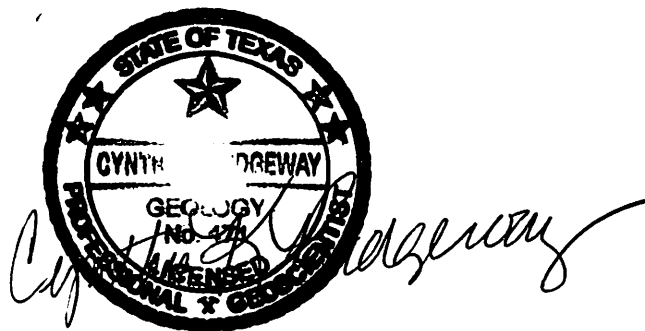

GAM TASK 11-006: GROUNDWATER MANAGEMENT AREA 6 MODEL RUNS FOR THE SEYMOUR AND BLAINE AQUIFERS

by Wade Oliver
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June 3, 2011



Cynthia K. Ridgeway is the Manager of the Groundwater Availability Modeling Section and is responsible for oversight of work performed by employees under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on June 3, 2011.

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EXECUTIVE SUMMARY:

This report documents a series of groundwater availability model simulations for the Seymour and Blaine aquifers within Groundwater Management Area 6. The simulations were run in coordination with representatives of Groundwater Management Area 6 to address a finding that some of the desired future conditions currently adopted are not physically compatible with one another. Specifically, the desired future conditions of 50 percent of the volume of water in the Seymour and Blaine aquifers remaining after 50 years in Mesquite Groundwater Conservation District were found to be incompatible with the desired future conditions of 1 and 2 feet of drawdown in the Seymour and Blaine aquifers, respectively, in neighboring Gateway Groundwater Conservation District. In each of the 13 scenarios simulated, pumping was only adjusted in Mesquite Groundwater Conservation District. Pumping in all other areas remained the same as in Groundwater Availability Model Run 08-44 (Oliver, 2008). The impacts of the pumping both inside and outside the district for both the Seymour and Blaine aquifers from these simulations are outlined in Tables 2-14.

PURPOSE OF MODEL RUNS:

In January 2011, the Texas Water Development Board notified the members of Groundwater Management Area 6 that the desired future conditions adopted in August 2010 for the Seymour and Blaine aquifers were found to be incompatible with one another. Specifically, the desired future conditions of 50 percent of the volume of water in both the Seymour and Blaine aquifers remaining after 50 years in Mesquite Groundwater Conservation District was not physically compatible with the desired future conditions of 1 and 2 feet of drawdown in the Seymour and Blaine aquifers,

respectively, in Gateway Groundwater Conservation District. The locations of each of the groundwater conservation districts within Groundwater Management Area 6 are shown in Figure 1.

After notifying the members of the management area of the issue, Texas Water Development Board staff completed several groundwater availability model simulations for the aquifers in coordination with Mike McGuire (General Manager of Rolling Plains Groundwater Conservation District and Groundwater Management Area 6 point-of-contact) and Ray Brady (consultant) on behalf of Groundwater Management Area 6 in order to find potential future conditions for the aquifer that are compatible. The 13 scenarios shown in this report represent all simulations completed to-date.

PARAMETERS AND ASSUMPTIONS:

- We used Version 1.01 of the groundwater availability model for the Seymour and Blaine aquifers. See Ewing and others (2004) for assumptions and limitations of the model.
- The model includes two layers representing the Seymour Aquifer (Layer 1) and the Blaine Aquifer and other Permian sediments (Layer 2).
- The areas from which average drawdowns were calculated are different for each layer of the groundwater availability model. In layer 1, all active model cells representing the Seymour Aquifer within each county were used. In layer 2, only those active cells within the district representing the Blaine Aquifer were used. This excludes active cells outside the Blaine Aquifer in Layer 2 representing other Permian sediments.
- The Blaine Aquifer boundary used in the groundwater availability model run was the official boundary during development of the groundwater availability model in 2004. Though the official boundary of the Blaine Aquifer has changed since model development, the model is only applicable in areas within this older boundary. The results presented in this report reflect only those areas of the Blaine Aquifer for which the groundwater availability model is applicable.
- The root mean squared error (a measure of the difference between simulated and measured water levels during model calibration) for the entire model for the period of 1990 to 1999 is 19.6 feet for the Seymour Aquifer and 26.4 feet for the Blaine Aquifer. This represents one percent and three percent of the range of measured water levels respectively (Ewing and others, 2004).

- The base pumping distribution from which adjustments were made is the same distribution shown in GAM Run 08-44 (Oliver, 2008). When increasing pumping from this base, the amount of the increase was spread evenly among all model cells in the aquifer in the area which contained pumping in the base distribution.
- We used average annual recharge conditions based on climate data from 1975 to 1999 for the simulation.

METHODS AND RESULTS:

Each of the 51-year predictive model simulations was run using the same methods described in Groundwater Availability Model (GAM) Run 08-44 (Oliver, 2008). As described in the desired future conditions submitted to the Texas Water Development Board, GAM Run 08-44 is the model simulation on which most of the existing desired future conditions for the Seymour and Blaine aquifers are based. The exception to this is Mesquite Groundwater Conservation District, where the desired future conditions are based on the district's management plan.

The Seymour Aquifer is divided into distinct, isolated areas informally referred to as "pods." The locations of each of the pods in the Seymour Aquifer, which are numbered as in GAM Run 08-44, are shown in Figure 2. The desired future conditions set by the members of Groundwater Management Area 6 were delineated by some combination of pod, county, and groundwater conservation district. Figures 3 and 4 show these zones for the Seymour and Blaine aquifers, respectively.

Table 1 contains the drawdown (or volume of water remaining for Mesquite Groundwater Conservation District) and pumping results from GAM Run 08-44. Notice that the pumping for both 2010 and 2060 are shown. This is because, in some cases, the pumping output from the groundwater availability model declines through time due to the occurrence of inactive (or "dry") cells. A cell becomes inactive when the water level in the cell falls below the base of the aquifer. In this situation, pumping can no longer occur in the model simulation.

Tables 2 through 14 contain the results for scenarios 1 through 13. Note that, for all of the scenarios below, only the pumping in Mesquite Groundwater Conservation District was adjusted from the levels in GAM Run 08-44 (Table 1). That is, the pumping input to the model was only adjusted in zones 1 and 13, representing the Seymour and Blaine aquifers, respectively, in Mesquite Groundwater Conservation District. Pumping and drawdown results are shown for all zones, however, because changes in pumping in one area can impact the aquifers in nearby areas. As noted previously, due to the occurrence of model cells becoming inactive during the

predictive model simulations, the output for pumping may not directly match the requested pumping scenario. The scenarios, chosen in consultation with representatives of Groundwater Management Area 6, are:

- Scenario 1 (Table 2): Matches approximately 50 percent of the volume of water remaining in the Blaine Aquifer in Mesquite Groundwater Conservation District beginning with 550,000 acre-feet per year of pumping and declining to 294,000 acre-feet per year. Pumping in all other areas remains the same as in GAM Run 08-44.
- Scenario 2 (Table 3): Matches approximately 60 percent of the volume of water remaining in the Blaine Aquifer in Mesquite Groundwater Conservation District beginning with 400,000 acre-feet per year of pumping and declining to 290,000 acre-feet per year. Pumping in all other areas remains the same as in GAM Run 08-44.
- Scenario 3 (Table 4): Pumping was adjusted in both the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to match 50 percent of the volume of water remaining in the Seymour Aquifer and 60 percent remaining in the Blaine Aquifer.
- Scenario 4 (Table 5): Pumping was adjusted in both the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to match 50 percent of the volume of water remaining in both the Seymour and Blaine aquifers.
- Scenario 5 (Table 6): Pumping was adjusted in both the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to match 60 percent of the volume of water remaining in both the Seymour and Blaine aquifers.
- Scenario 6 (Table 7): Pumping was adjusted in both the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to match 70 percent of the volume of water remaining in both the Seymour and Blaine aquifers.
- Scenario 7 (Table 8): Pumping was adjusted in both the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to match 80 percent of the volume of water remaining in both the Seymour and Blaine aquifers.
- Scenario 8 (Table 9): Pumping was adjusted in both the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to match 90 percent of the volume of water remaining in both the Seymour and Blaine aquifers.
- Scenario 9 (Table 10): Pumping was adjusted in both the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to match 50 percent of

the volume of water remaining in the Seymour Aquifer and 80 percent remaining in the Blaine Aquifer.

- Scenario 10 (Table 11): Pumping was specified in the Seymour Aquifer in Mesquite Groundwater Conservation District to be, on average throughout the simulation, approximately 30,000 acre-feet per year. Pumping was adjusted in the Blaine Aquifer in the district to match 80 percent of the volume of water remaining.
- Scenario 11 (Table 12): Pumping was specified for the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to be approximately 30,000 acre-feet per year and 150,000 acre-feet per year, respectively. Note: due to the occurrence of dry cells, the requested 30,000 acre-feet per year in the Seymour Aquifer throughout the simulation was not achieved.
- Scenario 12 (Table 13): Pumping was specified for the Seymour Aquifer to be, on average throughout the simulation, approximately 30,000 acre-feet per year. Pumping for the Blaine Aquifer was specified as 150,000 acre-feet per year.
- Scenario 13 (Table 14): Pumping was specified for the Seymour and Blaine aquifers in Mesquite Groundwater Conservation District to be approximately 30,000 acre-feet per year and 250,000 acre-feet per year.

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

“Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results.”

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and streamflow are specific to a particular historic time period.

Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Ewing, J.E., Jones, T.L., Pickens, J.F., Chastain-Howley, A., Dean, K.E., Spear, A.A., 2004, Groundwater availability model for the Seymour Aquifer: Final report prepared for the Texas Water Development Board by INTERA, Inc., 533 p.

Oliver, W., 2008, GAM Run 08-44, Texas Water Development Board GAM Run Report, 20 p.

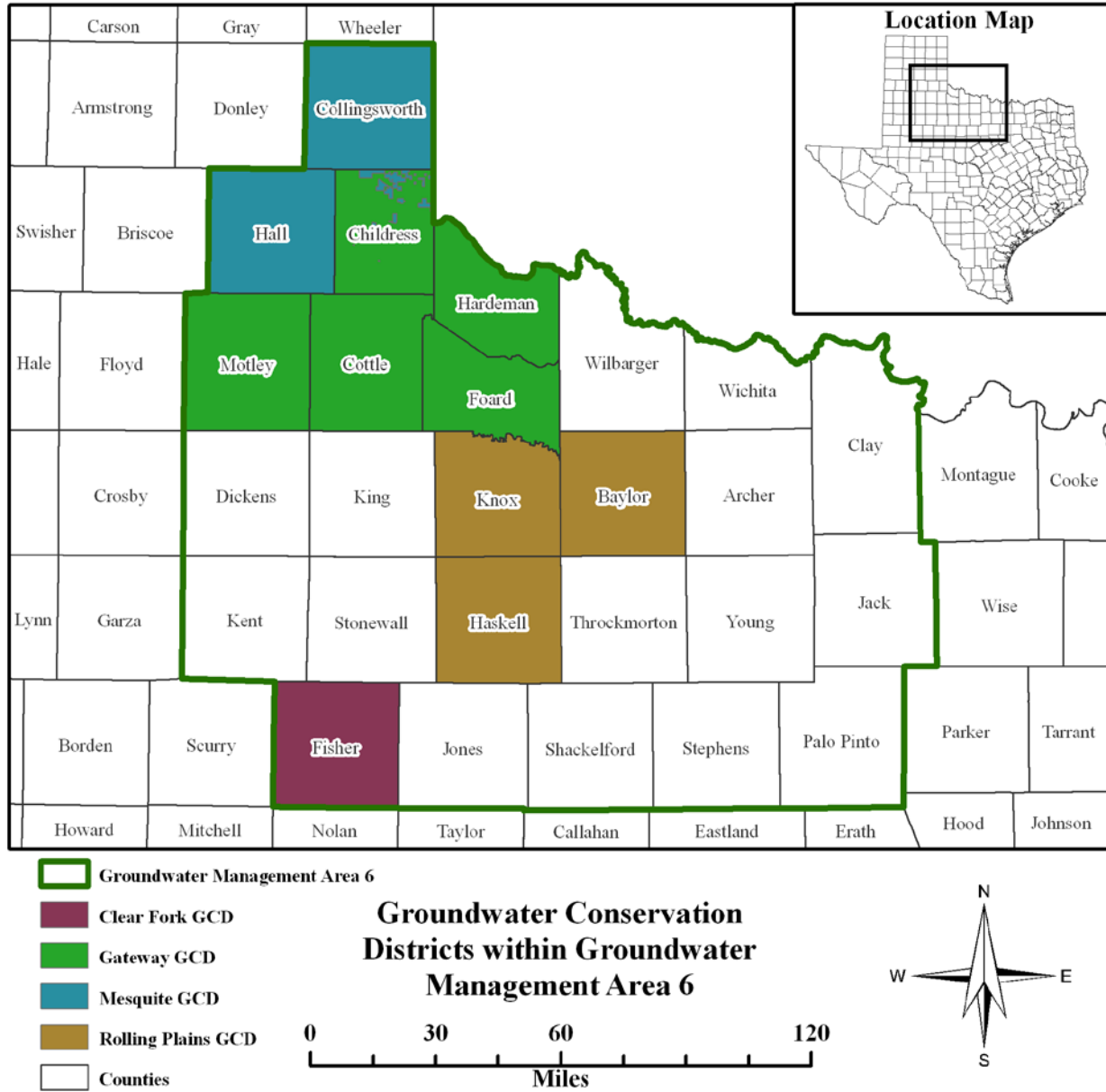


FIGURE 1: LOCATION MAP SHOWING THE GROUNDWATER CONSERVATION DISTRICTS (GCDs) WITHIN GROUNDWATER MANAGEMENT AREA 6.

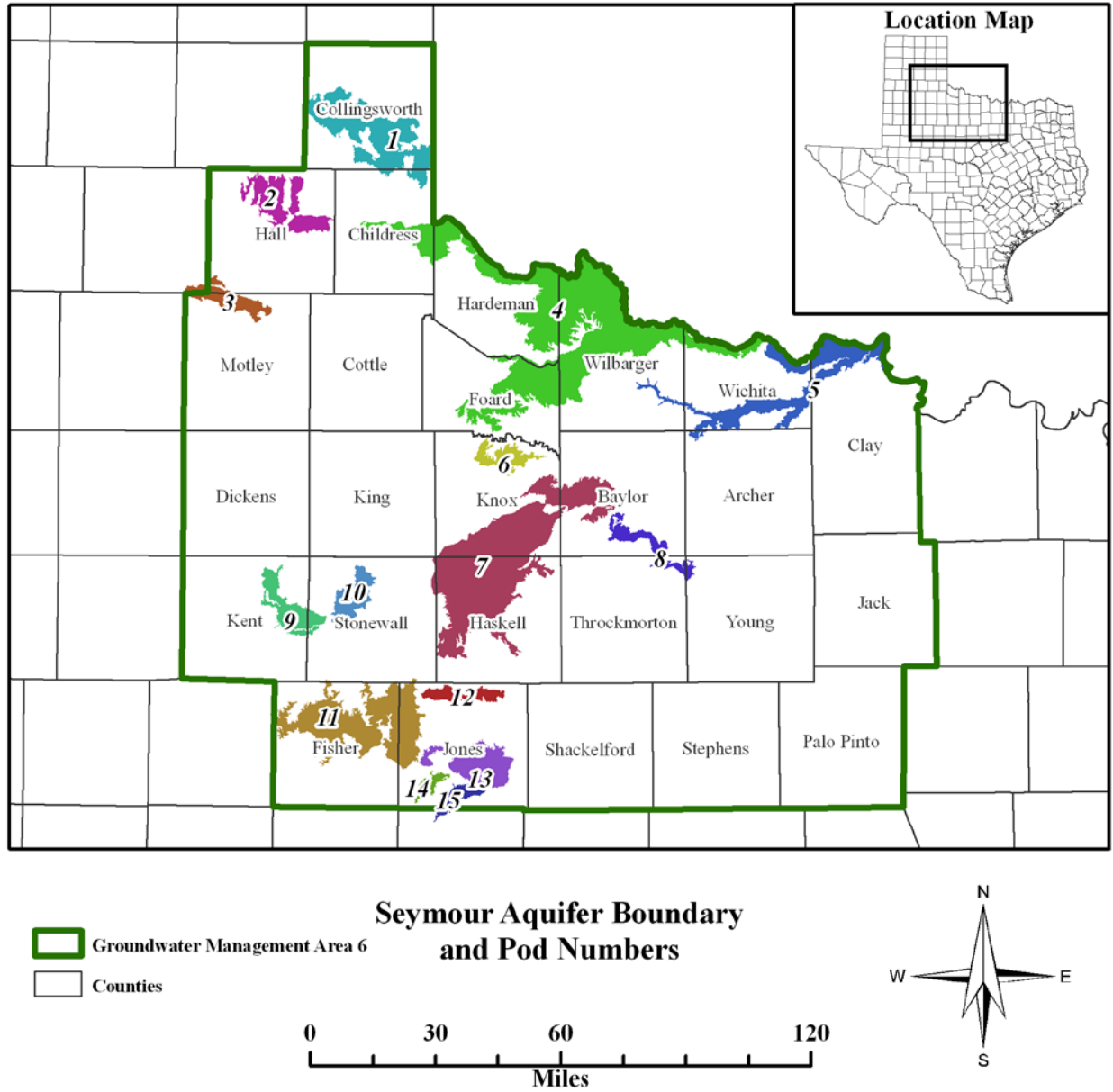


FIGURE 2: SEYMOUR AQUIFER BOUNDARY AND POD NUMBERS.

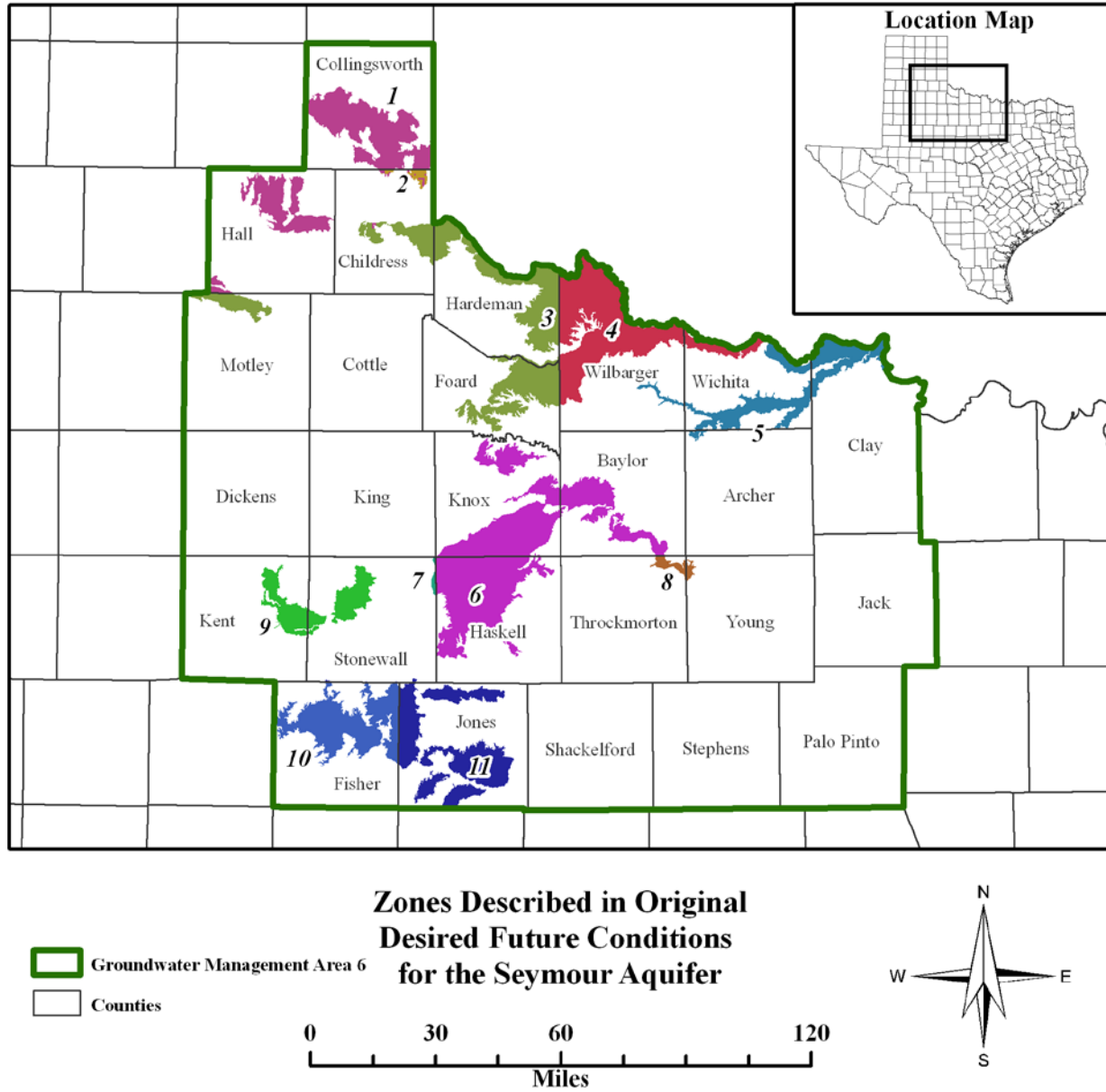


FIGURE 3: ZONES FOR THE SEYMOUR AQUIFER DESCRIBED IN THE DESIRED FUTURE CONDITIONS ADOPTED BY GROUNDWATER MANAGEMENT AREA 6 IN AUGUST 2010.

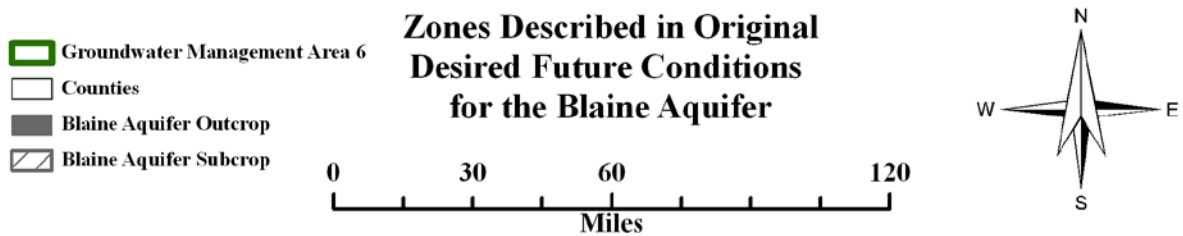
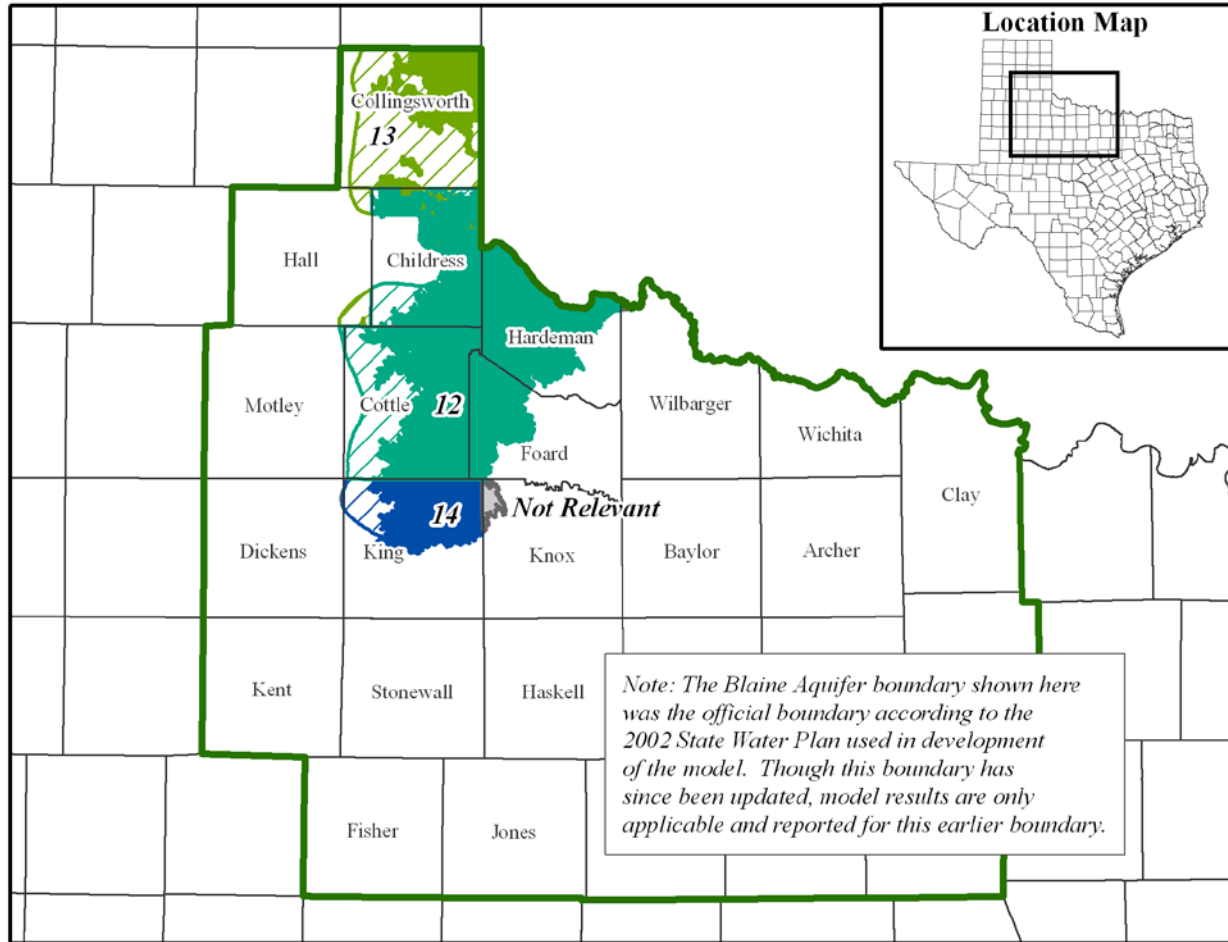


FIGURE 4: ZONES FOR THE BLAINE AQUIFER DESCRIBED IN THE DESIRED FUTURE CONDITIONS ADOPTED BY GROUNDWATER MANAGEMENT AREA 6 IN AUGUST 2010.

TABLE 1: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR GAM RUN 08-44 (OLIVER, 2008). NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	30,097	26,695	73 percent
Gateway GCD - Pod 1	2	1	180	227	-8
Gateway GCD - Pods 3 and 4	3	1	7,603	7,307	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	0
Mesquite GCD - Blaine	13	50 percent	12,594	12,594	99 percent
King - Blaine	14	7	390	390	6

TABLE 2: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 1. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	29,961	15,344	34 percent
Gateway GCD - Pod 1	2	1	164	91	14
Gateway GCD - Pods 3 and 4	3	1	7,603	7,291	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	6
Mesquite GCD - Blaine	13	50 percent	549,985	293,997	48 percent
King - Blaine	14	7	390	390	6

TABLE 3: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 2. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	30,002	17,371	38 percent
Gateway GCD - Pod 1	2	1	164	135	11
Gateway GCD - Pods 3 and 4	3	1	7,603	7,291	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	4
Mesquite GCD - Blaine	13	50 percent	399,989	289,149	59 percent
King - Blaine	14	7	390	390	6

TABLE 4: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 3. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	19,916	13,450	50 percent
Gateway GCD - Pod 1	2	1	164	135	10
Gateway GCD - Pods 3 and 4	3	1	7,603	7,382	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,681	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	4
Mesquite GCD - Blaine	13	50 percent	389,989	290,133	60 percent
King - Blaine	14	7	390	390	6

TABLE 5: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 4. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	14,912	9,375	50 percent
Gateway GCD - Pod 1	2	1	164	91	17
Gateway GCD - Pods 3 and 4	3	1	7,603	7,382	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	6
Mesquite GCD - Blaine	13	50 percent	529,985	290,023	50 percent
King - Blaine	14	7	390	390	6

TABLE 6: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 5. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	13,109	9,533	60 percent
Gateway GCD - Pod 1	2	1	164	135	10
Gateway GCD - Pods 3 and 4	3	1	7,603	7,382	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	4
Mesquite GCD - Blaine	13	50 percent	394,989	289,530	60 percent
King - Blaine	14	7	390	390	6

TABLE 7: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 6. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	11,895	9,423	70 percent
Gateway GCD - Pod 1	2	1	164	164	9
Gateway GCD - Pods 3 and 4	3	1	7,603	7,382	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	3
Mesquite GCD - Blaine	13	50 percent	294,992	280,520	70 percent
King - Blaine	14	7	390	390	6

TABLE 8: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 7. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	11,910	10,277	80 percent
Gateway GCD - Pod 1	2	1	164	179	2
Gateway GCD - Pods 3 and 4	3	1	7,603	7,398	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	2
Mesquite GCD - Blaine	13	50 percent	204,994	204,994	80 percent
King - Blaine	14	7	390	390	6

TABLE 9: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 8. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	13,823	12,832	90 percent
Gateway GCD - Pod 1	2	1	180	179	-5
Gateway GCD - Pods 3 and 4	3	1	7,603	7,398	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	1
Mesquite GCD - Blaine	13	50 percent	109,997	109,997	90 percent
King - Blaine	14	7	390	390	6

TABLE 10: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 9. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	30,016	21,446	50 percent
Gateway GCD - Pod 1	2	1	164	179	4
Gateway GCD - Pods 3 and 4	3	1	7,603	7,307	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	2
Mesquite GCD - Blaine	13	50 percent	204,994	204,994	80 percent
King - Blaine	14	7	390	390	6

TABLE 11: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 10. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	35,526	23,861	44 percent
Gateway GCD - Pod 1	2	1	164	179	5
Gateway GCD - Pods 3 and 4	3	1	7,603	7,307	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	2
Mesquite GCD - Blaine	13	50 percent	204,994	204,994	80 percent
King - Blaine	14	7	390	390	6

TABLE 12: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 11. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	30,056	23,095	55 percent
Gateway GCD - Pod 1	2	1	180	179	0
Gateway GCD - Pods 3 and 4	3	1	7,603	7,307	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	2
Mesquite GCD - Blaine	13	50 percent	149,996	149,996	86 percent
King - Blaine	14	7	390	390	6

TABLE 13: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 12. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	34,699	25,059	50 percent
Gateway GCD - Pod 1	2	1	180	179	1
Gateway GCD - Pods 3 and 4	3	1	7,603	7,307	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	2
Mesquite GCD - Blaine	13	50 percent	149,996	149,996	86 percent
King - Blaine	14	7	390	390	6

TABLE 14: PUMPING, DRAWDOWN, AND PERCENT VOLUME REMAINING BY ZONE FOR SCENARIO 13. NOTE THAT A NEGATIVE DRAWDOWN INDICATES A WATER LEVEL RISE. GCD REFERS TO GROUNDWATER CONSERVATION DISTRICT. DFC REFERS TO DESIRED FUTURE CONDITION. PLEASE SEE FIGURE 2 FOR THE LOCATION OF THE SEYMOUR "PODS" AND FIGURES 3 AND 4 FOR THE ZONES FOR THE SEYMOUR AND BLAINE AQUIFERS.

<i>Description</i>	<i>Zone</i>	<i>Original DFC (percent volume remaining or feet of drawdown)</i>	<i>2010 Pumping (acre-feet per year)</i>	<i>2060 Pumping (acre-feet per year)</i>	<i>Outcome (percent volume remaining or feet of drawdown)</i>
Mesquite GCD - Pods 1, 2, 3, and 4	1	50 percent	30,016	21,024	46 percent
Gateway GCD - Pod 1	2	1	164	179	7
Gateway GCD - Pods 3 and 4	3	1	7,603	7,307	-3
Wichita and Wilbarger - Pod 4	4	1	29,595	29,260	-3
Wichita, Archer, Clay, Wilbarger - Pod 5	5	2	2,726	2,774	0
Haskell, Knox, Baylor - Pods 6, 7, and 8	6	18	95,778	79,443	13
Stonewall - Pod 7	7	24	203	203	22
Throckmorton and Young - Pod 8	8	3	424	373	2
Kent and Stonewall - Pods 9 and 10	9	4	1,221	1,190	2
Clear Fork GCD - Pod 11	10	1	2,936	2,733	1
Jones and Stonewall - Pods 11, 12, 13, 14, and 15	11	1	2,918	2,918	-2
Gateway GCD - Blaine	12	2	16,787	16,787	3
Mesquite GCD - Blaine	13	50 percent	249,993	246,251	75 percent
King - Blaine	14	7	390	390	6