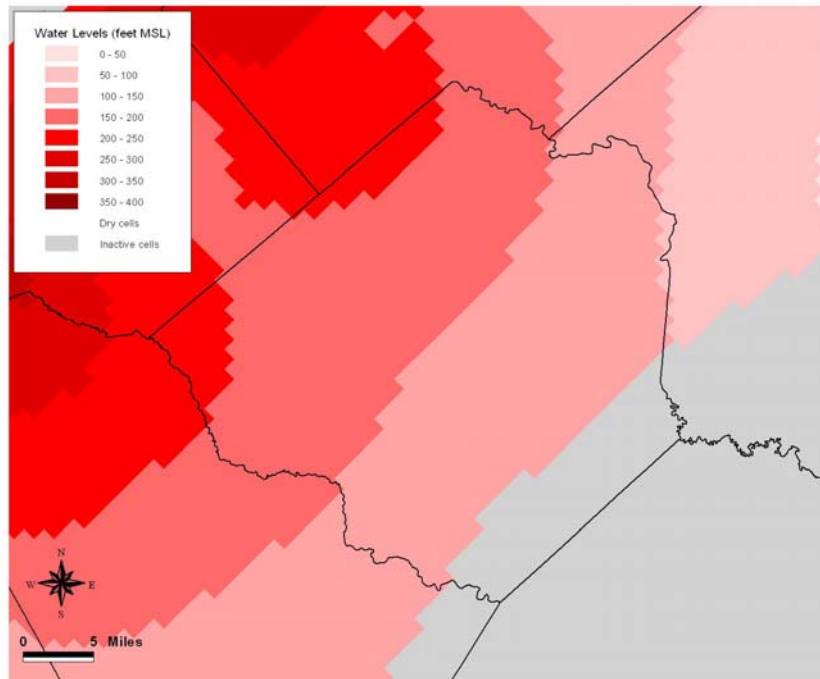


2040

Figure 4. (Continued)



2050



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Figure 4. (Continued)