Estimates of Twenty-Five Years of Groundwater Declines in the North Plains Groundwater Conservation District, 1995-2020

The North Plains Groundwater Conservation District monitors declines in groundwater levels by maintaining a network of water-level monitoring wells. The wells measured fall into three categories: producer-owned wells, District-owned wells with monitoring and telemetry equipment and District-owned wells with no equipment in them.

Currently the District measures water levels in approximately 434 wells. The wells are measured annually beginning in January and measurements are complete by mid-March. Wells with monitoring equipment record water levels every 12 hours and the data is sent to the District servers and is displayed on the District on-line interactive map. (The on-line maps are not updated every 12 hours) The information collected is analyzed, used to create maps, and plays a vital role in making reasonable long-term management decisions based on the best information available.

The District maintains a website where data from wells, monitor wells and recording equipment may be viewed in an interactive map. The map is always a work in progress and all data may not yet be available. Other data and other map layers are available, and others may become available as work on the on-line map progresses. http://map.northplainsgcd.org/

As part of its water level monitoring program, the District may annually drill wells or install water level monitoring equipment or rehabilitate wells it measures. The wells the District owns are non-production wells dedicated solely to data collection which provide information with more accuracy, reliability, and consistency than other types of wells the District measures. They are also readily available, if needed, for conducting aquifer tests that cannot be conducted using other types of wells.

Changes in the water table, calculated from monitor well measurements vary from rises in the water level to declines that may locally exceed 8-12 feet per year. Each county in the District have areas experiencing little or no decline as well as areas of greater decline. Declines are caused in the District predominately by agricultural pumping and are influenced primarily by surface recharge of the aquifer and lateral flows into and out of the aquifer.

Recharge is affected by cropping patterns, rainfall, surface runoff, evaporation and plant uptake, depth to water, soil porosity and the geologic substrata present. An aquifer characteristic that affects the speed an aquifer refills or recovers from pumping and consequently how much water a well can produce is intra-formational flow. Intra-formational flow is the flow of water from one part of an aquifer into another part of the same aquifer.

Average declines in water level are calculated by two methods and reported in the District's annual Hydrology and Groundwater Resources Report. One method is to use values calculated from reported annual groundwater production and an estimated aquifer

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specific yield of 18 percent. The second method is to use actual current and historical water level measurements to calculate average declines in monitor wells.

Average county declines calculated from groundwater production and average declines calculated from water level measurements from monitor wells may differ considerably due to the District monitor wells located predominately in or near areas of high pumping. This bias in monitor well location tends to cause an over estimation of declines when used to calculate county averages but is indicative of what groundwater producers experience at the well.

Range of 25-year County Declines

County	Low Range of 25-Year Average Declines	High Range of 25-Year Average Declines	Average Data Confidence Level	Wells Used in Calculations and Maps
Dallam	20 ft	110 ft	84%	42/68
Hartley	20 ft	110 ft	87%	51/68
Sherman	40 ft	110 ft	83%	53/60
Moore	30 ft	110 ft	84%	39/52
Hansford	40 ft	70 ft	75%	48/66
Hutchinson	30 ft	70 ft	80%	15/25
Ochiltree	0 ft	80 ft	76%	21/48
Lipscomb	0 ft	50 ft	65%	11/45

The following county maps show total estimated declines over the past 25 years, 1995-2020. These declines are calculated from a trend analysis of current and historical water level measurements from the District's Monitor Well Program. Twenty-five-year declines range from 0 feet to 110 feet with the larger declines predominately in the Western part of the District and the smaller declines in the Eastern part of the District. The maps have been highly edited to partially remove individual well influences to more clearly show areas of decline rather than individual well declines. Individual well declines may well show much higher declines.

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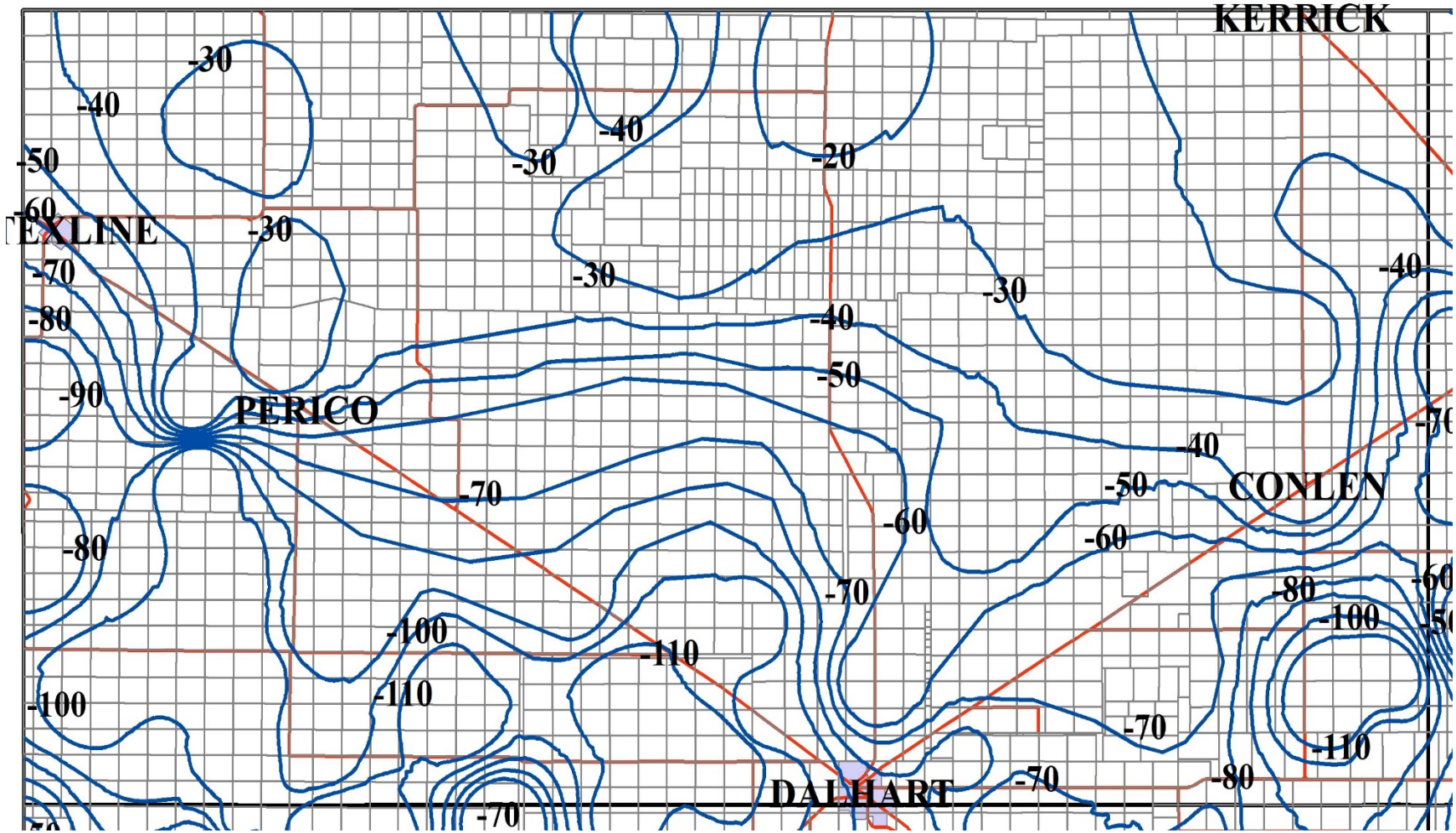
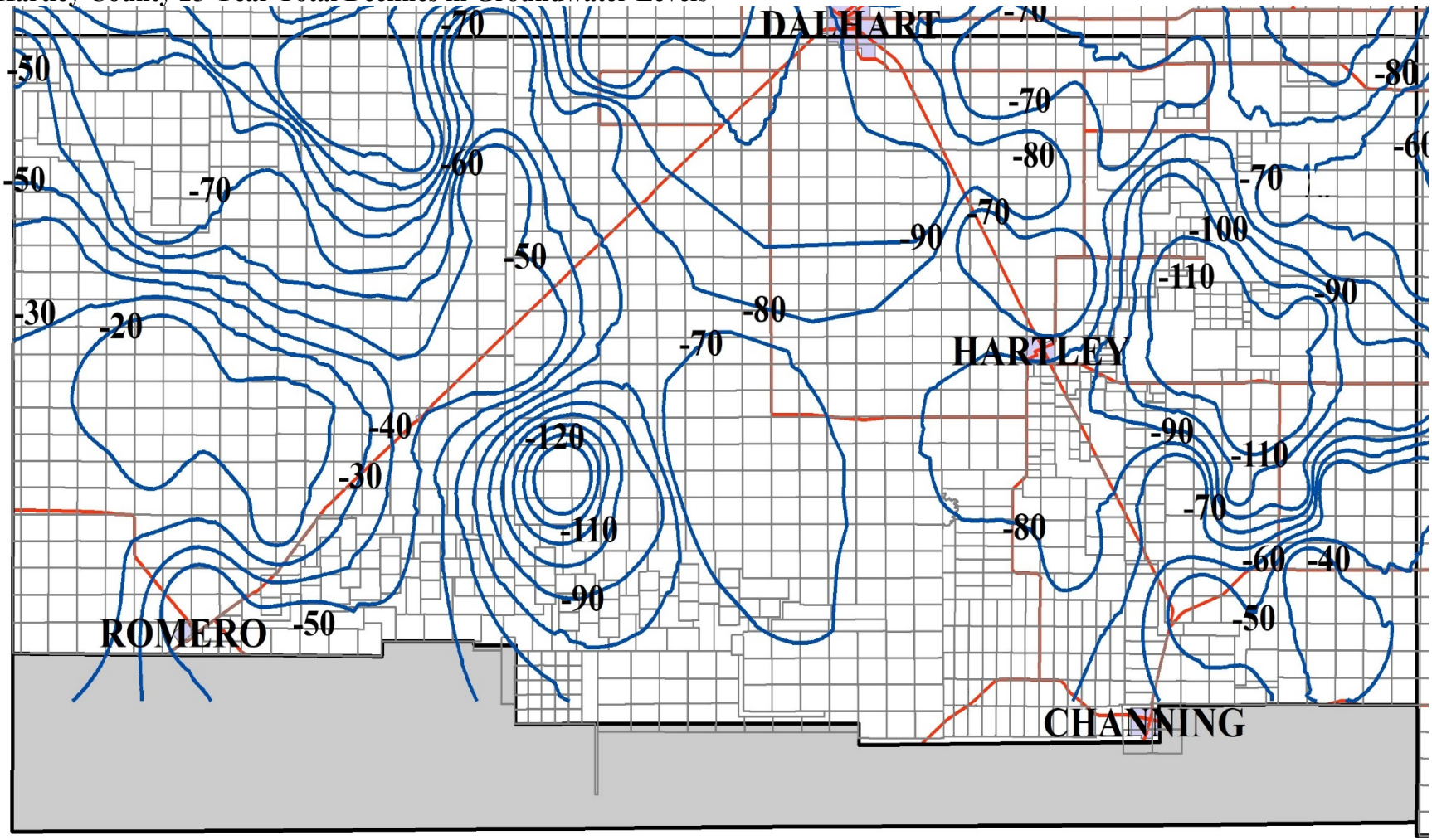
Dallam County 25-Year Total Declines in Groundwater Levels



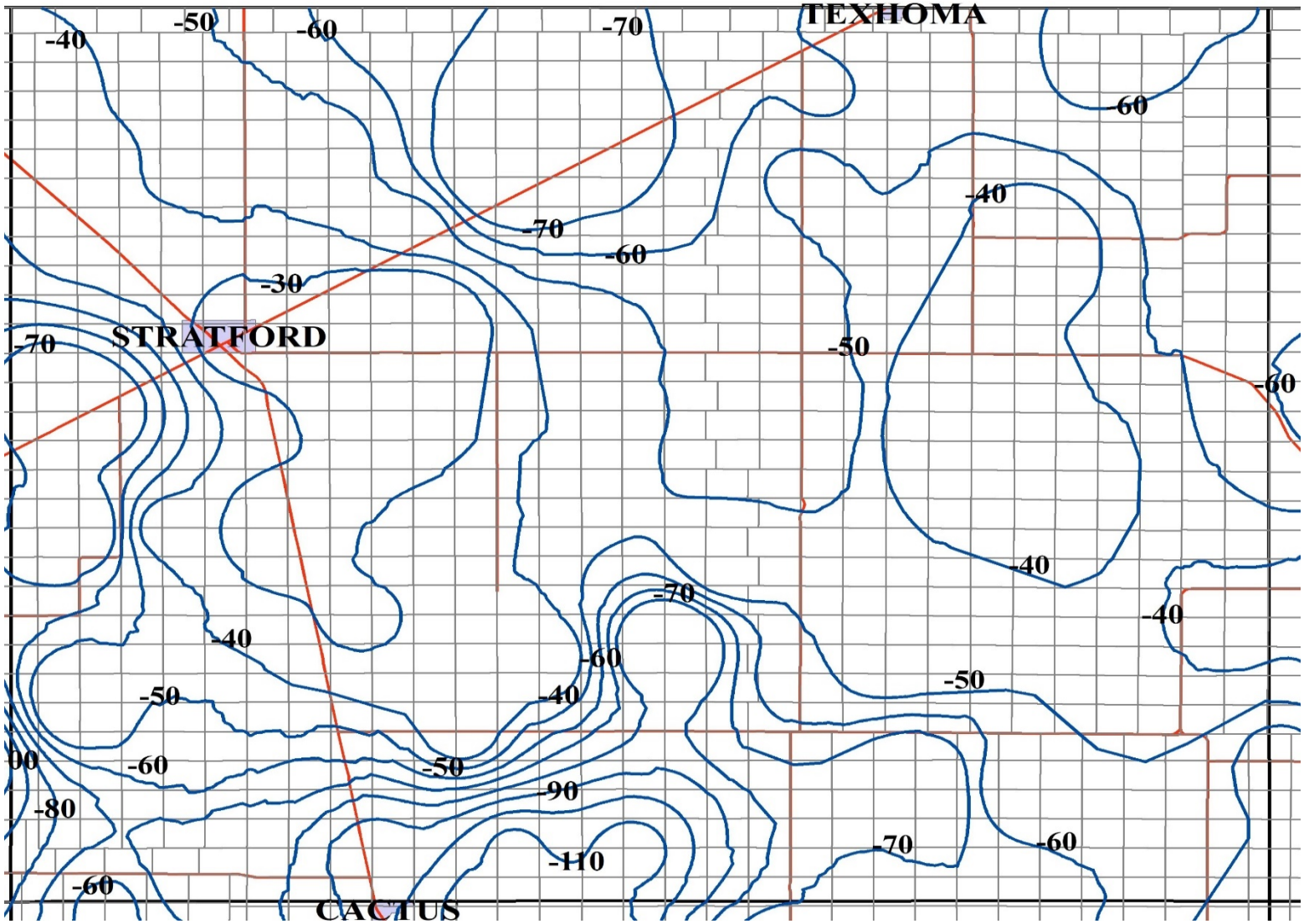
Estimates of Twenty-Five Years of Groundwater Declines in the North Plains Groundwater Conservation District, 1995-2020

Hartley County 25-Year Total Declines in Groundwater Levels



Estimates of Twenty-Five Years of Groundwater Declines in the North Plains Groundwater Conservation District, 1995-2020

Sherman County 25-Year Total Declines in Groundwater Levels



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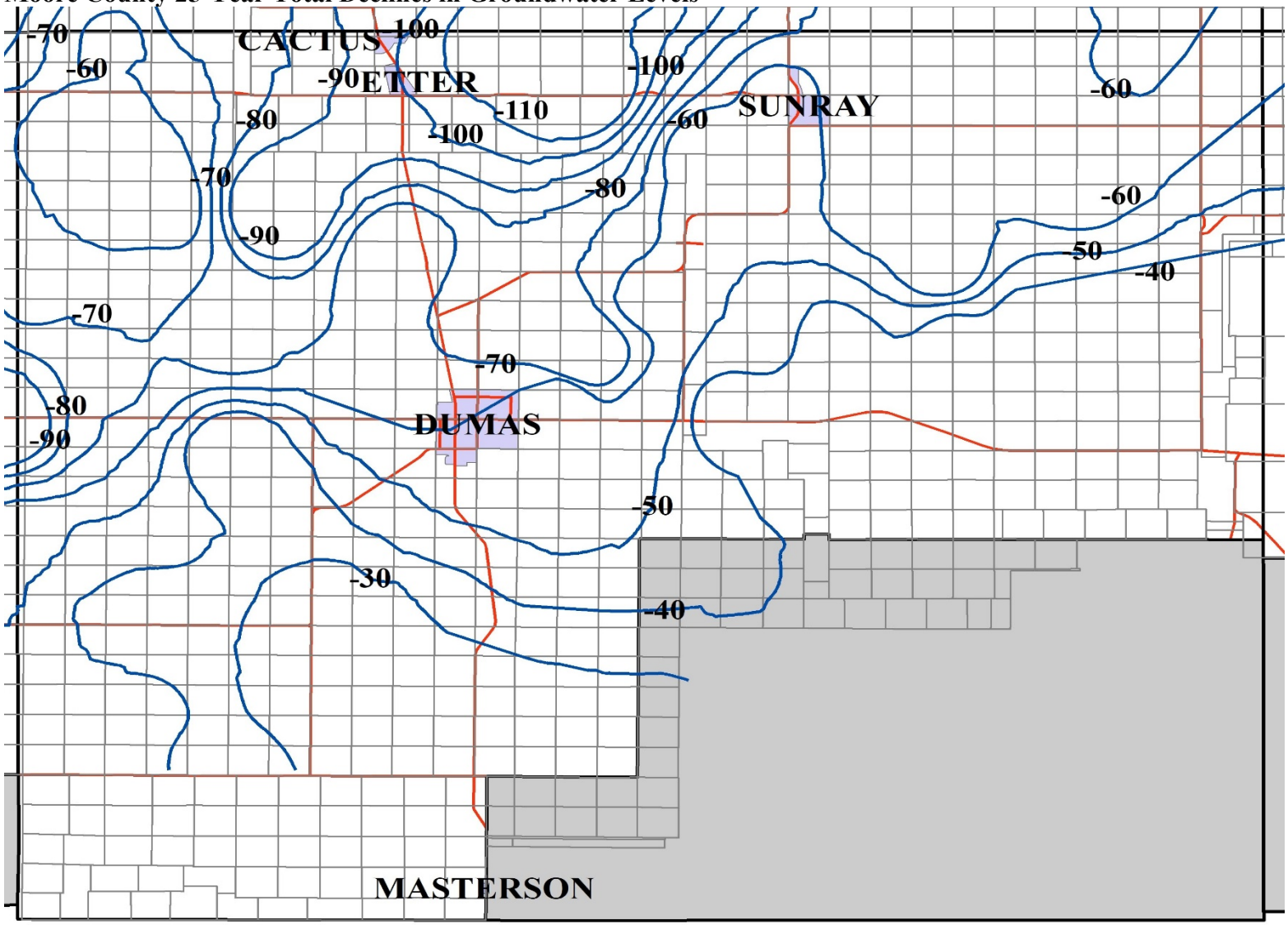
Moore County 25-Year Total Declines in Groundwater Levels



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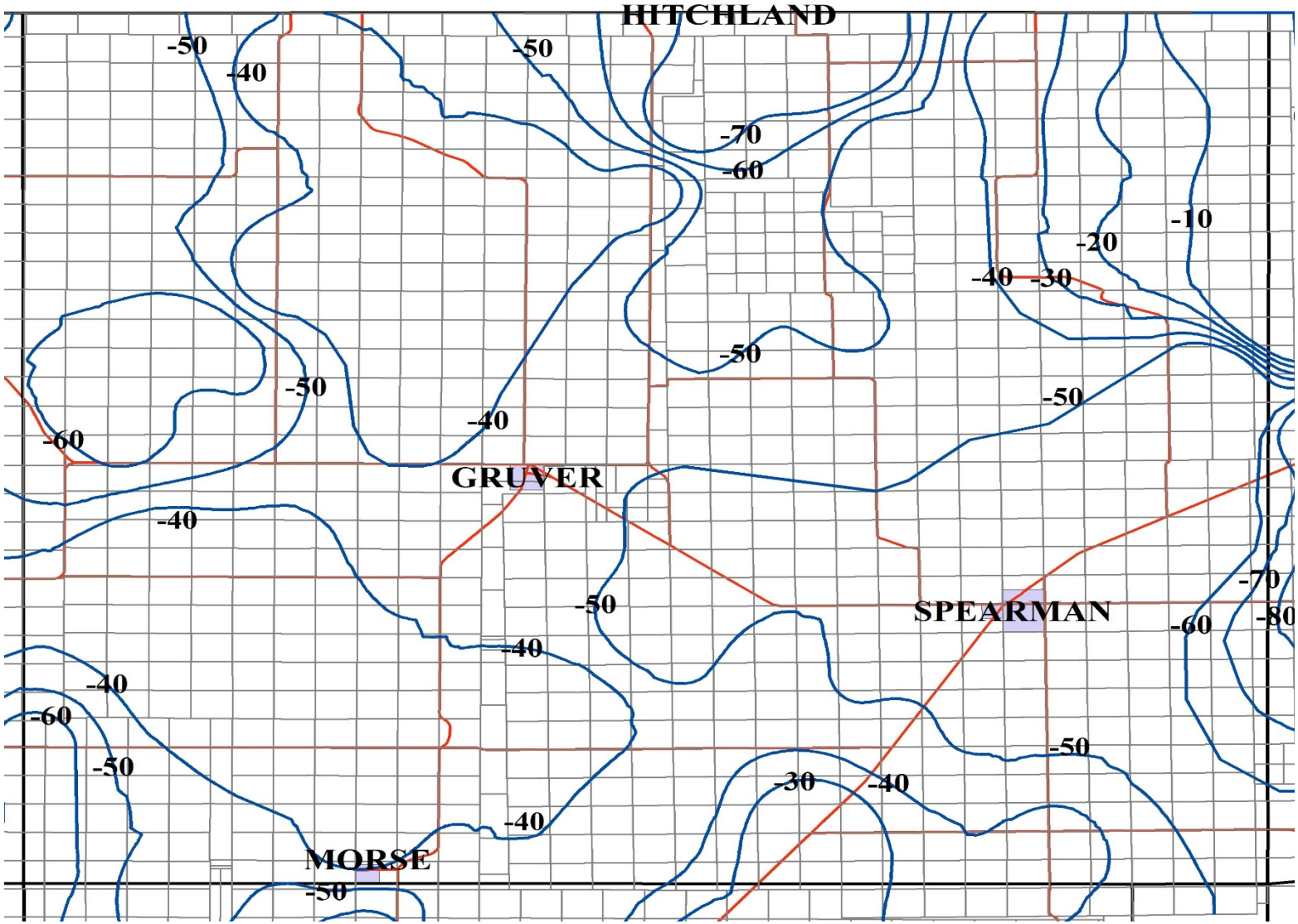
Hansford County 25-Year Total Declines in Groundwater Levels



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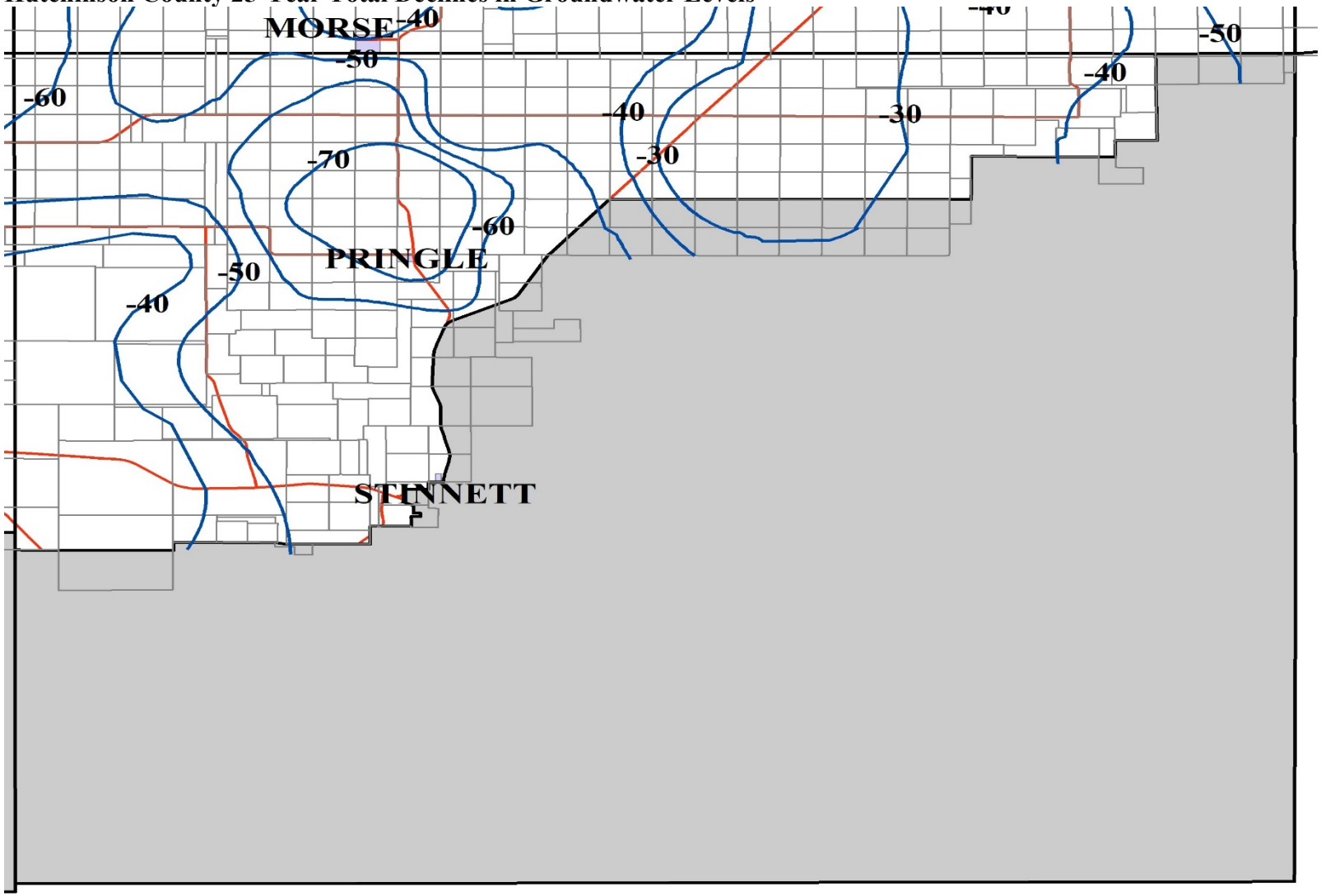
Hutchinson County 25-Year Total Declines in Groundwater Levels



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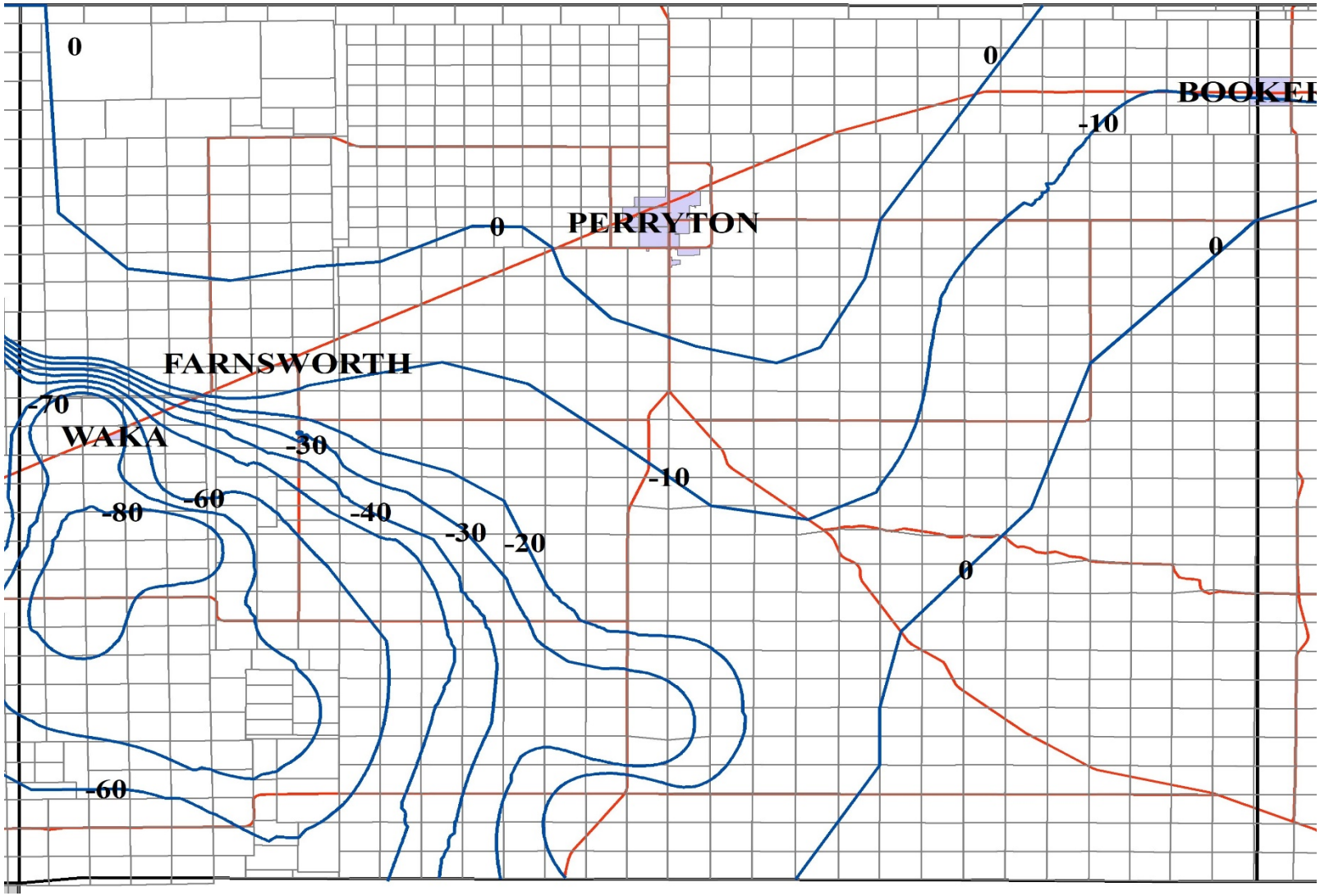
Ochiltree County 25-Year Total Declines in Groundwater Levels



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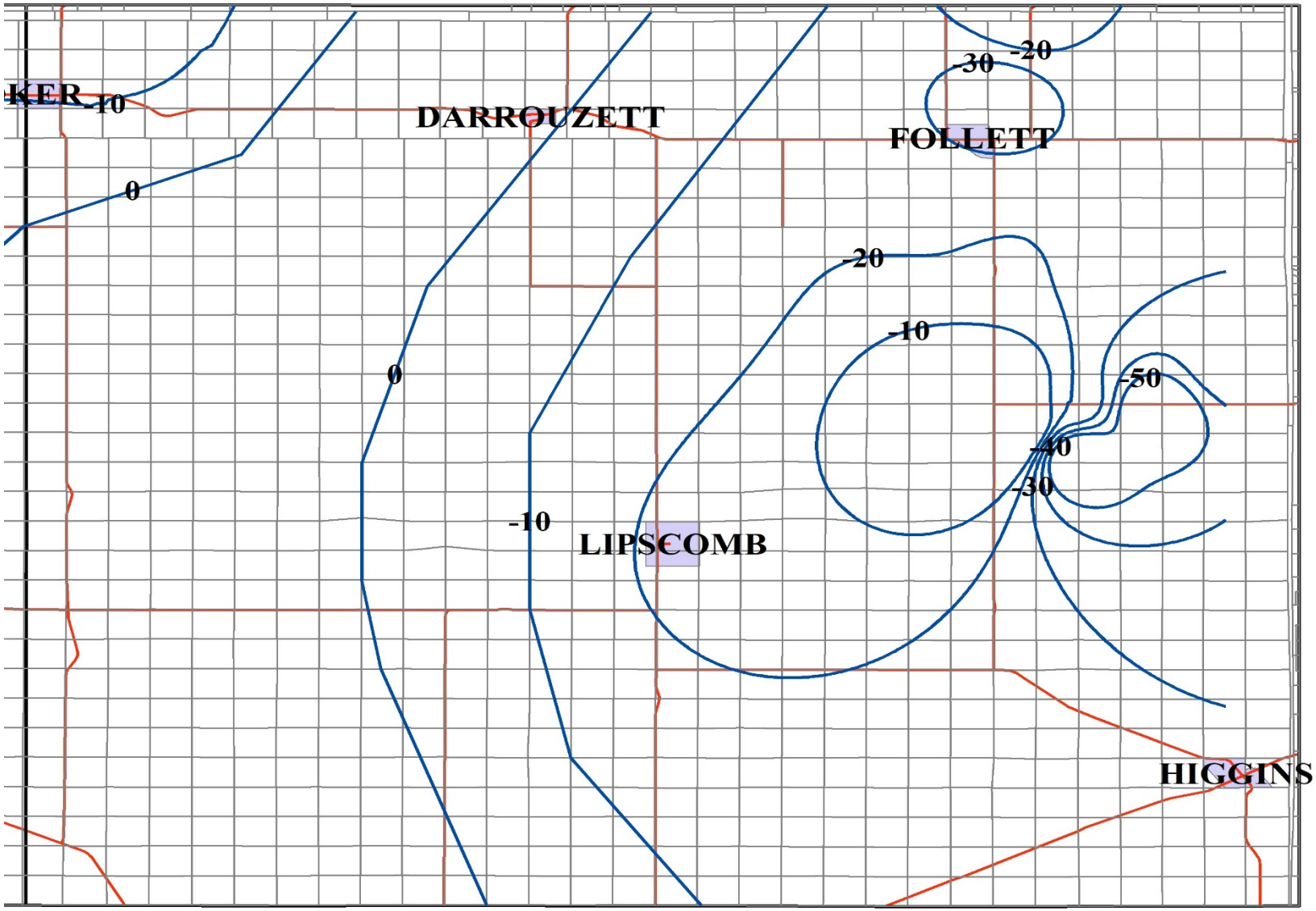
Lipscomb County 25-Year Total Declines in Groundwater Levels



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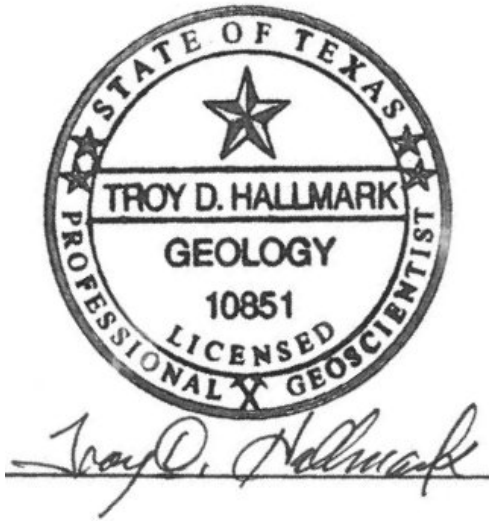

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