Western Kansas Groundwater Management District #1

REVISED MANAGEMENT PROGRAM
November 2023

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WESTERN KANSAS
GROUNDWATER MANAGEMENT DISTRICT NO.1
REVISED MANAGEMENT PROGRAM
November 2023 Final Draft for Review

1. Introduction to the Management Program

The Western Kansas Groundwater Management District No.1 (District, WKGMD1, GMD1) was organized in 1973 because of the need to better conserve and manage the groundwater resources in this area. By the enactment of the Groundwater Management District Act (GMD Act), it enabled the local people to determine their destiny as it related to the use and management of our water resources within the constraints of existing state laws.

Since the first irrigation well within the District was completed in 1907, many changes have taken place including the large scale development of irrigation within the 5 counties comprising the District; subsequent declines in well yields, groundwater pumping and irrigated lands; and more recently, increasing management of irrigation to extend the life and benefit of the aquifer to the area.

We believe it is the responsibility of the District, with input from its members, to guide future water use to maximize its benefit. Without the input of local people, this task would not be possible. It is our firm belief that a sound program can only be achieved by the continued efforts of the local people working in cooperation with this District.

The GMD Act required the development of a Management Program before the District began its active management after its creation, as well as regular reviews of the Management Program by the District Board and updating as necessary. The Management Program updating process requires review and approval of the Chief Engineer of the Kansas Department of Agriculture's Division of Water Resources as well as a public hearing.

The GMD Act defines a management program as, **"*a written report describing the characteristics of the district and the nature and methods of dealing with groundwater supply problems within the district. It shall include information as to the groundwater management program to be undertaken by the district and such maps, geological information, and other data as may be necessary for the formulation of such a program.*"**

Much has changed since the current Management Program was approved in 2005. This 2023 update to the Management Program will focus on providing an update on the current status of groundwater resources within the District, the District's on-going programs to address groundwater resources declines, and the District's plans for the future.

Note to the Reader: Much of the data included in this Management Program is from the Kansas Geological Survey Groundwater Model Report that was prepared for GMD1 in 2015. GMD1 is set to have this Groundwater Model revised in 2024 and 2025. At such time, several figures and data discussions will be updated.

2. District Purpose/Mission Statement

The Board of Directors and staff of the Western Kansas Groundwater Management District No. 1, has a primary responsibility to serve the local community members, stakeholders, and residents of the counties it represents. The High Plains Aquifer System and specifically the Ogallala is a precious resource, and GMD1 aims to manage, protect and provide education on responsible use of this resource with the implementation of local control measures, outreach and community involvement to prolong and protect the life of the aquifer.

3. Formation of the District and Early Irrigation Development

The Western Kansas Groundwater Management District No.1 (WKGMD No.1) was formed because of an urgent need to conserve and better manage the groundwater supplies of the area. Its formation was made possible by the enactment of the Groundwater Management District Act of 1972. The Western Kansas Groundwater Management District No.1 was the first such district to be formed in Kansas. Since that time, four other districts have been formed to better manage the water resources in Kansas.

*More details of the District's initial formation is found in Section II of **Appendix 1**.*

During the first year of formal organization, the district developed its first management program, and determined the best ways to accomplish the district objectives. It was the feeling that through demonstrated projects, meetings, news releases and personal contacts, the district's objectives would be accomplished.

A brief history of early irrigation development within the District, which dates as far as 1888, is included as **Appendix 1.**

4. Description of the District

a. Location and Boundary

The Western Kansas Groundwater Management District No.1 includes the major portion of five western Kansas counties: Lane, Scott, Wichita, Greeley, and Wallace Counties (see **Figure 1** below), with 1,166,920 acres of total land included in the district. Of this total, approximately 170,000 acres are irrigated. There are 1,700 wells in the district with existing production capacities ranging from 50 gallons per minute to 1,800 gallons per minute with most wells producing less than 300 gallons per minute.

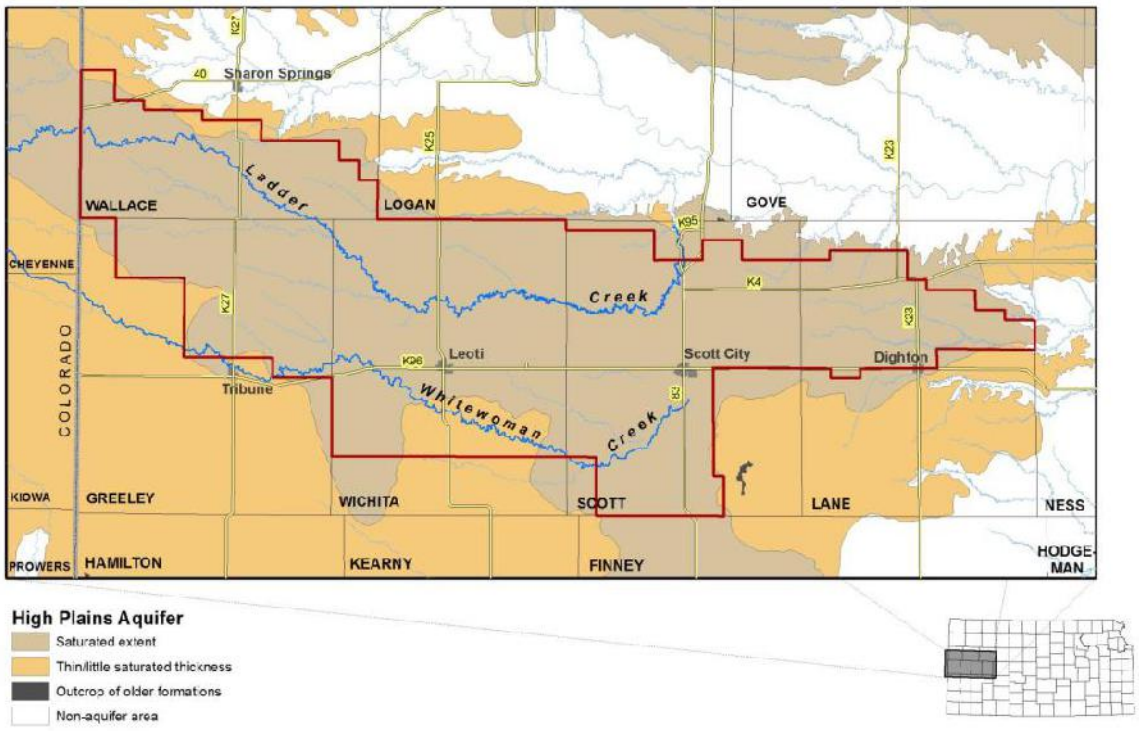

Figure 1 *Map of GMD1 (Kansas Geological Survey)*

b. Drainage

Two creeks which offer potential for recharge are located within the district. These include Ladder Creek, which originates in Colorado and flows through Wallace, Greeley, Wichita, and Scott counties, and Whitewoman Creek which originates in Colorado and terminates in the Whitewoman Basin located just south of Scott City (see **Figure 1** above).

c. Soils

A variety of soils exist within the district, ranging from Sandy Loam in the west-northwest to Silty Loam in the central and eastern portions of the District.

d. Cropping

Typical cropping within GMD No. 1 varies depending on economic circumstances, climate, available crop varieties, and many other factors. Predominantly corn, milo, wheat and recently triticale are the major irrigated crops grown in the District. However, a limited number of acres are devoted to the production of alfalfa, soybeans, sunflowers, canola, and other crop varieties. The majority of the corn, alfalfa, triticale, wheat and milo production is used to support the significant livestock industry within the District. The beans and sunflowers are usually shipped to places outside the district.

e. Climate

The average precipitation ranges from 18 inches on the western edge and 22 inches in the eastern portion of the district, approximately seventy five percent of the moisture occurs during the growing season from April to September. Showers account for most of the annual moisture within the district, particularly in April, May, and June. Local storms occur in a scattered pattern over the area. Heavy rains may be reported in one locality, while a nearby area receives little or no rainfall.

Figure 2 below shows the annual variation in average precipitation in inches across the District.

Because of the elevation and the influence of the surrounding landmass, daily and annual temperatures vary greatly. Frequent cloudless or nearly cloudless skies and dry atmospheric air result in warm days and cool nights. Even in July, the hottest month, the nights are usually cool. Again, **Figure 2** below shows the annual variation in average maximum winter temperatures.

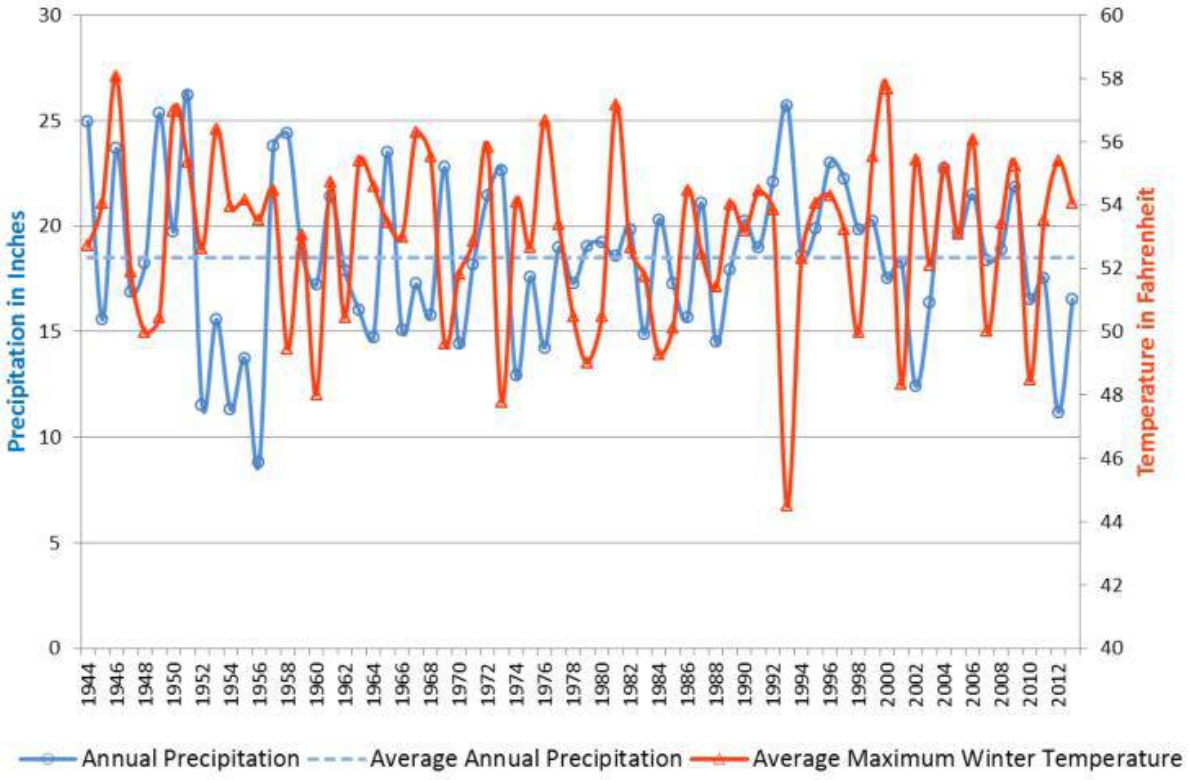

Figure 2 *Average Annual Precipitation*

Surface winds are moderate to occasionally strong in all seasons. The period of strongest winds, on average, is in the spring when low-pressure storm centers are most intense. During dry periods, strong winds may be accompanied by soil blowing, particularly in March and April. However, improved soil management has reduced the amount of soil erosion.

f. Geology

The 2015 Kansas Geological Survey Model Report on GMD1 provides the map of the District's surface geology provided in **Figure 3**, indicating the following.

"*Geologic formations at or near the surface across the model area are sedimentary in nature. The area is overlain by unconsolidated sediments primarily from the Ogallala Formation and loess and recent alluvial deposits. The Ogallala and related deposits, consist of clay, silt, sand, and gravel, accumulated as sediments eroded from the uplifting Rocky Mountains and carried eastward by streams. Eolian (wind deposited) sand dunes are not common but can be found in southeast Scott and southwest Lane counties along with a small area several miles north of Tribune. The northern and eastern boundaries of the active model area coincide with Ogallala/late Cretaceous outcrops. The core areas of the model are concentrated over the thicker portions of the unconsolidated sediments that overlie the bedrock.*"

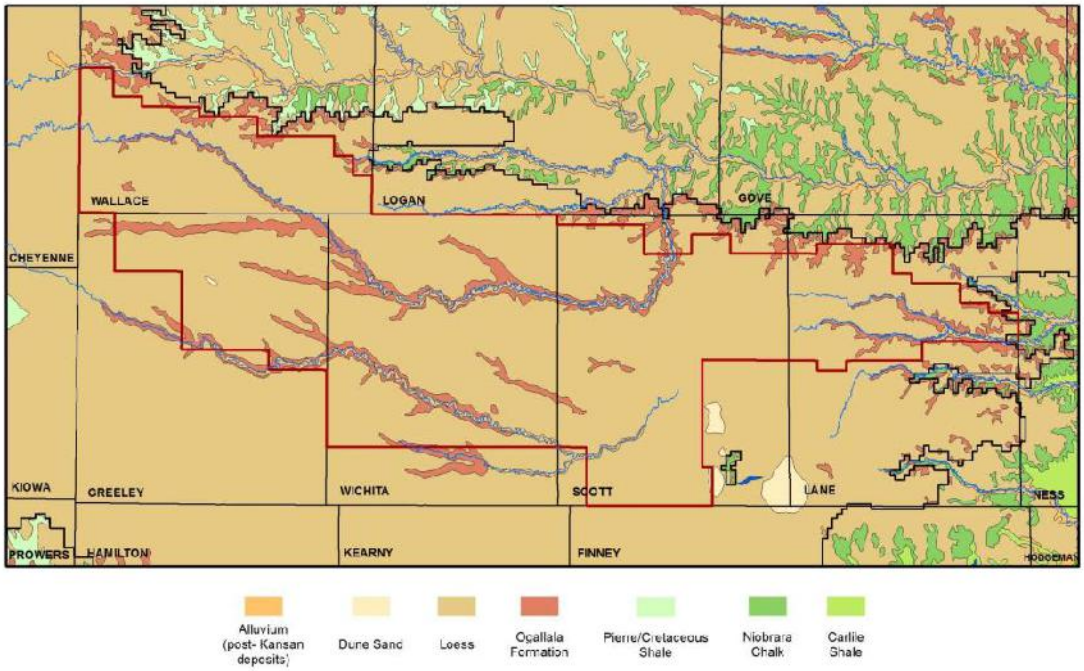

Figure 3 *GMD1 Surface Geology*

g. Land use/Landcover

The following abbreviation is from the 2015 KGS Model Report KGS, on Land Use.

"*The USGS's 2011 National Land Cover Database shows that cropland is the primary land cover type over the model area and even more so within the active area of the model (**Figure 4** below). Grassland, the next most common cover classification, is most prevalent along Ladder and Whitewoman creeks and virtually the entire northern and eastern border of the model's active area."*

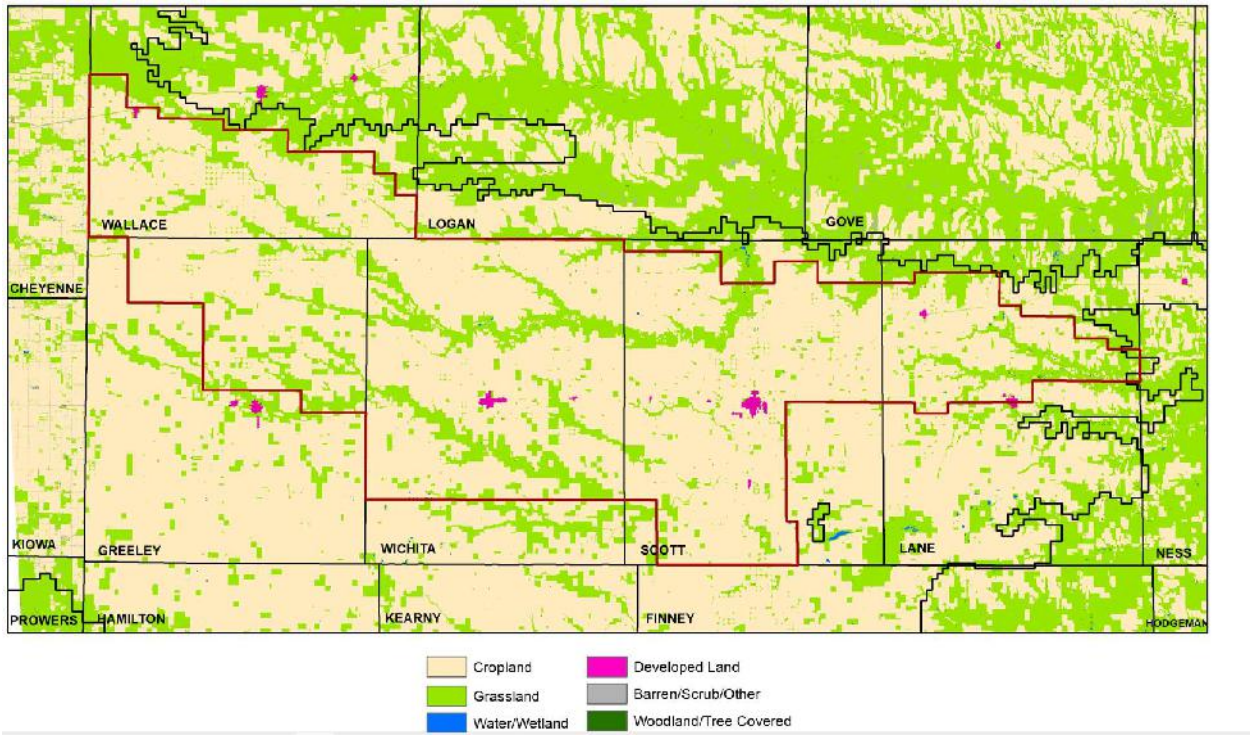

Figure 4 *GMD1 Land Use Map (yr. 2015)*

h. Groundwater Resources

The Ogallala formation of Neogene age is an unconsolidated deposit of silt, sand, and gravel, which makes up the principal aquifer in this district. It ranges in thickness from approximately 0 feet to a little over 150 feet in the northwest portion of the district.

The total amount of water in storage currently available is estimated to be approximately **2,750,000** acre-feet, but some of this total is not available for use by normal pumping methods. It is estimated that pre-development storage was approximately 7,400,000 acre-feet

The following abbreviation is from the 2015 KGS Model Report KGS, on Aquifer Characteristics.

The Ogallala HPA is the principal aquifer in the area and provides water for almost all uses within the active area of the model. Although groundwater is found in the alluvial deposits of Ladder and Whitewoman creeks, as a sole-source water supply these deposits are limited to relatively small yields. The Niobrara Formation is a water-bearing formation but is not considered a principal source because the water typically is found in fractured limestone or in dissolved solution openings and thus can be highly variable in terms of availability. The Graneros Shale, Greenhorn Limestone, and Carlile Shale are found below the Niobrara but are generally of very low permeability and yield little water. The Dakota aquifer system is water bearing and underlies the entire model area. However, given its depth and higher salinity, only 13 water-right wells have been developed in the Dakota in recent years (3 in Lane, 8 in Scott, and 1 in Wichita) and account for less than one percent of the total overall average use of their respective counties (Whittemore et al., 2014).

Figure 5 below is KGS' estimate of the District's pre-development saturated thickness.

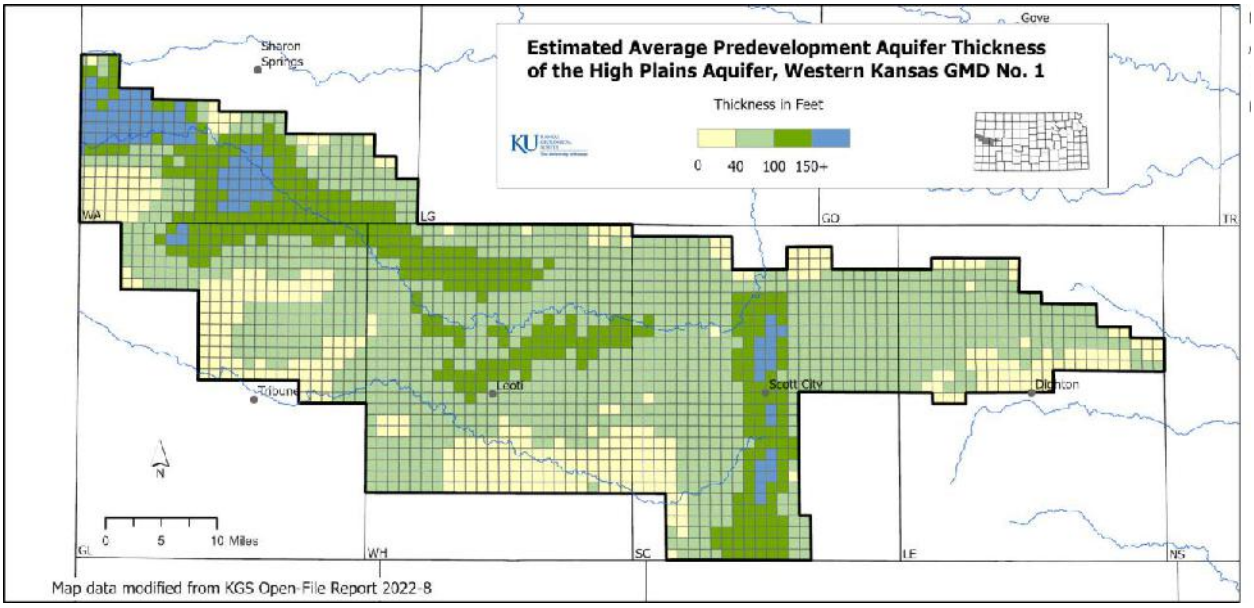

Figure 5 *KGS Interpolated Predevelopment of Saturated Thickness of the Aquifer in GMD1*

As will be discussed further in the Depletion section below, because of decades of withdrawals in excess of recharge, the pre-development saturated thickness above has been reduced to the current saturated thickness shown in **Figure 6** below. Other than areas near Weskan and the Scott County trough, most of the District has less than 50 feet of remaining saturated thickness.

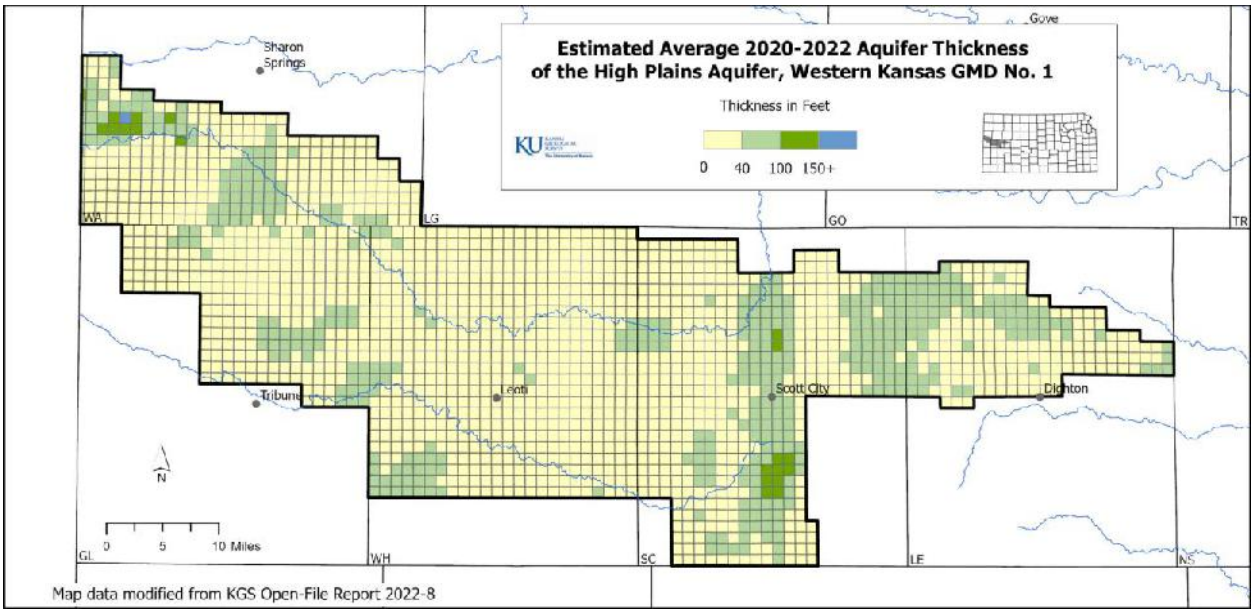

Figure 6 *KGS 2020-2022 of Saturated Thickness of the Aquifer in GMD1*

i. Recharge

Water enters the Ogallala Formation in west-central Kansas primarily by infiltration from precipitation over the area and seepage losses from creeks crossing the district. In addition, a significant portion of water returns to the subsurface through irrigation return flows and from lagged drainage where de-watered sediments of the aquifer slowly release capillary-held water to the aquifer.

The KGS groundwater model uses a variety of recharge estimates including precipitation-based recharge, enhanced recharge over irrigated areas, and irrigation return flows. Combined with lagged drainage from de-watered units, total recharge reaching the aquifer is estimated to have peaked at a rate of approximately 0.83 inches a year in the 1980s and 1990s, roughly 81,800 acre-feet a year, on average, over the district. In response to reduction in both rates of irrigation return flows and lagged-drainage, total recharge rates are projected to decline and stabilize over the next twenty years at a rate of approximately 0.42 inches annually, roughly 41,600 acre-feet a year, on average, over the district. **Figure 7** below, identifies the current estimated storage per County within the District. For tangible reference, if these quantities were to be distributed evenly across the 1.1 Million acres *(approximate)* of the District's surface area there would be approximately two to three feet deep of water.

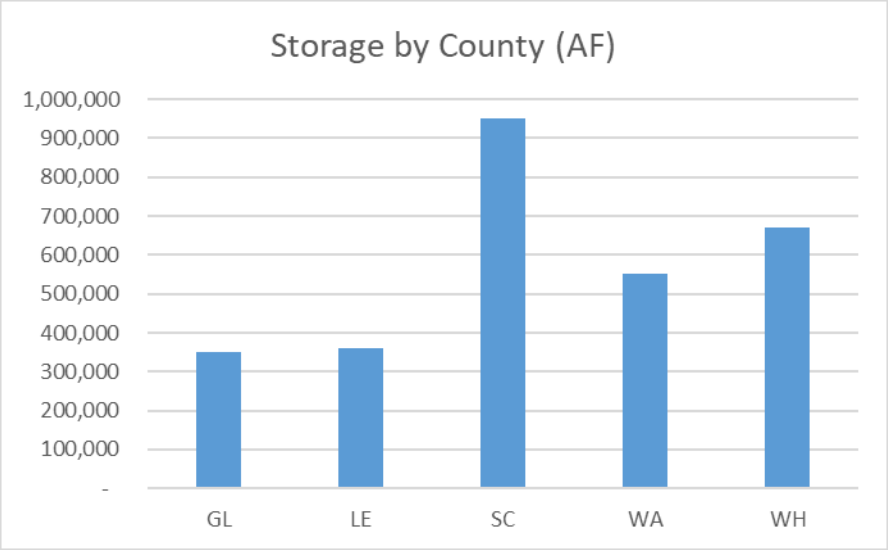

***Figure** 7 Estimated Storage by County*

5. Groundwater Development

The following information is adapted from the KGS's groundwater model report on the development of the District's water resources.

"*Water rights in Kansas are dynamic entities whose characteristics can change over time. The authorized quantities and water-right locations used in the model represent conditions as of*

October 3, 2013. The vast majority of water rights in the model area are groundwater based with 2,529 unique appropriated and vested water rights. The vast majority of these, 97 percent, are authorized for groundwater-based irrigation. Although some surface-water-based appropriations exist, most have been limited by water availability and are insignificant relative to the total authorized quantities." KGS' **Table 1** below for the breakdown of the authorized quantities within the District by source and use made of water.

Authorized Quantity, Appropriated and Vested Water Rights, GMD1, 09/15/2023							
	INDUSTRIAL	IRRIGATION	MUNICIPAL	RECREATION	STOCKWATER	OTHER	TOTAL
SURFACE	0	0	0	142	0	204.6	346.60
GROUND	330.7	672,512.60	4,145.48	419	18,692.34	8.89	692,992.10
TOTAL	330.7	672,512.60	4,145.48	419	18,692.34	213.49	693,338.60
Average Reported Water Usage, GMD1, 2013 to 2022							
	INDUSTRIAL	IRRIGATION	MUNICIPAL	RECREATION	STOCKWATER	OTHER	TOTAL
SURFACE	0	0	0	0	0	0	0.00
GROUND	126.7447325	142,120.78	2,076.62	17.6	7,039.52	3.97	151,385.23
TOTAL	126.7447325	142,120.78	2,076.62	17.6	7,039.52	3.97	151,385.23

Table 1 *KGS Data - Authorized Quantity, Appropriated and Vested Water Rights*

Figure 8 below is a map from the KGS report showing the distribution of water rights within the District. *This figure and others throughout this document that originate from the KGS Model report will be updated following the completion of the GMD1 KGS Model scheduled for 2024 or 2025.*

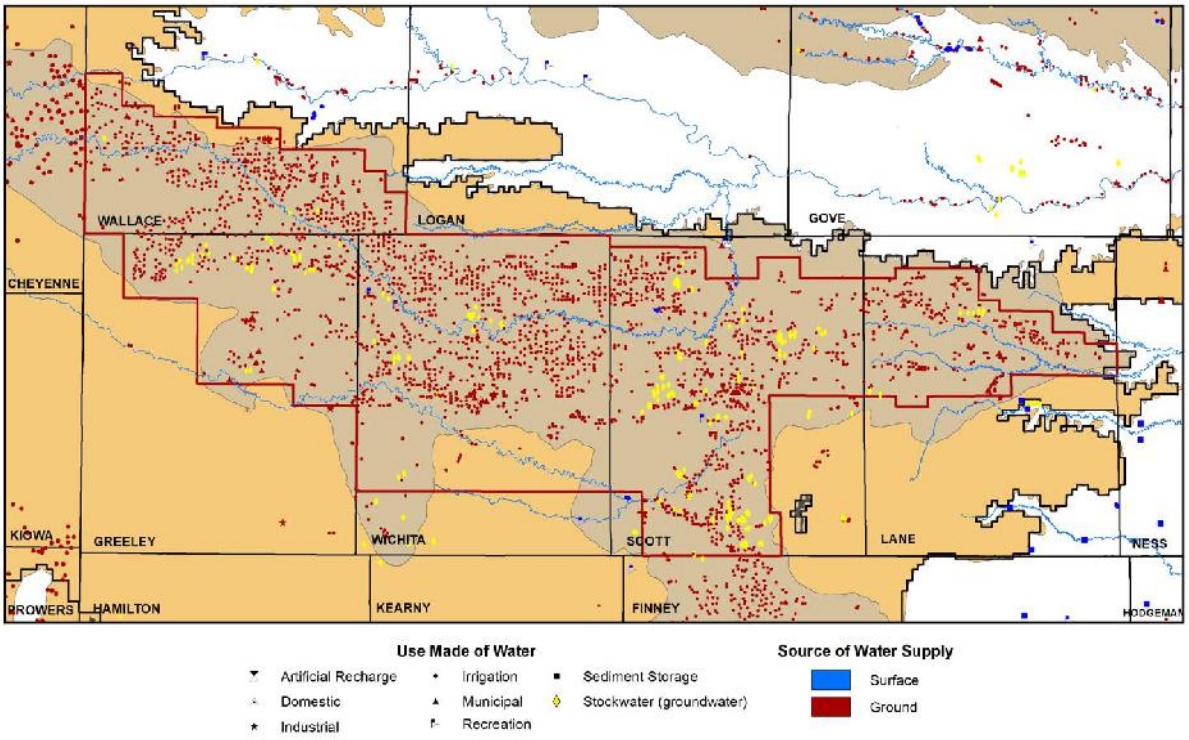

Figure 8 *GMD1 Water Right Distribution*

Figure 9 below depicts the growth in total authorized quantity under (non-dismissed rights) over time, as of 2017, along with reported water use in red and KGS estimates of water use for its groundwater model development.

What the graph does *not* capture is authorized quantities associated with dismissed water rights which are believed to be significant, likely approximately 1/3 of the water rights granted. It is estimated that there are approximately 2,349 unique active appropriated or vested water rights/uses in GMD1, while approximately 718 have been filed as "dismissed" water rights.

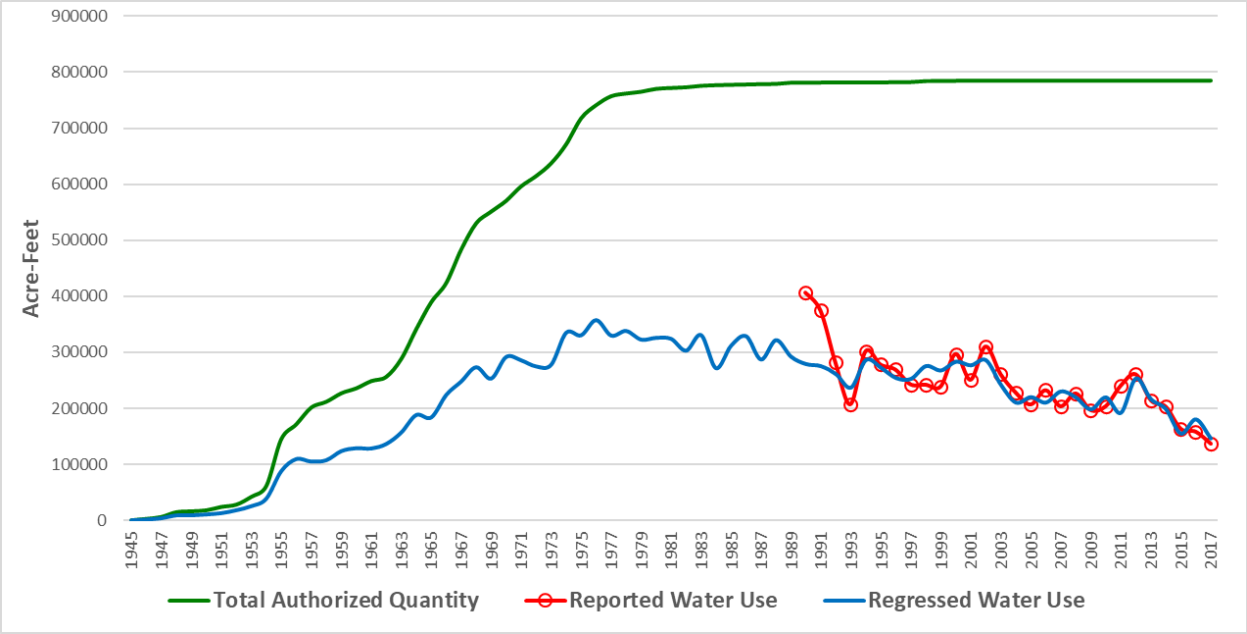

Figure 9 *Growth in Total Authorized Quantity-statement update*

a. Irrigation

As is shown in the data above in **Figure 9**, the dominant use of water within the District is irrigation. **Figure 10** below shows the distribution of authorized places of use for irrigation as of 2014.

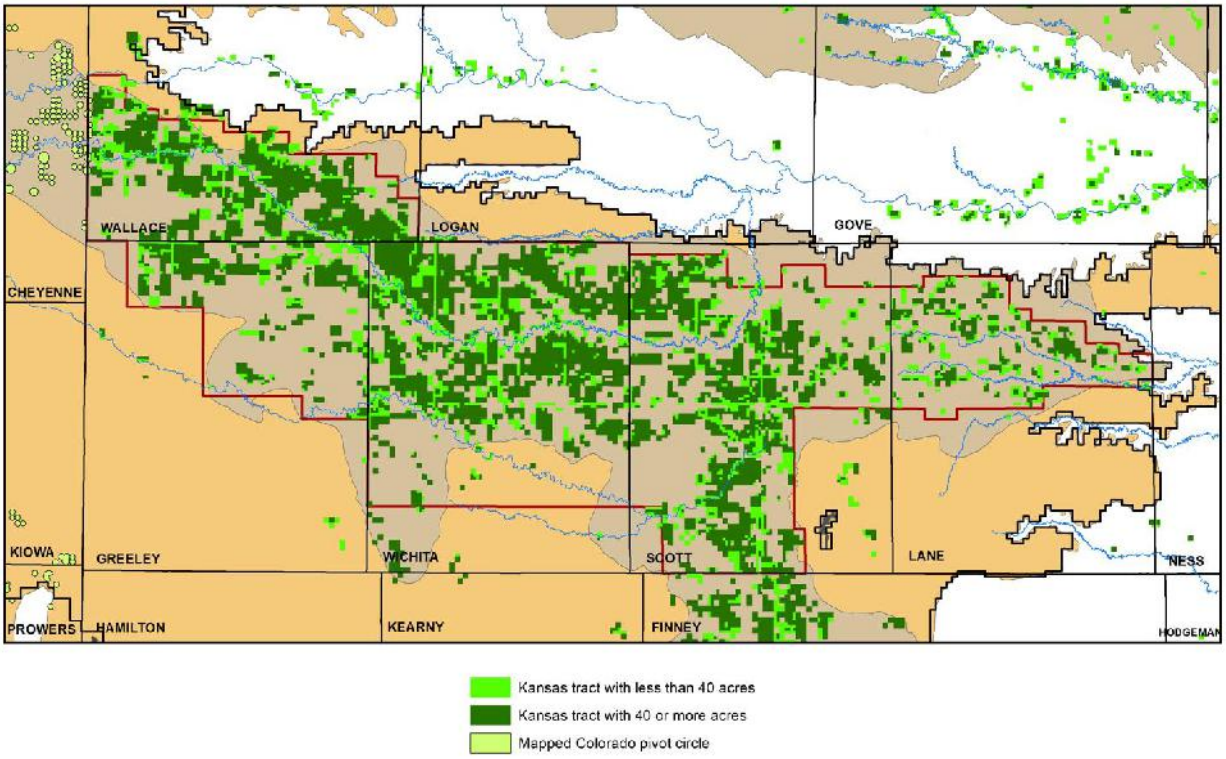

Figure 10 *Authorized Places of Irrigation Use*

As will be discussed in the section on Depletion, the reduction in groundwater levels within the District has resulted in reductions in well yields which in turn has led to significant changes in irrigation over the last four decades.

Responses to the declining water supply have included a dramatic shift to improved irrigation efficiencies via system improvements, a reduction in irrigated acres, and transitioning to crops that use less water.

KGS ground model report captures the change in irrigation system types, leading to increased irrigation efficiencies (and reduced recharge). **Figure 11** from the KGS report illustrates these changes for Wallace County. Similar transitions have been seen in the entire District.

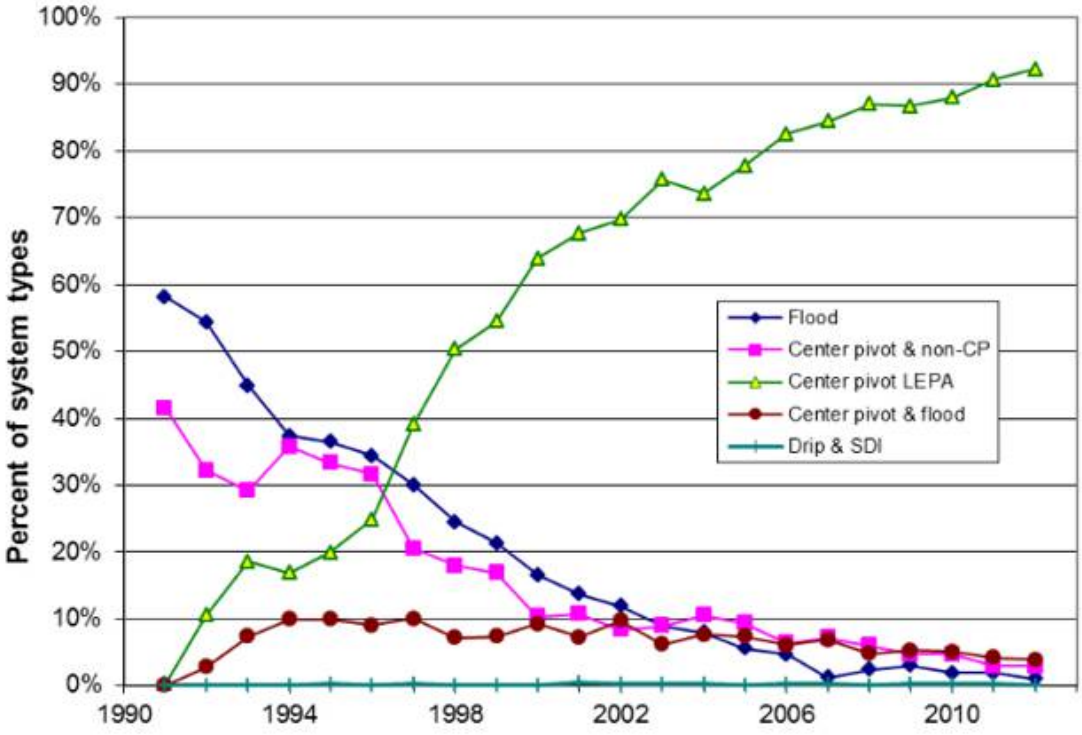

Figure 11 *Reported Irrigation Systems Wallace County 1990 to 2012*

Figure 12 below shows the changes in total water use *(all water uses reported collectively)*, from 2000 to 2022. There is less confidence in any earlier data as meters were not required in the District until 2016, with previous reporting done based on hours and estimated rate of pumping. As the KGS analysis referenced below evidence, there is significant annual variation in pumping related to variation in precipitation during the irrigation season. Even with this variation, it is apparent that groundwater pumping and acres irrigated are declining over time with the decline in water supply as well as on-going efforts to conserve water for the future.

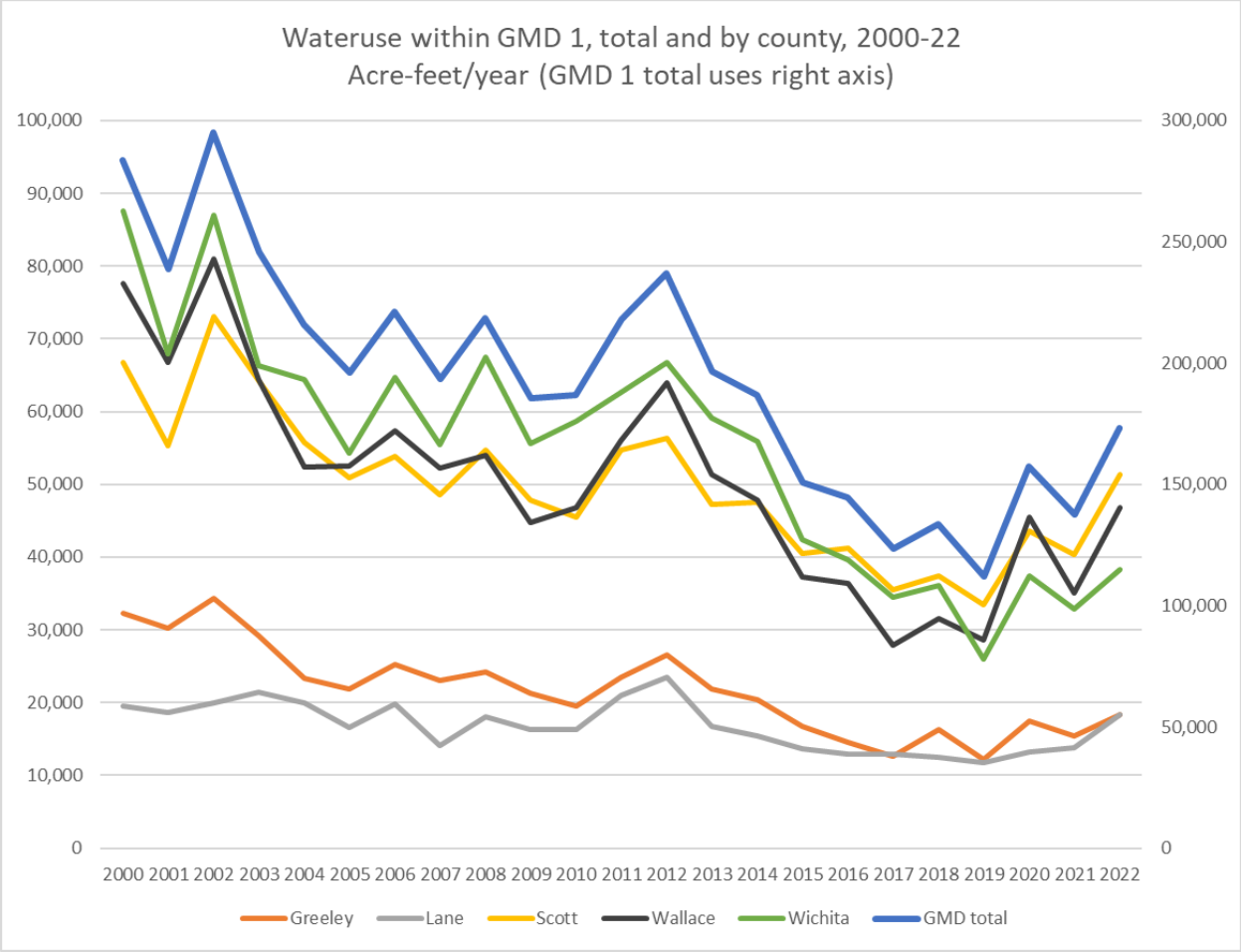

Figure 12 *GMD1 Change in Water use Within GMD1*

b. Municipal Use and Domestic Use

The District has several rural municipalities ranging in population from less than 400 to more than 4,000. Municipal use of groundwater is a minimal use regionally when compared to water use for irrigation, however the District works to engage with local municipalities to assess concerns and to identify contingency plans and/or opportunities to collaborate on outreach, education and other projects. The District is working to expand the Municipal Outreach Initiative which is focused on developing ongoing collaboration with municipalities and domestic water users.

Scott City – Scott City, located in Scott County has a population of approximately 4,113 *(2020 Census).* They currently are working to enhance existing infrastructure with the building of a new water tower and the replacement of old lines and mains in various areas of the City. Additionally, the City has begun coordinating with the District on possible outreach/education and cost-share opportunities. Like most communities, conservation is very important, and ongoing efforts are in place towards promoting local conservation of water resources.

Dighton – Dighton is located in Lane County and has a population of approximately 960 *(2020 Census).* (More information will be added when available regarding ongoing projects in coordination with the District)

Leoti – Leoti is located in Wichita County and has a population of approximately 1,475 *(2020 Census).* (More information will be added when available regarding ongoing projects in coordination with the District)

Weskan – Weskan is located in Wallace County and has a population of approximately 158 *(2020 Census).* The City is currently looking at adding a water right and a groundwater well to their city supply, and has collaborated with the District on assessing options and potential work to bring water into the District for use by the municipality.

In **Figure 13** and **Figure 14** the water use within GMD1 specific to municipalities and separated by County. It is important to note that this is only reflective of municipal water right use, and not irrigation water use for recreational purposes within city limits, golf courses, football fields, etc.

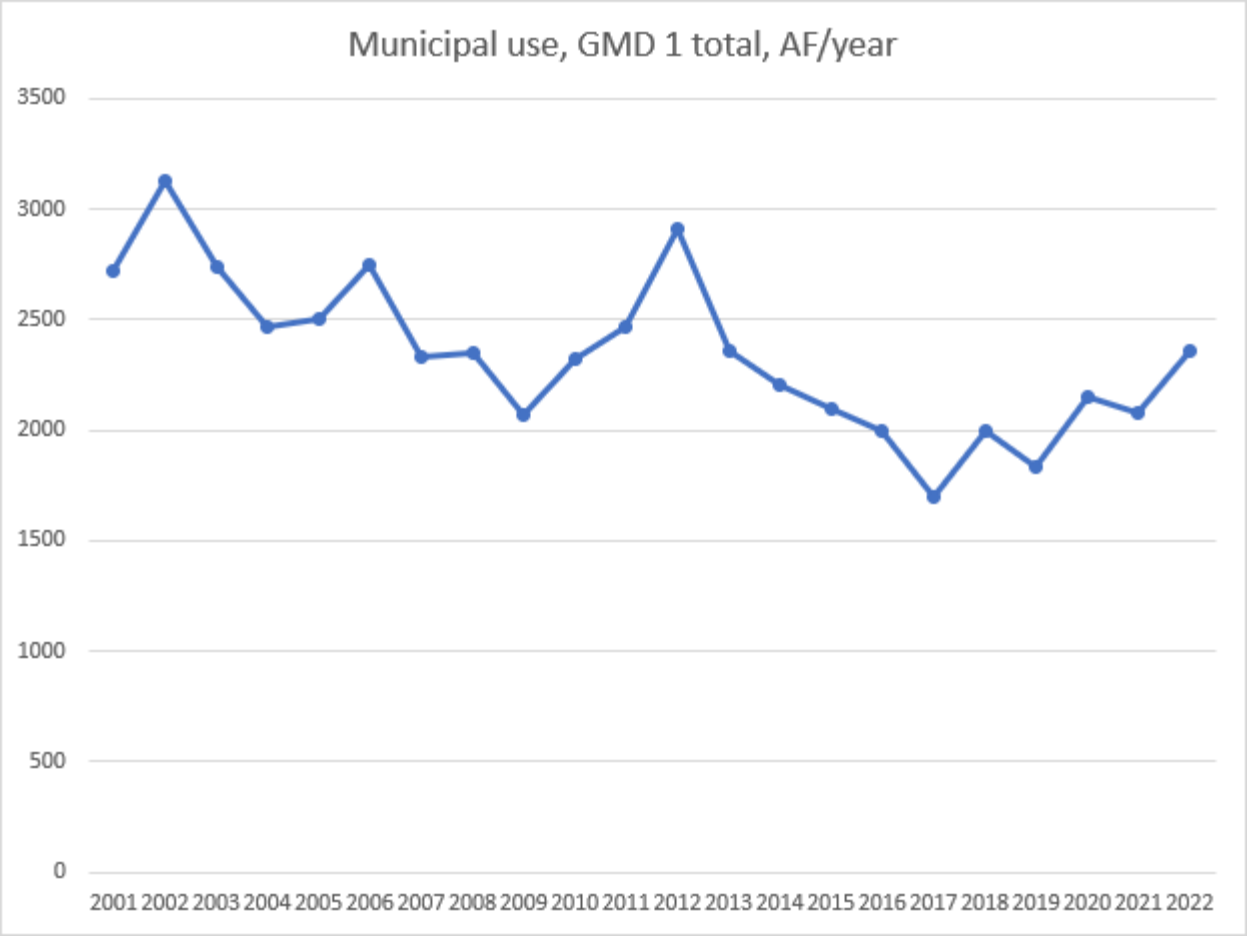

Figure 13 *Municipal Water Use in GMD1*

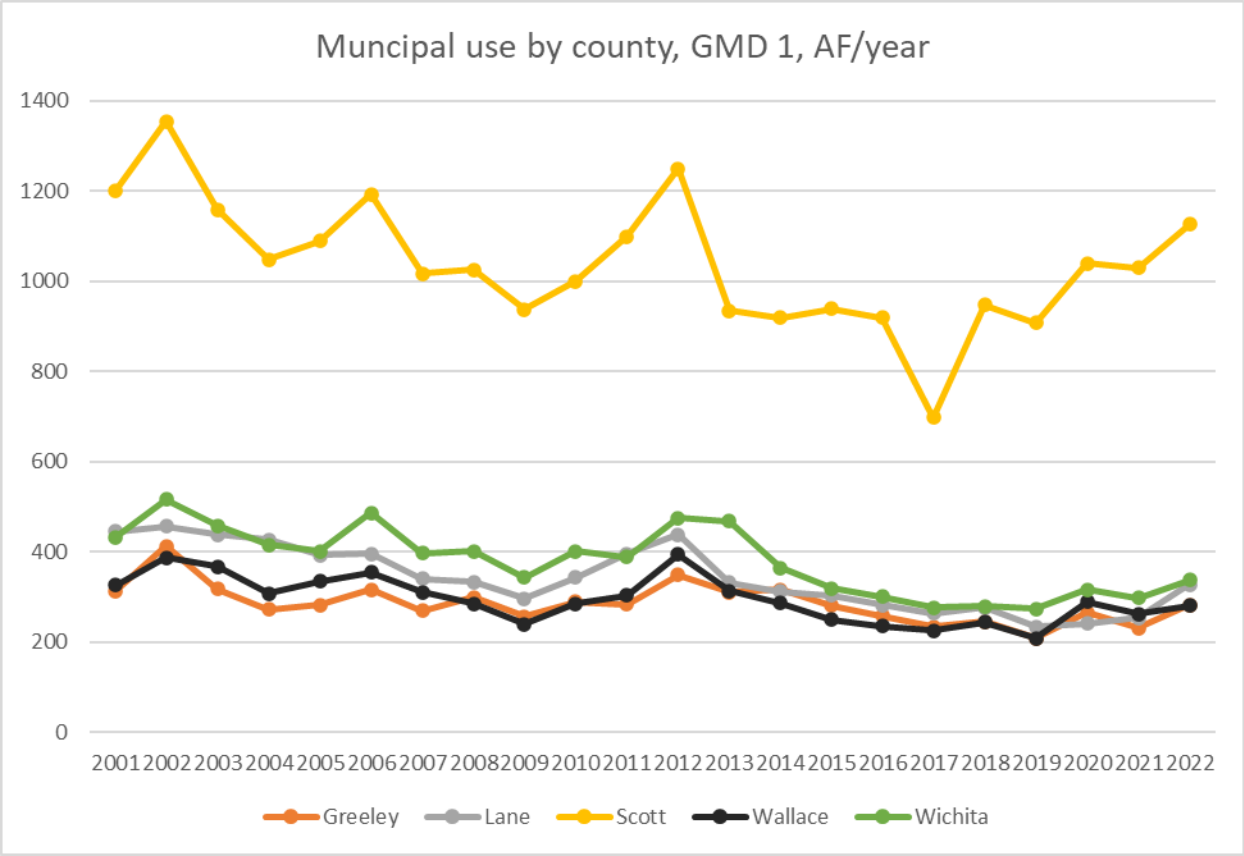

Figure 14 *GMD1 Municipal Water use by County*

c. Stock Water Use

Stock Water Right Holders are a very critical economic driver in Western Kansas. The District has initiated a **Stock Water Right Holders Initiative** focused on collaborating with local industries, dairies, cattle feeding facilities and swine facilities to identify areas of concern and how the District can address these issues. Within the five counties of the District are more than 20 cattle feeding yards, as well as multiple large dairies, and several large swine facilities. As previously discussed in this plan, much of the dry land and irrigated crop production is used for livestock feed and therefore is a very significant economic driver for the surrounding communities.

Figure 15 and **Figure 16** show stockwater use within GMD1 and separated by County.

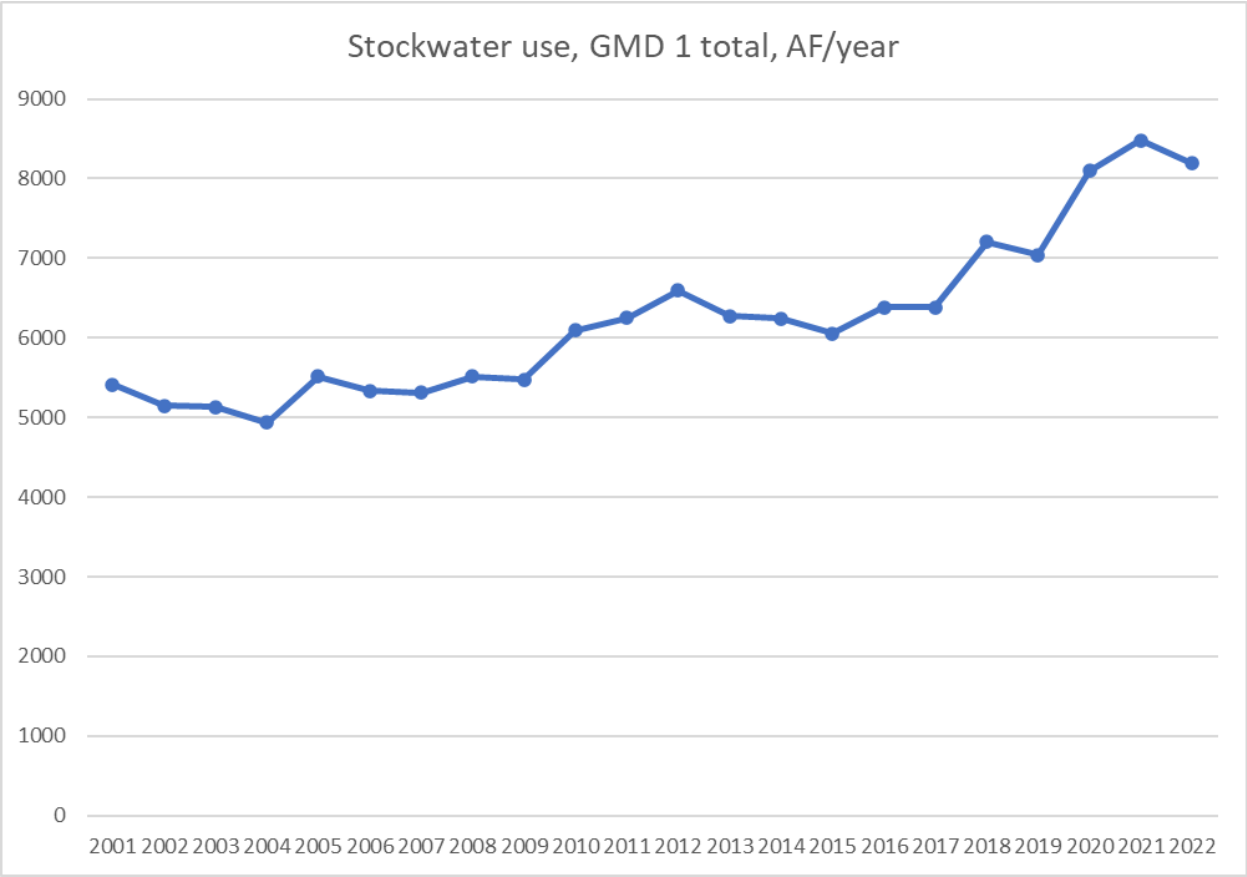

Figure 15 *GMD1 Stockwater Use*

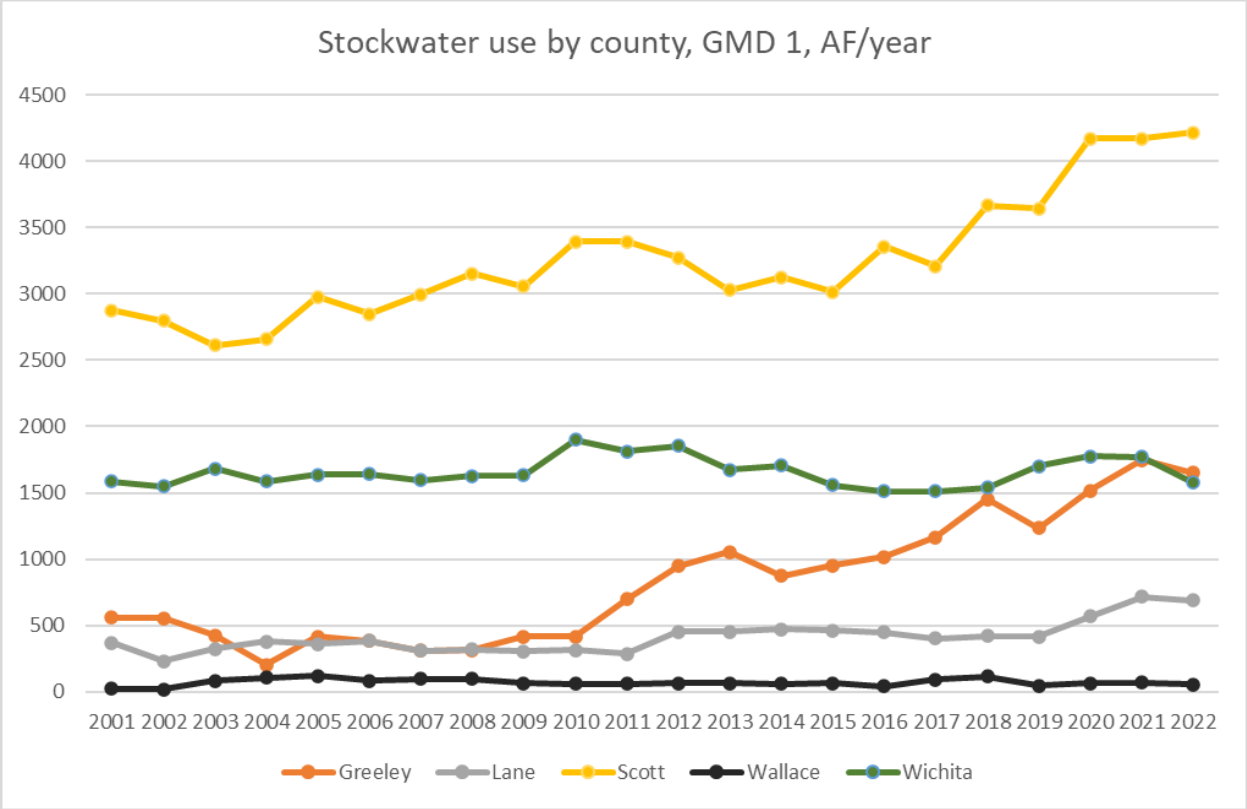

Figure 16 *Stockwater Use by County*

Appendix 2 2017 County Ag Census Data, provides extensive detail on the economic impacts and total value of products sold in each of the five counties of GMD1. This simply reiterates the importance of water and agriculture to the local economy. A few specific statistics can be found below in **Table 2**, most significantly indicating that Scott County alone is responsible for over $1.13 Billion dollars of Total Annual Market Value of Products sold for the State of Kansas. *(It is estimated that these values may be updated in the coming years with renewed census data).*

	Total Annual Market Value of Products Sold	Other Significant Statistics
Scott County	**$ 1,135,039,000**	**Ranks as 2nd County in the State and 4th in the USA for Cattle & Calves**
Wichita County	**$ 555,347,000**	**Ranks as 3rd County in the State for Hogs & Pigs**
Lane County	**$ 266,374,000**	**Ranks as 12th County in the State for Cattle & Calves**
Greeley County	**$ 251,308,000**	**Ranks as 1st County in the State for Hogs & Pigs. 3rd in the State for Milk from Dairy Cows**
Wallace County	**$ 81,786,000**	**Ranks as 12th County in the State for Hogs & Pigs.**

Table 2 *2017 Census of Agriculture - County Summaries*

6. District Regulations

As is noted in the introduction, the state's Groundwater Management District Act allows for the creation of GMDs to better conserve and manage the groundwater resources in this area.

This has been accomplished in numerous ways over GMD1's long history including demonstration projects, data collection, cooperation on irrigation research, education, assisting in water conservation planning, and more recently in the development of Local Enhanced Management Areas (LEMAs) and cooperating in encouraging the development of Water Conservation Areas (WCAs), and more. On-going programs are discussed below under **Section 7.**

In addition, GMD 1, in cooperation with the Chief Engineer, has implemented a set of rules and regulations to prevent waste, guide new development and water right changes in the public interest and more. Among these include:

- K.A.R. 5-21-2, adopted 1979, to require the control of tailwater to prevent waste.
- K.A.R. 5-21-3, adopted in 1979, to establish well spacing requirements for new wells and water right changes.
- K.A.R. 5-21-4, adopted in 1994, with significant amendments in 2000 and 2011, related to "Safe Yield" to guide new development. The 2011 amendment essentially closed the District to new appropriations.
- K.A.R. 5-21-6, initially adopted in 2003, related to standards for flow meters and their installation. In 2016, the regulation was amended to require all wells to be metered except for domestic use or pursuant to a temporary permit.

a. Board of Directors

The District maintains a Board of Directors of five members that are publicly elected at the District's Annual Meeting which takes place in February of each calendar year. Each County represented in the District (Scott, Lane, Wichita, Greeley & Wallace) has a Board Member specific to that county, that serves a three year term.

At this time, the District does not have a designated seat for a Municipal Representative or a Stock Water/Industrial Representative. However, the District welcomes involvement at monthly Board Meetings from all stakeholders and Zoom/remote options are available at all meetings. Additionally, the District holds annual Municipal and Stock Water Right stakeholder outreach meetings to gain feedback from interested parties.

7. WKGMD1 Areas of Concerns & Initiatives to Address Concerns

Concern	Solution
Depletion	Programs to Address Depletion: LEMA's, WCA, Cost Share, Education, Agency Partnerships, Data Collection
Prevention of Waste	Programs to Address Waste: Cost Share Technologies, Education, Regulation
Water Quality	Proposed Programs to Address Water Quality: Partnership with KDHE Monitoring
Education	Initiatives: Outreach and Educational Campaigns, Tech Farms, Stakeholder Group Summary (include Stock KDA numbers)
Economics	Research and Education: Transitions to Dryland, Technology, Research Partnerships

Table 3 *GMD1 Concerns and Solutions*

a. The Concern of Depletion & Implementation of LEMA's and WCA's to Address

The Concern of Groundwater Depletion

WKGMD No.1 has historically observed decline rate across much of the District. As is referenced in the sections above on the District's groundwater resources and groundwater development, the District saw significant growth in irrigation and other use over the late 1950's, through the 1960's, with the slowing of large-scale development in the early to mid-1970's as the District's adopted restrictions on new development. However, approximately 690,000 acre-feet per year is currently authorized for use within the District. This is in contrast to the KGS' estimates of recharge which has been as high as 81,800 acre-feet/year during past times of

significant irrigation return flows, but has decreased and potentially stabilized at approximately 41,600 acre-feet/year (as return flows diminish over time).

This deficit between pumping and recharge has created significant declines in the aquifer as is illustrated in **Figure 17** below, where KGS shows the percentage of pre-development saturated thickness that has been lost over time.

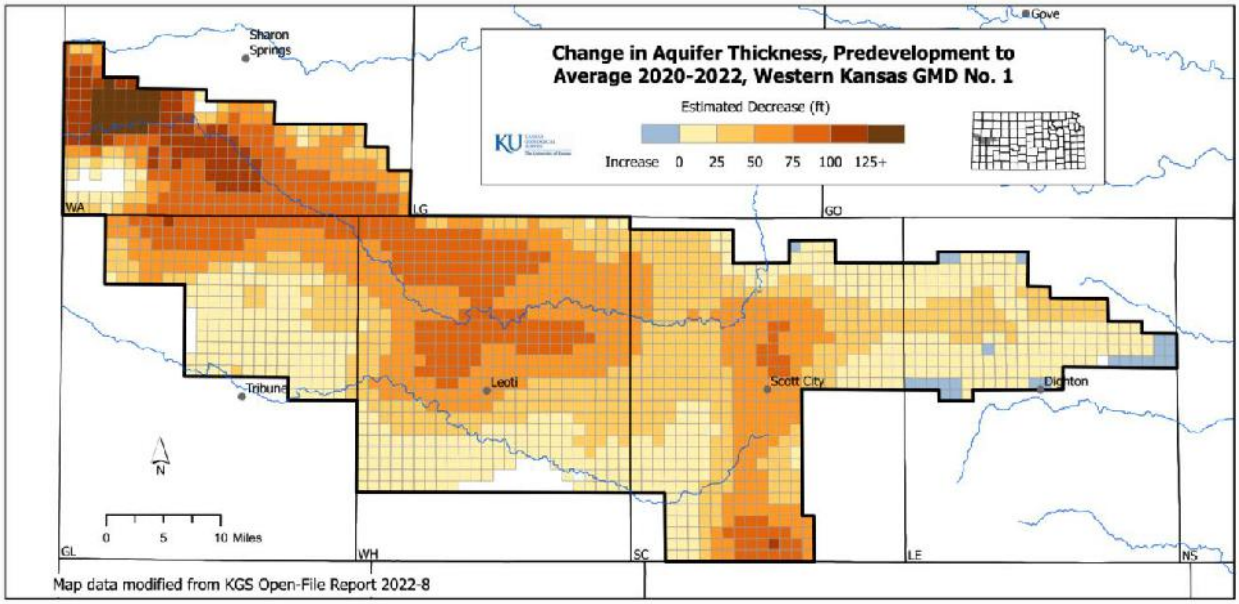

Figure 17 *Change in Aquifer Thickness - Predevelopment to 2022*

The reductions in groundwater levels have not been uniform over the District but varied with the density of development and use. The KGS and DWR annually measure groundwater levels below land surface over a significant network of wells within GMD 1 and the rest of the High Plains aquifer. The graph below (**Figure 18**) shows the trends in average groundwater level measurements over time, in each of the counties and the District as a whole, as well as in a township of the Weskan area.

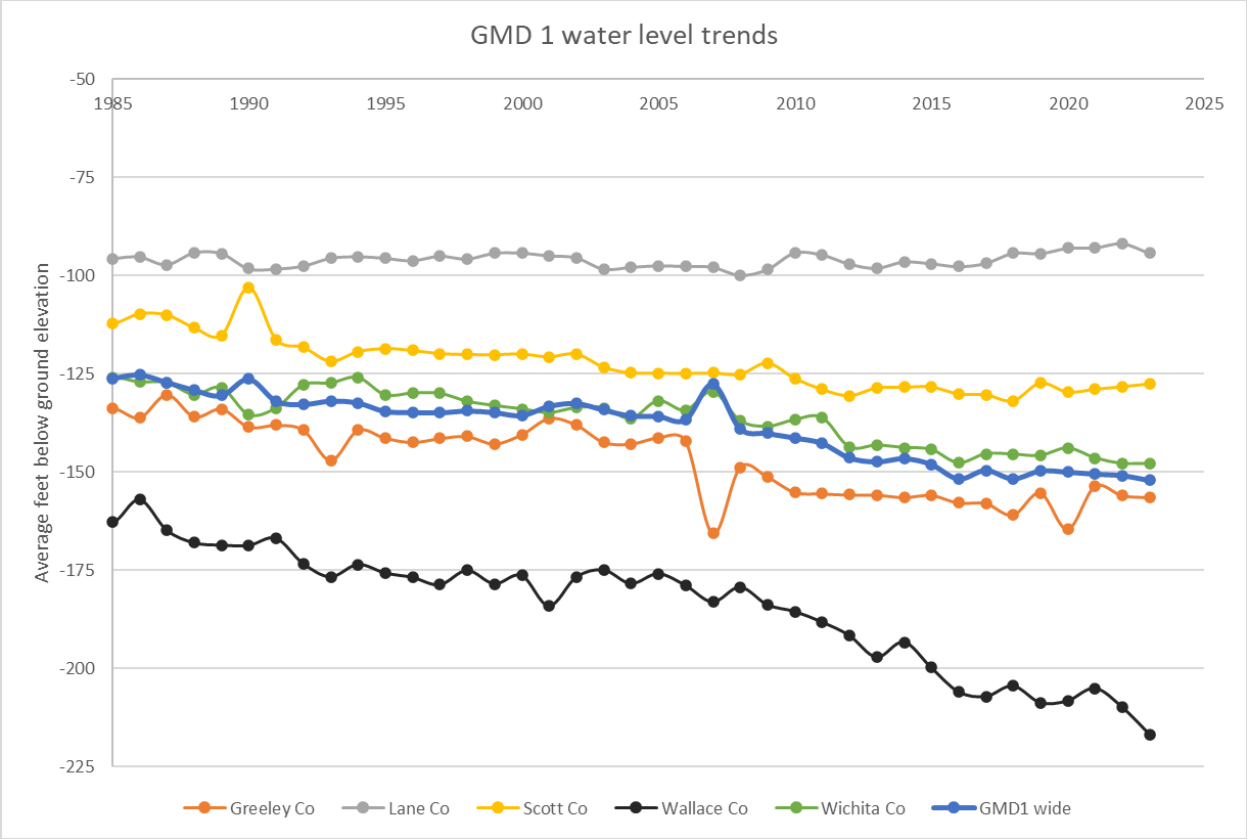

Figure 18 *GMD1 Water Level Trends*

The declining groundwater level has led to a gradual reduction in well yields and groundwater withdrawals. KGS estimated water use peaked in the mid-1970's at approximately 400,000 acre-feet and has been on a decline since. The graph below shows more recent trends, with water use averaging approximately 150,000 acre-feet/year over the last decade. In certain areas there does seem to be some indication of data leveling possibly due to recent conservation measures. Total irrigated areas have also been on the decline.

District Activities to Address the Depletion Concern

The District initially responded to the groundwater depletion concern by increasing the restrictions on new groundwater development, ultimately closing the District to new appropriations.

The District has also supported a variety of programs to reduce the depletion concern including supporting increased irrigation efficiency through research, demonstration projects and other forms of education, and cost-sharing on irrigation improvements.

Historically, there have been limited programs available to Kansas Groundwater Districts to help in restricting water use. In 2012 Kansas Groundwater Management Districts were granted the ability and authority through KSA 82a-1041 to recommend **Locally Enhanced Management Areas (LEMA's)** for approval by the Chief Engineer of the Kansas Department of Agriculture, Division of Water Resources. A LEMA is a locally developed and locally implemented tool at the District level that promotes conservation measures to prolong the life of the aquifer. Since 2012, GMD1 has engaged with stakeholders across all five counties on need for the development of a LEMA. In 2014, a district wide LEMA was put to vote and was denied. However, the Board of Directors continued discussions, and refocused specifically on Wichita County which at the time was identified informally as a high priority of concern for the District.

In 2015, the Legislature amended the Water Appropriation Act to allow for creating **Water Conservation Areas (WCAs)**, which is a streamlined tool for allowing a singular water right owner or group of water right owners to enter into a conservation plan. A Water Conservation Area (WCA) is a designated area with an approved management plan developed by a water right owner or group of water right owners with the consent of the Chief Engineer to reduce water withdrawals while maintaining economic value via water right flexibility.

Following the attempted 2014 GMD1 LEMA, the Board focused rather on supporting efforts in the Wichita County area to establish **the Wichita County WCA** which then began in 2017.

Participation in the WCA is voluntary. The basic provisions, number of participants and results are summarized in **Table 4** Quick Facts - GMD1 Conservation Efforts**.** The recent work of the Kansas Geological Survey has cited the WCA is a significant contributor toward lowering the rate of aquifer decline in Wichita County. Following the development of this WCA, the Board then worked to establish the Wichita County LEMA. The LEMA provisions chosen by the Board complimented the WCA, requiring a 25% reduction from 2009-2015 average water use, which is less than the required by WCA, but the LEMA Plan requires participation by all irrigation use and included more limited flexibility in the use of allocations. The **Wichita County LEMA** plan was submitted to the Chief Engineer in early 2020 and after the two required hearings, was approved, effective for the 5-year period, 2021-25. Again, **Table 4** below provides a summary of this LEMA and its initial results.

Figure 19 and **Figure 20** indicate (according to the Kansas Geological Survey) that total water savings from 2005 to 2022 in Wichita County is roughly **39%** which has exceeded expectations and has been in part due to management changes put in place by these described conservation methods (WCA & LEMAs). Data indicates that total savings may be broken down to 23.9% from improved irrigation management, and 15.6% from decreased irrigated areas and other factors (KGS). Importantly, this data shows that these locally based conservation plans are successful in decreasing pumping through management changes.

Wichita County-wide Water Conservation Area (WC WCA)

- WCA Plan developed by local steering committee.
- WCA Plan approved by the Chief Engineer on March 7, 2017.
- Participants committed to a 29 % reduction from the average use of 2009-15 for the first 7 years; increasing to 50% by the end of the third 7-year period.
- There are 26 participants in the WC WCA covering 9433 acres with a minimum of average savings of 2210 acre-feet per year in the first 7-year period.
- Over the first 6 years of the WCA (2017-22) average use has been 69% of the average allocation allowed and 48% of the 2009-15 average use.
- Savings (average use 2009-15 – average use 2017-22) have been twice that projected above, approximately 4500 acre-feet per year.

Wichita County Local Enhanced Management Area (WC LEMA)

- The LEMA plan was developed by the GMD Board (at the request of the Wichita County WCA steering committee) and submitted to the Chief Engineer during early 2020.
- After hearings, the LEMA plan was approved by the Chief Engineer for the years 2021-2025.
- The plan requires most water users to reduce water use by 25% from the 2009-2015 average use.
- Average use for the first two years of the Wichita County LEMA (2021-22) was 66% of the average LEMA allocation.
- The non-vested irrigation use within Wichita County in 2022 was 82% of the 2011-20 average, compared to 111% in the rest of the District.

Four County Local Enhanced Management Area (FC LEMA)

- The LEMA Plan was developed by the GMD Board and submitted to the Chief Engineer on July 1, 2022.
- After hearings, the LEMA plan was approved by the Chief Engineer for the years 2023-2027.
- Request water use reductions of 0-25% from the 2011-2022 average use, depending on historic use.
- The Plan required an overall reduction in water use from the 2011-20 average use of a minimum of 10%.
- The Four County LEMA covers Lane, Scott, Greeley and Wallace counties.

Table 4 *Quick Facts - GMD1 Conservation Efforts*

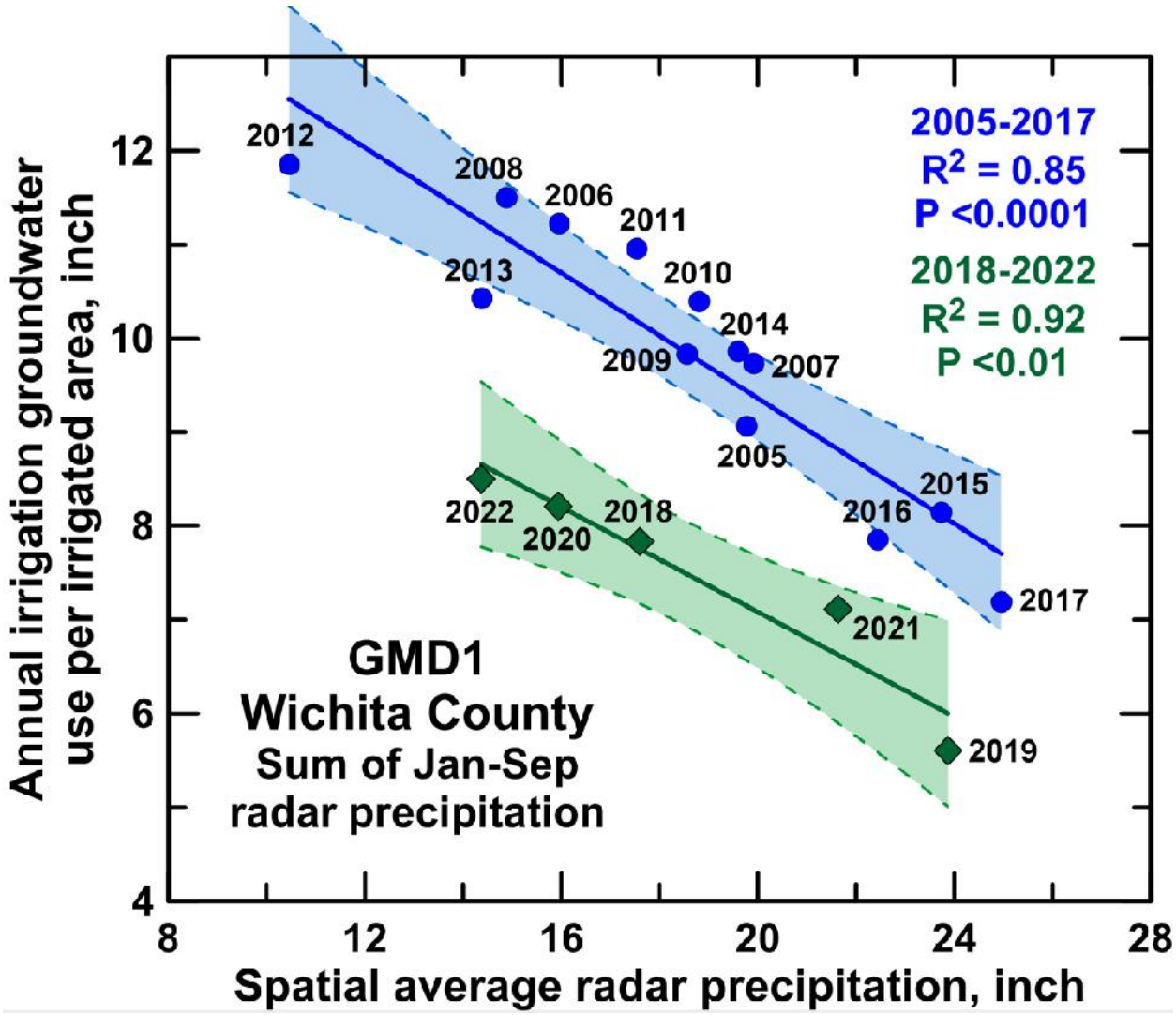

Figure 19 *Wichita County in GMD1 Change in Pumping*

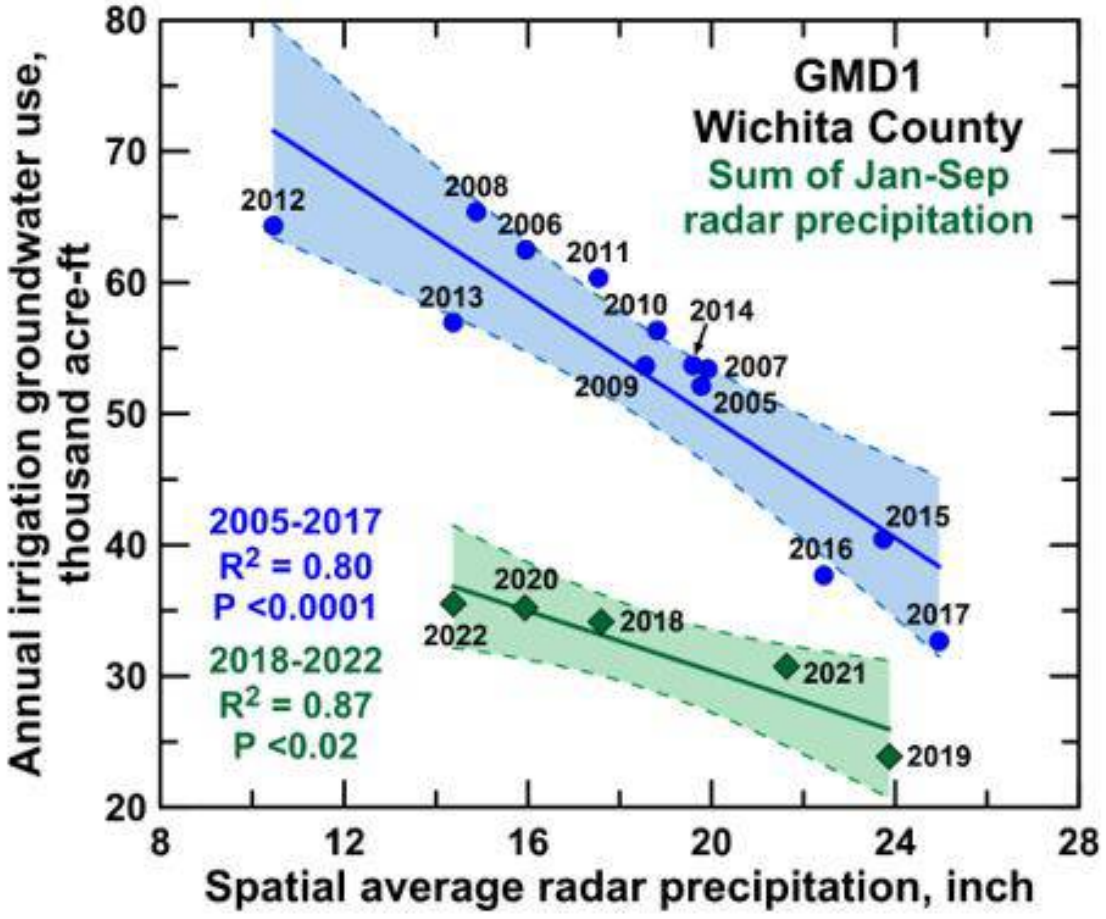

Figure 20 *Wichita County Change in Water Use in Acre-feet*

During November 2020, the Board began its consideration of one or more LEMAs to cover the rest of the District. LEMA development for the rest of the District was discussed at most of the Board's monthly meetings and multiple special meetings from November 2020 throughout the submission of its LEMA plan to the Chief Engineer on July 1, 2022.

After exploring a host of options, the Board decided on an allocation method that makes reduction based on 2011-2020 average water use, with larger reductions for larger water use and lesser reductions for smaller water use. Flexibility is provided in the form of five-year allocations and single allocations shared by water right groups. Vested rights are exempt from regulation by the LEMA as are non-irrigation uses. The Plan also included a robust appeal process for those whose water use record included voluntary conservation and new owner/operators.

After its required public hearings, the **Four County LEMA** Plan was approved by the Chief Engineer, effective for the 5-year period, 2023-27. See **Figure 21** below showing the boundary of the District's LEMA. *See also* ***Table 4*** *above.*

Significant additional information regarding both the Wichita County LEMA and the Four County LEMA is on the District's website.

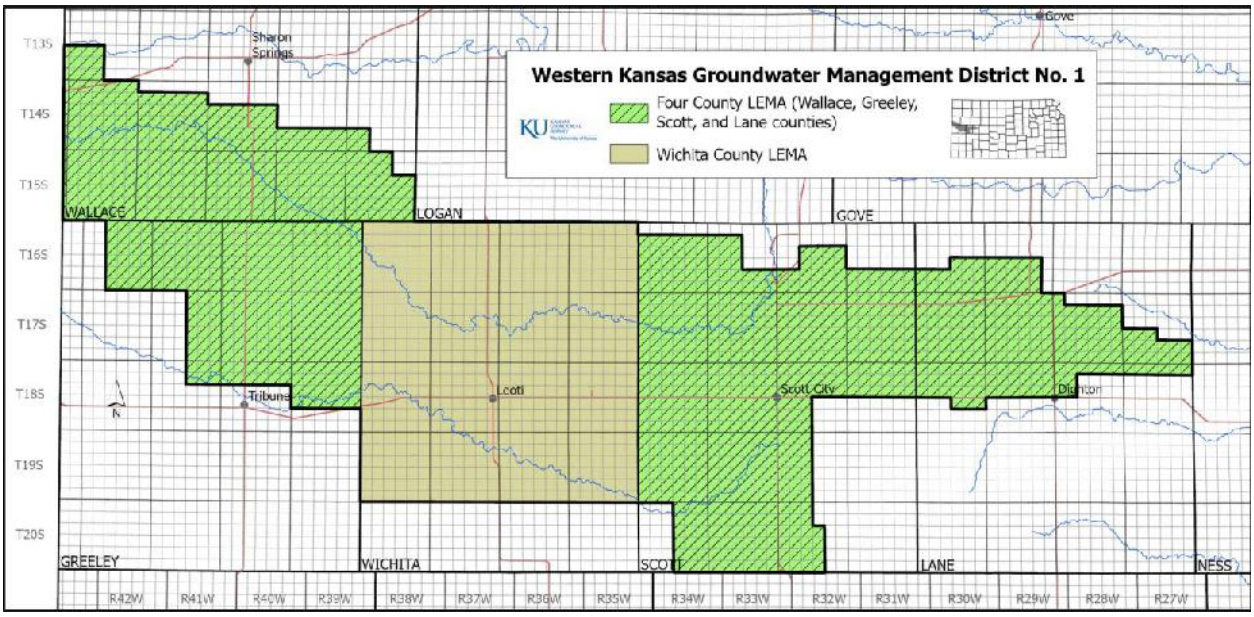

Figure 21 *Map of LEMA's in GMD1*

Additionally, KGS has recently reviewed groundwater use data for GMD1 from 2005 through 2022 and has seen 24.3 % water savings in irrigation water use from 2005. Data indicates that approximately 8.6 % of this can be attributed to improved irrigation and water use. While 15.7% may be attributed to decreased irrigated areas and other factors (See **Figure 22** and **Figure 23** below.) It is expected that additional data will be gathered and updated as part of the 2024/2025 GMD1 Groundwater Model update with the Kansas Geological Survey. But it appears that general trends towards conservation and changed management practices are active in all five counties of the GMD and will increase with the implementation of the Four County LEMA.

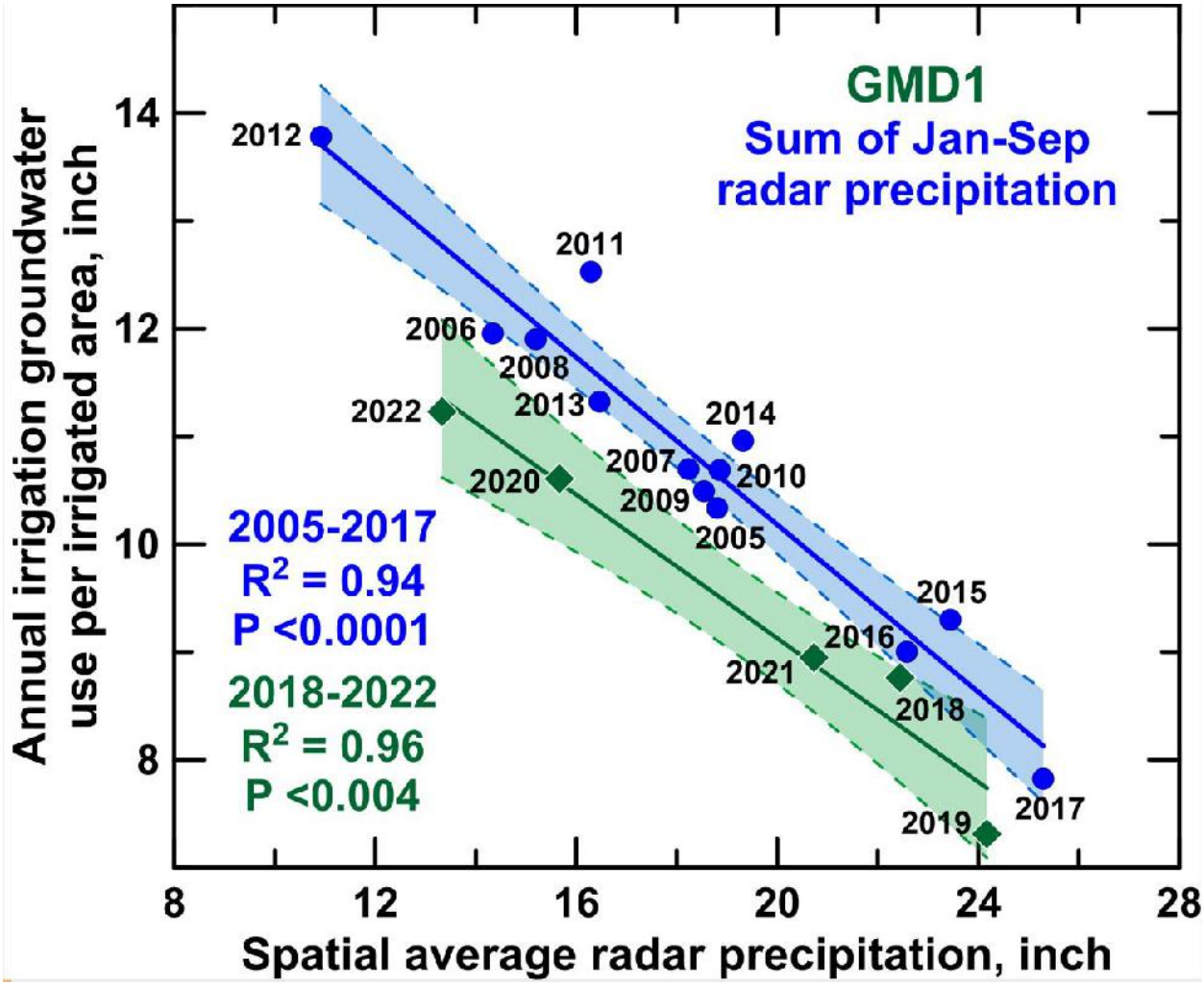

Figure 22 *GMD1 Change in Pumping 2005 to 2022*

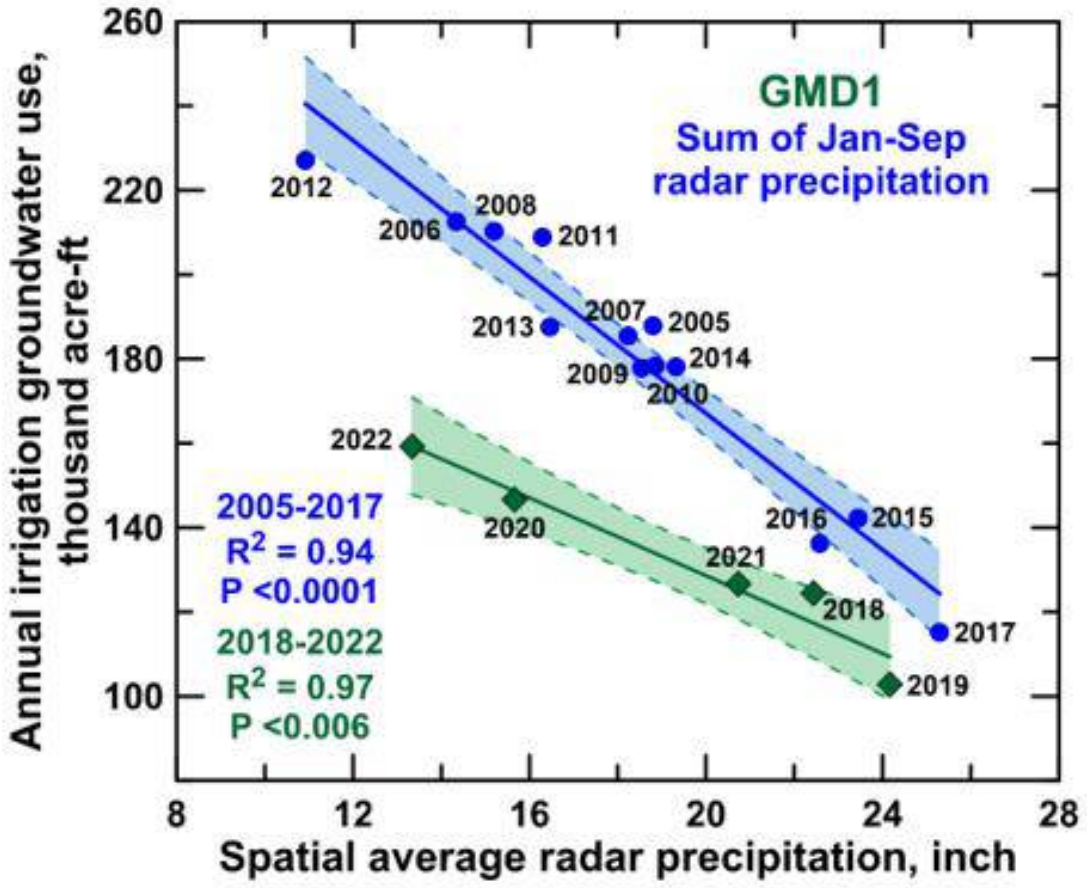

Figure 23 *GMD1 Change in Water use in Acre-feet*

b. Prevention of Waste

Another concern is the wastage of irrigation tailwater. It is estimated that approximately twenty percent of the water applied through flood systems, runs off the ends of fields as tailwater. This water, if collected and re-used, could mean a dramatic savings in the total amount of water withdrawn annually. Most of this tailwater is allowed to remain in barrow pits or lagoon areas where it is subject to very high evaporation rates and slow infiltration.

Current regulations state that it shall be unlawful to allow any water applied to leave the land under the water user's direct supervision and control.

GMD1 Cost-Share Program – Additionally, to address this concern the District maintains a Cost-Share program for irrigation efficiency technologies. This program allows producers to apply for money to help cover the cost of implementing new technologies. District staff evaluates each application that is submitted and they will assess the type of technology that is being applied for. In 2023 the GMD1 Cost-Share Program was revised and expanded to incorporate a wider variety of technologies to encompass planning tools, and to also encompass technologies that may be appropriate for municipal/domestic water use as well as stock water

use. The GMD1 Cost-Share Program is available on a first come first serve basis or until funds are gone. To date, in the year 2023 **over $65,000.00** has been provided to producers for a wide variety of water saving technologies. (See **Appendix 3 GMD1 Cost Share Application**)

c. Water Quality

The District has historically focused primarily on addressing and slowing the decline of the aquifer and efforts to conserve resources. However, the Board has discussed working with the Kansas Department of Health and Environment, as well as local municipalities and other agencies, to more closely assess and test water quality within the District. Should a constituent of concern be present or a contamination plume need observation the District may develop a comprehensive contingency plan within one year of discovery that may include additional research/investigation and an action plan if deemed necessary by the Board of Directors.

d. Education

The District prioritizes community involvement, outreach and ongoing educational efforts. In an effort to engage with all stakeholders the District has a Municipal Outreach Initiative as well as a Stock Water Right Holder Initiative. The mission(s) of these initiatives is to provide all stakeholders with an opportunity to voice concerns, bring forth ideas, and initiate collaboration with the District and finally to identify how the District may provide assistance, cost-share or other technical resources to every stakeholder. **The following outreach initiatives will take place on an annual basis.**

1. **Municipal Outreach Initiative** – At least one public outreach meeting per year focused specifically on providing domestic water users, municipalities, and other community members with the opportunity to meet directly with the Board of Directors, to identify areas of concern, possible initiatives, or opportunities to collaborate. It is imperative that municipalities and domestic water users feel supported and are given resources by the District. Ongoing meetings and opportunities to collaborate with individual communities/city administrator may continue throughout the year as needed.
2. **Stock Water Right Holders Initiative** – At least one public outreach meeting per year focused specifically on providing stock water right holders, feed-yard and dairy managers with the opportunity to meet directly with the Board of Directors, to identify areas of concern, possible initiatives or opportunities to collaborate. The District recognizes the significant economic driver that these stakeholders provide and is dedicated to making sure that all possible resources are made available to them. Throughout the year, project collaboration and additional outreach may continue as needed.
3. **Annual County Outreach Meetings** – Every year the Board will hold county specific outreach meetings to engage with each county's stakeholders, respectfully. These meetings will allow for each county to hear directly from District staff as well as the Board of Directors, as well as chosen guest speakers such as the Kansas Geological Survey, the Kansas Water Office, the Division of Water Resources and others.
4. **Semi-Annual Newsletter and Email Outreach –** District Staff under guidance by the Board of Directors will produce a semi-annual newsletter to be mailed out to all stakeholders within the District. Additionally, a monthly email (as deemed appropriate)

will be sent out to the District with updates on programs, initiatives and will highlight important dates and deadlines.

5. **GMD1 Annual Meeting –** Every year the District will hold an Annual Meeting in February of the Calendar year. This meeting will be focused on providing an annual update to all stakeholders, will entail presentations from staff and other agencies, will address any Board Member elections and will cover the annual budget, audit, and other mandatory updates.

The District will continue to effectively and proactively engage with all stakeholders throughout the District whenever possible, sharing the importance of our precious water resources.

e. Economics

Groundwater use within the WKGMD1 predominately is used for crop irrigation, which is the primary economic driver in the region. The WKGMD1 is home to more than 20 cattle feeding facilities, multiple dairies and multiple large swine facilities. Therefore, it is imperative that everything possible is done to protect this regional economy, preserving groundwater resources for future generations of use *(See **Section 5c** and*

***Appendix 2 2017 County Ag Census* Data** *of this report for more information).*

f. Evaluation of Program Effectiveness

The Board of Directors will evaluate the effectiveness of all programs, initiatives, policies, and procedures on a regular basis throughout the year. Any substantial changes will be presented at next calendar year's WKGMD1 Annual Meeting. This Management Program will also be evaluated by the Board of Directors on an annual basis.

Additionally, as part of the requirements for both the Wichita County LEMA and the Four County LEMA an annual report will be prepared each year to track the progress of these LEMAs and assess effectiveness. Lastly, as outlined in Kansas House Bill 2279, Groundwater Management Districts will be responsible for preparing and submitting annual reports to the State Legislature for evaluation.

8. District Operations

a. Headquarters and Staff

The WKGMD office is located at.

906 West 5th, Scott City, Kansas 67871
PO Box 604
www.GMD1.org
Office: 620-872-5563

District Manager: Katie Durham
Office Administrator: Toni Palen
Field Technician: Pat Ryan

b. Legislative Requirements

The District is required to perform an annual financial audit in accordance with KSA 75-1120a, and to submit this final approved audit to the State. In addition, the WKGMD1 must abide by the reporting requirements outlined in House Bill 2279 as well as the Groundwater Management District Act.

c. Daily Operations and Services

The District office staff is available five days a week **Monday through Friday from 8:00am CT to 5:00pmCT.** Daily services to producers include but are not limited to the following.

1. **Water right information assistance**
2. **5-5-11 compliance checks**
    a. The District has a field technician that helps all growers within GMD1 on meter compliance issues. This individual provides several services including but not limited to; inspecting meters for compliance, assists in addressing concerns in order to get them back into compliance, performs compliance checks for those growers enrolled in a 5-5-11 or other special state programs, assures that all meters within the District have a visible seal to protect against tampering, replaces batteries in meters upon request from the grower.
3. **Ongoing education**
    a. GMD1 has always maintained a website to host the most recent information about ongoing activities, programs, and events. The District also has a newsletter that is circulated by standard mail quarterly. Recently the District has enhanced their mailing list based off the county assessor's database to make sure the mailings are reaching as many people as possible. Lastly, the District has begun building an email database so the newsletter and other updates can also be sent electronically.
4. **Preparation of Multi Year Flex Accounts**
    a. Assistance in the preparation of applications and evaluating the need for enrollment due to water use.
5. **Preparation of Water Use Correspondent Changes**
    a. Assistance in preparation of these forms/applications.
6. **Assistance with Cost-Share**
    a. The District has a robust cost-share program that provides financial assistance to growers within the GMD1 area, for implementing irrigation technology efficiencies. The District has applications available in the office as well as on the website. A producer simply has to fill out an application and submit it to the District along with an invoice. Once approved by the Board of Directors the District will cover a portion of the cost to assist with the implementation of the water efficiency technology. Examples of applicable cost-share technologies include but are not limited to the following; bubbler nozzles, efficiency regulators, sub-surface drip irrigation, moisture probes, water management applications or software, aerial field imagery, EC soil field mapping, pivot control systems, etc. The District wants to make sure that everyone has access to these technologies and that the District can offset some of the financial burden placed on growers.

7. **Irrigation Management**
    a. Many facets of irrigation management have to do with implementation of technology, water usage tracking and navigating an individuals irrigation management practices with pending or active water conservation programs, such as the LEMA or a Water Conservation Area (WCA) or Local Enhanced Management Area (LEMA). It is common to spend time discussing these different facets with landowners, on how they will impact their individual irrigation system and applied management. These conversations tend to lead to think-tank conversations where ideas can be shared, that staff may then bring before the Board for discussion. Every landowner manages their irrigation systems a little differently and it is imperative that the District look at all possible approaches when deciphering policies and programs to implement, because these policies directly affect irrigation management
    b. GMD1 has 2,379 water rights (2,120 IRR, 286 STK, 20 STK/IRR) and each water right has a different quantity (acre feet), authorized rate (gallons per minute) and place of use. Since property is constantly being sold, purchased, or redeveloped, it is a regular occurrence that staff will assist in providing technical or historical information/assistance on someone's water right.
8. **Monitoring**
    a. The District regularly coordinates with the Kansas Geological Survey to assess data collected through the Index Well Program. KGS is currently looking to expand the Index Well monitoring program by adding a few more monitoring wells within the District. This data provides real time/reactionary data from the aquifer and helps to create a map of the hydrogeological system within the District. KGS typically attends a few different GMD1 Board Meetings throughout the year and presents a PowerPoint presentation at the District's Annual Meeting each February. This data is carefully reviewed for trends, and helps to identify areas of concern, that helps the Board identify and develop conservation measures/policy/programs such as WCA's and LEMA's.
9. **Assistance with Permitting and Correspondence with the Division of Water Resources**
    a. GMD1 works closely with the Garden City Division of Water Resources (DWR) on applications or permitting. Even though the District is closed to new appropriation, the District's Board of Directors provides recommendations on term permits, spacing wavers and other projects. The District Staff, on a day to day basis will help landowners complete and submit WRCP applications, Change of Place of Use forms, MYFA requests, etc. The District continuously works to assist producers in navigating through the process of completing and submitting any application to DWR.
10. **Ongoing Research**
    a. GMD1 Staff is regularly reviewing published information on water management throughout the Western United States, to identify tools, policy recommendations or programs that may be of benefit to the communities within GMD1.

Additionally, reviewing/ studying available datasets on groundwater levels is of great assistance when evaluating future water policy ideas/initiatives.

b. GMD1 Staff may spend time investigating both Federal and State programs that may be applicable or helpful to the local communities. This may include grants, additional cost-share programs, etc. Additionally, at times there may be a complaint issued by a water right holder than may require a level of investigation & coordination with DWR staff if needed.

11. Plugging Abandoned Wells

a. GMD1 Staff refers to KDHE in regard to well plugging, however the District has participated in outreach and education focused on the danger of abandoned wells & the importance of plugging. Lastly, the Board has discussed in the past the possibility of adding well plugging to the existing cost-share program.

b. The GMD1 Board is currently working to assess the need for an initiative to assist in identifying and plugging abandoned wells throughout the District, which may include financial incentive if the Board deems it necessary.

12. Weather Modification

a. The GMD1 Weather Modification Program was in existence for decades and only recently in 2016 was suspended due to funding. Historically the program was funded also by surrounding counties, and the GMD1 Weather Modification program was quite significant and provided a valuable service to the region. Weather Modification's are becoming popular again as noted recently by the USDA. Cloud seeding is a scientific process that increases the cloud's probability of creating a rain event and can help to prevent a hail event. The method first appears in 1946 by scientists at the General Electric Research Laboratory. It consists of the use of silver iodide, and dry ice to improve the creation of ice crystals in clouds. These ice particles then help to create cloud droplets, that then become rain droplets. The program also helps to prevent hail events. After a long summer of irrigating crops, a hail event could destroy a crop thus also wasting the water that was needed to produce those crops. *The GMD1 Weather Modification Program is currently suspended, but always maintains the option of returning at some point in the future.*

13. LEMA Based Programs

a. The primary use of District Staff time has gone to developing the Wichita County Water Conservation Area (WCA), the Wichita County LEMA, and the GMD1 Four County LEMA. This work has been the primary day-to-day focus of the Board of Directors and District Staff for the better part of the last decade. Daily activities, duties and staff work are dedicated to developing, implementing, and tracking these programs and the data associated with them. This includes but is not limited to, analyzing water use data, analyzing and assessing hydrologic conditions in the aquifer, public education and outreach, research and plan development, coordination with the District's legal counsel, the District's Consultant and various State Agencies.

14. Other Ongoing Partnerships

a. The District also is a supporting partner for the Playa Lakes Joint Venture program, which works with partners such as County Conservations Districts and Ducks Unlimited to restore natural Playa's. This not only helps to recharge groundwater but provides natural bird and insect habitation.
b. The District works to keep a website updated with information covering ongoing programs or initiatives, the website was completely redesigned in 2022. Additionally, the District provides GMD1 constituents with a quarterly newsletter and currently is discussing other efforts partnering with local NRCS (Natural Resources Conservation Services) offices, County Conservation Districts and the Kansas Water Office (KWO) to engage in outreach, training or workshop events available to the public. The District can reach a greater audience and assist producers, landowners, and municipalities more efficiently when all the agencies are working together, so collaboration is key. Lastly, the District has worked in the past and will continue to work with the Department of Conservation on Water TAP, a program focused on retiring diminishing water rights for conservation or municipal use.

d. Annual Water Use Reporting

District staff provides annual assistance to producers submitting their annual water use report cards, which can be done electronically or in person at the District office.

According to the Kansas Division of Water Resources, "K.S.A. 82a-732 requires the owner of a water right or permit to appropriate water for beneficial use, except for domestic use, to file a complete and accurate water use report on or before March 1, following the end of the previous calendar year. Any owner of a water right or permit to appropriate water for beneficial use who fails to timely file a complete and accurate water use report is subject to a civil penalty not to exceed $1,000 per water right."

9. Future Initiatives

a. Moving Forward

The GMD1 Board of Directors will continue to work with all stakeholders to identify future initiatives/outreach, programs, and efforts to conserve water resources for future generations and to protect the local communities, and local economies it represents.

As future information, data or research is made available, suggested edits or additions to this document may be proposed and the Board may choose to update this plan to reflect that information. Annually, the Board will review and re-approve this Management Plan beginning in the year 2025.

Appendices

Appendix 1 GMD1 Management Program - Year 2005

Appendix 2 2017 County Ag Census Data- USDA

Appendix 3 GMD1 Cost Share Application

Notes

GMD1 water level maps: https://www.kgs.ku.edu/Hydro/Publications/2022/OFR2022-8/index.html
Index well Report page: https://www.kgs.ku.edu/HighPlains/OHP/index_program/index.shtml

- Latest report: KGS OFR 2022-27: 2021 Annual Report, December 2022
- GMD1_Tables_for_2021_report_final.xlsx

GMD1 model report: https://www.kgs.ku.edu/Hydro/Publications/2015/OFR15_33/index.html
Status of the HPA (will be updated in 2023):
https://www.kgs.ku.edu/Publications/Bulletins/TS22/index.html
KS HPA Atlas: https://www.kgs.ku.edu/HighPlains/HPA_Atlas/index.html

Liu, G., Wilson, B. B., Bohling, G. C., Whittemore, D. O., and Butler, J. J., Jr., 2022, Estimation of specific yield for regional groundwater models: Pitfalls, ramifications, and a promising path forward:. Water Resources Research, v. 58, e2021WR030761.
https://doi.org/10.1029/2021WR030761

WESTERN KANSAS GROUNDWATER

MANAGEMENT DISTRICT NO.1

REVISED MANAGEMENT PROGRAM

11/18/04

APPROVED

This 8th day of March 2005

David L. Pope, P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

KANSAS

DEPARTMENT OF AGRICULTURE
ADRIAN J. POLANSKY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

BEFORE DAVID L. POPE, CHIEF ENGINEER
DIVISION OF WATER RESOURCES
KANSAS DEPARTMENT OF AGRICULTURE

IN THE MATTER OF THE REVISED MANAGEMENT PROGRAM
OF WESTERN KANSAS GROUNDWATER MANAGEMENT DISTRICT NO. 1

On this 7th day of March, 2005, after having examined and studied the Western Kansas Groundwater Management District No. 1 Revised Management Program transmitted by the Board of Directors of the District on February 21, 2005, and received on February 23, 2005, which was the same as the one approved on December 10, 2004, except for the protocol section, the Chief Engineer, Division of Water Resources, Kansas Department of Agriculture, makes the following findings and order:

FINDINGS

1. That the Board of Directors, Western Kansas Groundwater Management District No. 1, has requested the Chief Engineer to give approval to the Revised Management Program.

2. That the Revised Management Program contains a written report describing the characteristics of the District and the nature and method of dealing with groundwater supply problems within the District.

3. That the Revised Management Program includes information as to the groundwater management program to be undertaken by the District and such maps, geological information, and other data necessary for the formulation of the revised program.

4. That the Revised Management Program is compatible with Article 7 of Chapter 82a of the Kansas Statutes Annotated, and all acts amendatory thereof or supplemental thereto and any other state laws or policies.

Division of Water Resources David L. Pope, Chief Engineer
109 SW 9th St., 2nd Floor Topeka, KS 66612-1283
Voice (785) 296-3717 Fax (785) 296-1176 http://www.accesskansas.org/kda

ORDER

NOW, THEREFORE, It is the decision and order of the Chief Engineer, Division of Water Resources, Kansas Department of Agriculture, that the Revised Management Program, Western Kansas Groundwater Management District No. 1, received on February 21, 2005, should be and herewith is approved and upon adoption by the Board of Directors, Western Kansas Groundwater Management District No. 1, this Revised Management Program supersedes the Revised Management Program approved by the Chief Engineer on July 17, 1991, and which became effective on September 17, 1991.

Dated at Topeka, Kansas, this 7th day of March, 2005.

David L. Pope, P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

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I. INTRODUCTION

The Western Kansas Groundwater Management District No.1 was organized because of the need to better conserve and manage the groundwater resources in this area. By the enactment of the Groundwater District act, it enabled the local people to determine their destiny as it related to the use and management of our water resources within the constraints of existing state laws.

Since the first irrigation well within the district was completed in 1907, many changes have taken place. It is the responsibility of the district to guide and regulate future water use development and to plan for future water needs. Without the input of local people, this task would not be possible. It is our firm belief that a sound program can only be achieved by the continued efforts of the local people working in cooperation with this district.

II. FORMATION OF THE DISTRICT

The Western Kansas Groundwater Management District No.1 (WKGMD No.1) was formed because of an urgent need to conserve and replenish the groundwater supplies in our area. Its formation was made possible by the enactment of the Groundwater Management District Act. This made it possible for local people to have a voice in the management and conservation of their groundwater supply.

In this district, an initial meeting was held on January 20, 1972 in Scott City. This was done to obtain the feeling of the people in this area towards the formation of such a district. The meeting was sponsored by the Soil Conservation District from Scott County. At this meeting, it was the feeling of those present that a district should be formed. An initial steering committee was elected as follows:

Chairman	Wallace N. Robinson III	Scott County
Secretary	M.E. Neidens	Lane County
Member	Robert E. Berg	Wichita County
Member	Lyle Griffen	Greeley County
Member	Victor Rauch	Greeley County
Member	Dean Schemm	Wallace County
Member	Clyde Schinnerer	Scott County

Upon election of the Steering Committee, a Declaration of Intent was filed with the Chief Engineer of the Division of Water Resources, along with a map of the proposed

district. After approval was given on the Declaration of Intent, a petition was circulated, signed by fifty eligible voters, and filed with the Secretary of State. After his review and approval, the petition was submitted to the Chief Engineer for final approval. Upon receipt of the Chief Engineer's approval, the committee adopted a resolution calling for an election. The election was held on April 3, 1973 with two hundred and sixty nine votes cast. Eighty two percent of the votes cast were in favor of the district's formation, with only eighteen percent opposed.

The first formal meeting of the district was held in Leoti on August 13, 1973. The Board of Directors was elected as follows:

Chairman	Wallace N. Robinson III	Scott County
Vice-Chairman	Lyle Griffen	Greeley County
Secretary	M.E. Neidens	Lane County
Treasurer	Robert E. Bergh	Wichita County
Member	Ray Welsh	Wallace County

During the first year of formal organization, the district developed their management plan, and determined the best ways to accomplish the district objectives. It was the feeling that through demonstration projects, meetings, news releases and personal contacts, the district's objectives would be accomplished.

The second annual meeting of the district was held in Scott City, Kansas on August 12, 1974. Mr. Ralph Walker from Sharon Springs was elected to replace the expiring term of Ray Welsh. Due to the inconvenient date of the meeting, it was decided to change the date to a winter month. The third annual meeting of the district was held in Leoti, Kansas, February 20, 1975. Subsequent meetings are held annually at various locations throughout the district.

The Western Kansas Groundwater Management District No.1 was the first such district to be formed in Kansas. Since that time, four other districts have been formed to better manage the water resources in Kansas.

III. HISTORY OF IRRIGATION

Scott County records some of the earliest development for irrigation. While it was not the first to have development for irrigation from groundwater sources, its development dates back as far as 1888. It is reported that by 1895, 24 individuals were irrigating a total of 40 acres. Apparently, all of these used windmills for power and more than likely, irrigated only garden size plots. It is also known that prior to this time, irrigation was being done by the Indians in what is now known as the Lake Scott State Park.

The next phase in the development of irrigation came in 1907 when Mr. E.E. Coffin installed a well. It is reported that this well was 90 feet deep with a nine-inch casing. The small centrifugal pump was powered by a 4 1/2 horsepower gasoline engine,

and pumped at a rate of 120 gallon per minute. In that same year, he also installed two 15-inch wells to a depth of 23 feet. The two wells were approximately 25 feet apart and pumped at a rate of 450 gallons per minute combined. The two wells were combined through a header to one centrifugal pump and driven by an Olds 12 horsepower oil-burning engine.

Other irrigation wells were soon constructed. In 1909, Mr. J.W. Lough purchased a deep-well type centrifugal pump. It was estimated to pump at a rate of 1,000 gallons per minute. Also in that year, Mr. W.S. Manker completed a well near the southeast limits of Scott City. The following year he again constructed a well, which became known as the "big well" which pumped an estimated rate of 1,600 gallons per minute.

In addition to these individual projects, several large financial interests were attracted by this irrigation development. From the time between 1909 and 1916, several large companies bought large tracts of land for irrigation development.

One of these companies, the Great Western Irrigation Company, made a survey in the Whitewoman Creek to bring groundwater to the surface by gravity flow, and irrigate vast areas of land. Some small construction work was done, but the flow was disappointingly small, and the project was given up. About the same time, Marks and Son of Chicago, the Garden City Development Company, and the Garden City Company purchased thousands of acres for irrigation development in the southern part of Scott County. Several irrigation wells were constructed, as well as a power line into the area.

By 1917, Mr. Lough had completed a $75,000 electric generating plant to furnish power to his own pumping plants.

It is very difficult to estimate the amount of irrigation in the early years, however, it was noted that by 1922, 4,921 acres of land were under irrigation. The rate of development for irrigation slowed down from that time until the early thirties when interest in development once again increased. In 1945 a total of 129 wells supplied 18,400 acre-feet of water to irrigate 21,002 acres of land.

IV. DESCRIPTION OF THE DISTRICT

A. Location

The Western Kansas Groundwater Management District No.1 includes the major portion of five western Kansas counties. (Lane, Scott, Wichita, Greeley, and Wallace) (See Figure 1) 1,166,920 acres of total land is included in the district, and of this total, approximately 391,000 acres are irrigated. There are approximately 2,600 wells in the district with existing production capacities ranging from 50 gallons per minute to 1,800 gallons per minute.

B. Drainage

Two creeks which offer potential for recharge are located within the district. These include Ladder Creek, which originates in Colorado and flows through Wallace, Greeley, Wichita, and Scott counties, and Whitewoman Creek which originates in Colorado and terminates in the Whitewoman Basin located just south of Scott City. (See figure 2)

C. Soils

A variety of soils exist within the district, ranging from Sandy Loam in the west-northwest to Silty Loam in the central and eastern portions of the district.

D. Cropping

Corn, milo and wheat are the major irrigated crops grown in the district. However, a limited number of acres are devoted to the production of alfalfa, soybeans, and sunflowers. The majority of the corn, alfalfa, wheat and milo production is used to support the cattle industry within the district. The beans and sunflowers are usually shipped to places outside the district.

E. Climate

The average precipitation ranges from 15 inches in the west to 20 inches in the eastern portion of the district. Approximately seventy five percent of the moisture occurs during the growing season from April to September. Showers account for most of the annual moisture within the district, particularly in April, May and June. Local storms occur in a scattered pattern over the area. Heavy rains may be reported in one locality, while a nearby area receives little or no rainfall.

Because of the elevation and the influence of the surrounding landmass, daily and annual temperatures vary greatly. Frequent cloudless or nearly cloudless skies and dry atmospheric air result in warm days and cool nights. Even in July, the hottest month, the nights are usually cool.

Surface winds are moderate to occasionally strong in all seasons. The period of strongest winds, on the average, is in the spring when low-pressure storm centers are most intense. During dry periods, strong winds may be accompanied by soil blowing, particularly in March and April. In recent years, however, improved soil management has reduced the amount of soil erosion.

F. Geology

The Ogallala formation of Tertiary age is an unconsolidated deposit of silt, sand and gravel, which makes up the principle aquifer in this district. It ranges in thickness from approximately 20 feet to as much as 260 feet in the northwest portion of the district.

V. GROUNDWATER SUPPLY AND RELATED PROBLEMS

Groundwater supplies are being depleted as a result of long-term withdrawals that exceed recharge. Declines in water levels in the Ogallala formation since predevelopment average about 35 feet ranging to about 85 feet (KGS, Tech. Series 9, 1996) in the WKGMD No. 1. These declines represent more than 25% of the original saturated thickness and more than 50% in many areas in Wallace, Greeley, Wichita and Scott counties. Lane county declines represent more than 10% of the original saturated thickness and more than 25% on many areas. Annual declines in water levels averaged .2 ft. from 1991 through 1995, ranging from a 1.1 ft. decline in 1995 to .9 ft. increase in 1994. It is anticipated that water supplies will eventually become very limited if withdrawals continue at or near current rates. Information summarized from several publications provides some insight about the limits of the groundwater supply in the WKGMD No. 1.

A. Groundwater Resources

The total amount of water in storage is estimated to be approximately 7,257,600 acre-feet, but some of this total is not available for use by normal pumping methods. Several estimates of the percent of the total storage available have been made and include-- 60% (McClain, KGS, 1975), 67% (KWO, 1984), and 80% (Fader and Stullken, USGS, 1978). This would indicate between 4,862,592 acre-feet and 5,806,080 acre-feet of storage are available for use.

B. Recharge

Water enters the Ogallala Formation in west-central Kansas by infiltration from precipitation on the area, and by seepage losses from creeks, which cross the district. This phenomenon is known as "natural recharge". Annual recharge rates compiled from U.S. Geological Survey information (Hansen, USGS, WRI 87-4230) indicate annual recharge to be 70,000 acre-feet or less.

C. Depletion

Management criteria used in the development of well locations in the past have produced major aquifer depletion in WKGMD No.1. During the 6-year period 1990-1995 reported annual water use from these counties ranged from 198,200 acre feet in 1993 to

389,100 acre feet in 1990 (DWR water use reports). The average reported annual water use for these counties over the 6-year period was 292,800 acre-feet. Assuming available storage of 5,800,000 acre feet, an annual recharge rate of 70,000 acre feet, and a continued annual withdrawal of 292,846 acre feet, the groundwater would be gone in about 26 years. Assuming an estimate of available storage of 4,800,000 acre feet, that some believe is more reasonable, and the same withdrawal rate would indicate that the water supply would be gone in about 21 years. It is not likely that the withdrawals would continue at rates of the past but instead would decrease, as the saturated thickness in the aquifer decreased and wells could no longer pump at a reasonable diversion rate. However, the thickness of the aquifer and the withdrawal rates are not equally spaced throughout WKGMD No.1 so water supplies in some areas would probably be gone in less than 25-30 years and others would remain longer.

In comparing the amounts of water pumped annually, and the amount of natural recharge, one can easily see that the hydrology of the aquifer is not in balance. This balance cannot be restored unless these losses from storage are compensated for by increases in natural recharge, artificial recharge, decreases in pumpage, or water augmentation programs. In an effort to better manage remaining groundwater supplies, the WKGMD No.1 has established several goals and objectives. These include (a) control of new development; (b) the possibility of regulating existing development; (c) programs to augment existing water supplies; and (d) reduce the acres irrigated.

D. Future Development of Irrigation

The control of new development brings about several additional questions. These are; (1) how much additional development should be and will be allowed; and (2) how can this be accomplished in a fair and equitable way. WKGMD No.1 has adopted a methodology of a safe yield program for the district. Future new appropriations are not allowed in areas with minimal saturated thickness or significant depletion since 1950. In other areas future appropriations are limited to additional quantities that would not cause the total appropriations to exceed safe yield. The protocol for enhanced water management will focus on options for decreasing consumptive use from the aquifer.

E. Tailwater Control

Another problem, which is of prime concern in our district, is the wastage of irrigation tailwater. It is estimated that approximately twenty percent of the water applied through flood systems, runs off the ends of fields as tailwater. This water, if collected and re-used, could mean a dramatic savings in the total amount of water withdrawn annually. Most of this tailwater is allowed to remain in barrow pits or lagoon areas where it is subject to very high evaporation rates and slow infiltration.

Current regulations state that it shall be unlawful to allow any water applied to leave the land under the water user's direct supervision and control. With the application

of this regulation, the twenty percent of the water applied is contained for re-use rather than being allowed to run off of the land.

F. Public Education

The concept of local control for this district hinges entirely on the input from the people in this area. Keeping local people informed and soliciting their concerns is an extremely difficult task. WKGMD No.1 will, through the use of newsletters, public meetings, and personal contacts, inform people of the goals and objectives of this district.

G. Energy

The cost of energy necessary to pump water in this area is of primary concern. There has been a great deal of discussion regarding the abandonment of wells due to the high cost of pumpage. To date however, there have not been a substantial number of wells abandoned. A related problem, created by the cost of pumping irrigation wells, is the non-use of these wells and their temporary abandonment. Care must be taken not to leave abandoned wells open to allow possible pollution of the aquifer and also as a safety hazard to the public.

VI. GROUNDWATER MANAGEMENT PROGRAM AND OBJECTIVES

A. Data Collection

This district is involved in many areas of data collection. These include such things as water levels, discharge measurements, well locations and information obtained through the conduct of our weather modification program. A combination of all of this information will provide a better database on which the WKGMD No.1 can set decisions and policies.

B. Monitoring Groundwater Levels & Discharges

Annual water level measurements are taken each winter through a cooperative program between the Division of Water Resources, Kansas Geological Survey, and the U.S. Geological Survey. Those measurements are taken annually, generally during the middle of January to determine annual declines or increases in our water levels. In addition to this, individual measurements are taken by WKGMD No.1 to assist water users in determining individual water levels.

Upon making a request to the WKGMD No.1, well discharge measurements are taken to assist water users in determining how much water their individual wells are pumping. This information can be used to increase the operation efficiencies of the system

and better manage and conserve groundwater resources. These measurements also provide a means for the water user to comply with WKGMD No.1's metering program.

C. Pilot Groundwater Recharge Project

In 1975 the district began working on projects to test artificial recharge of the groundwater resources in selected areas. Those projects were completed with the assistance of local landowners. A cooperative program with the U.S. Geological Survey was initiated to provide the instrumentation on the sites. The largest project completed was an earthen fill structure, which was constructed under the pilot recharge program of the State of Kansas. This program has been completed and has provided the assurance that water can be recharged if a supply is available.

D. Review of Applications to Appropriate Water for Beneficial Use

Through an agreement with the Division of Water Resources, the district receives all new applications to appropriate water for beneficial use and all applications for change in point of diversion, place of use, or use made of water. This gives the district an opportunity to determine the applications compliance with their local regulations and policies. After their review, a recommendation is made to the Chief Engineer of the Division of Water Resources to either approve the application as filed, deny the application or perhaps modify it to meet the policies of the WKGMD No.1.

The WKGMD No.1 will also provide assistance in the preparation of applications. It will however, be the responsibility of the applicant to file their application with the Division of Water Resources.

E. Water Use Reports

In addition, the district will continue to assist water users in the preparation and filing of annual water use reports. This will give the district an opportunity to assess the rate and quantities of water being annually withdrawn.

F. Water Conservation Plans

In 1986, the Kansas Legislature amended K.S.A. 74-2608. The Act among other things requires the Kansas Water Office to develop and maintain guidelines for water conservation plans and practices. The Act also requires the Kansas Water Office, when developing such guidelines, to consider existing guidelines of Groundwater Management Districts and the cost to benefit ratio of any plan.

The Kansas Water Office developed guidelines in December of 1986 for Irrigation, Municipal and Industrial water users.

In addition to this, the Water Appropriation Act was also amended to allow the Chief Engineer, Division of Water Resources the authority to require an applicant for a permit to appropriate water to adopt and implement conservation plans and practices.

It shall be the policy of the WKGMD No.1 to use water conservation planning to bring about a higher level of groundwater use efficiency for all use types withdrawing water from within the District. As part of the WKGMD No.1's responsibility to manage it's groundwater resources, the District will assist the water users in the district in the preparation of the required conservation plans. This assistance shall apply to the following applications:

a. All new applications to appropriate water for beneficial use where the district development program can be met.
b. All non-emergency applications to change the place of use or the use made of water as long as the change is consistent with the districts regulations.

In developing these plans, the requirements in the Kansas Water Office guidelines will also be met. These guidelines include:

1) Not prejudicial or unreasonably affect the public interest;
2) be technologically and economically feasible for each water user to implement;
3) be designed to curtail the waste of water;
4) consider the use of other water if the use of freshwater is not necessary;
5) not require curtailment in water use, which will not benefit other water users or the public interest;
6) not result in the unreasonable deterioration of the quality of the waters of the state;
7) consider the reasonable needs of the water user at the time;
8) not conflict with the provisions of the Kansas water appropriation act and the state water planning act;
9) be limited to practices of water use efficiency except for drought contingency plans for municipal users;
10) take into consideration drought contingency plans for municipal and industrial users.

In order to assist the water users, the WKGMD No.1 will request assistance from the local Conservation Districts in the preparation of these plans. This may be done through a memorandum of agreement between the districts. In addition, plans may be prepared by private contractors or by the WKGMD No.1 staff.

Once a plan is prepared, it will be reviewed by the WKGMD No.1 and submitted by the applicant as part of the application process to the Chief Engineer, Division of Water Resources. Irrigation plans will be prepared to include a generalized topographic survey of the land to be irrigated along with the proposed point of diversion. It shall also include a listing of structural measures that may be required to meet the guidelines prepared by the Kansas Water Office utilizing the procedures and criteria outlined in the Kansas Irrigation

Guide. Municipal and Industrial Water Conservation Plans should specify the age and condition of their distribution network.

Cognizance will be taken of being technologically and economically feasible pertaining to the implementation of the plan.

G. Water Quality Protection

Although groundwater depletion has been recognized as the districts number one priority item, the quality of the remaining supply must be given a great deal of consideration. Data on groundwater quality is showing contamination from man-made sources is present as well as increasing. The primary contaminants in Kansas have included chlorinated organic solvents, petroleum products, chloride, metals, and pesticides. Although most contamination incidents have been a result of petroleum industry activities, contamination of groundwater by agricultural chemicals is a growing concern. The WKGMD No.1 has six sites of contamination and an additional 20 sites under investigation in the five county area.

The WKGMD No.1 recognizes that most of the legislative authority and responsibility of administering water quality protection programs rest with the Kansas Department of Health and Environment and the Kansas Corporation Commission. However, the district believes it should assist these agencies in their efforts to maintain water quality.

The WKGMD No.1, in an effort to become more involved has established the following water quality objectives and goals:

1) Develop a memorandum of understanding with the appropriate state agencies to establish a cooperative working relationship.
2) Establish a program to conduct water analysis with the private sector or in conjunction with the State.
3) Establish an observation well network in areas considered to be a potential pollution hazard.
4) Develop procedures for remedial action with the appropriate state agencies as it pertains to water quality.
5) Serve as a central reporting point for possible violations and referral to the appropriate state agency.

H. Irrigation Management

In an effort to promote improved water use efficiencies throughout the WKGMD No.1, a demonstration program was conducted in Wichita County. Items included in this program were such things as: Metering discharge rates and quantities; evapotranspiration studies; soil moisture monitoring; open ditch loss studies; pumping plant efficiencies; aquifer modeling; and water use efficiencies. A great deal of information was obtained

and has been published through our cooperative program with the U.S. Geological Survey.

One of the primary goals of WKGMD No.1 is the efficient use of our remaining groundwater supplies while reducing the consumptive use of our water supply. Through a program of promoting the use of more efficient water use crops, and the proper efficiency levels in the pumping and application of that water, an improved level of management will result. Again, one of the key elements is the reduction in the total irrigated acres throughout the district.

I. Municipal Water Use

This district encourages the wise use and conservation of our water resources by our municipal users. There are many programs, which can be implemented to better conserve municipal waters in Kansas. A better understanding of water conservation programs by all users would result in a substantial reduction in the total use and consumption of our water supplies. The average water use in WKGMD No.1 for the past five years is 250 gallons per capita per day. The average usage for the area communities for the period of 1991 thru 1995 is as follows:

Dighton	216 GPCD	Lane Co RWD	238 GPCD
Horrace	136 GPCD	Leoti	220 GPCD
Scott City	256 GPCD	Sharon Springs	221 GPCD
Tribune	235 GPCD	Wallace RWD	268 GPCD

The five-year average for all of the above communities and the area average is basically the same. There is however, a considerable difference between the high of 268 and the low of 136 GPCD throughout this area. There appears to be a number of things, which affect the amount of water used. Those are the amount of outside watering, the cost of the water, and the amount of summer rainfall.

J. Industrial Water Use

Like any other type of use, the quantity of water used by industry could also be reduced. By using recycled water or finding processes which require less water, a significant savings would result.

K. Operational Weather Modification

In 1975 this district began the first operational weather modification program in Kansas. It was the feeling of the board of directors that if seeding clouds could induce additional rainfall, it would reduce the stress being imposed on our groundwater resources. It was also felt that hail suppression had to be included as a major part of this program. This program has been conducted annually for the past thirty years in most all of southwest Kansas. The program was enlarged in 1997 to include the area of the Northwest Kansas Groundwater Management District No.4, and the eastern full township

of Yuma county, Colorado. After four years of operation, the area was reduced back to what it was originally. The WKGMD No.1 now owns nine aircraft plus the radar facility in Lakin. From the evaluation which has been done by the Kansas Water Office, it has shown that the program is achieving its objective. The overall reduction in hail losses since 1979 have shown a 27% reduction, while the period of 1987 through 1994 has shown a 46% reduction in hail damages. Because of these findings, this program has now been included in the Kansas Water Plan, and is eligible for state assistance from the Water Plan Fund. A recent study conducted for the U.S. Air Force Research Laboratory states that programs such as ours helps prevent tornadoes in supercells, when seeded to reduce hail.

L. Importation of Water

There have been several studies which involve the transportation of water from areas north of Kansas through the western side of the High Plains states. One of these such studies is the NAWAPA water collection and distribution system. This study, which was conducted by the North American Water and Power Alliance, involves the construction of a 500-mile long storage reservoir in Canada, in what is known as the Rocky Mountain Trench. This water would then be distributed from Canada through the United States and on into Mexico. Water deliveries in our area would be made to the Platte, Arkansas, Canadian, Rio Grande and Pecos Rivers. Aqueducts would then deliver water to the states of New Mexico, Texas, Colorado, Kansas, Nebraska and Oklahoma. This study did not however, deal with the estimated cost, but only the project benefits.

Another project was one developed by R.W. Beck and Associates to divert water from the Missouri River below Fort Randall to the northwestern part of Nebraska. This would be done by the construction of eleven dams and lift stations along the northern side of Nebraska. Water would then be delivered through eastern Colorado, western Kansas, Oklahoma and Texas through 940 miles of canals. The estimated cost of this project in 1967 was 3 to 3.5 billion dollars.

The district does look at these studies with a great deal of interest, but unless the states themselves take enough interest to promote and push for a federal program of this type, the cost would be prohibitive. If at some time the importation of water does become a reality, this district would take an active roll in the distribution, allotment and water charges.

VII. STANDARDS AND POLICIES

A. Board of Directors

This district is operated by a board of directors, which is elected at each of its annual meetings. The terms are for a period of three years with not more than two members being elected any one year. There are five members on the WKGMD No.1 board. An attempt is made to select one member from each of the five counties included

in the district. Among themselves they annually elect a president, vice president and secretary-treasurer.

B. Development Policy

In an effort to control the development of the water resources in west central Kansas, the board of directors has proposed the following policy in the WKGMD No.1.

The approval of all applications for a permit to appropriate water for beneficial use from the Ogallala aquifer, except for domestic use, temporary and term permits, shall be subject to the following criteria.

1) The proposed appropriation, when added to the vested rights, certified rights, and prior appropriations shall not exceed the allowable safe-yield amount for the area under consideration within a two-mile radius (approximately 8,042 acres) of the proposed well.

The allowable safe yield amount shall be calculated using the formula:

$$\frac{AR}{12}$$

Where A is the area within the two mile circle or 8,042 acres.
Where R is the annual recharge rate of 0.5 inches per year.

$$\frac{8042 \times 0.5}{12} = 335 \text{ acre feet}$$

2) For the purpose of calculating the available water, all vested rights, certified water rights and prior rights shall be considered as fully used. If wells authorized under a vested right, certified water right or a permit to appropriate water are divided by the circumference of the radial area, the authorized quantity of water shall be assigned to each well. If specific quantities are not authorized for each well, a proportional amount shall be assigned to each well.

3) If part of the two-mile area falls outside of the WKGMD No.1 boundary, it shall be included in the depletion analysis. All areas where the Chief Engineer has determined no groundwater exist, will not be included in a depletion analysis.

4) The areas in which applications may be considered are those in which the total depletion since 1950 has been less than 15% of the 1950 saturated thickness, and the current saturated thickness is at least 40 feet.

5) The wells spacing requirement for wells which meet the depletion criteria, shall be a minimum of 2,640' from all wells, other than domestic. The well spacing from domestic wells shall be 1,320', unless a waiver of spacing requirement is granted by the Chief Engineer. A request for such a waiver includes a written statement from neighboring well

owners indicating no objection to the reduced spacing. If the well is considered a battery as defined in section 5-5-1 (e) of the DWR Rules and Regulations, all wells in the battery must meet the spacing from domestic wells and other permitted wells as set forth above.

6) The relocation of a replacement well under an existing water right is limited to a 300-foot radius of the existing well, or not to exceed 1,320 feet from the originally authorized point of diversion, as long as the move does not violate the minimum spacing criteria, and is approved by the Chief Engineer. If the relocation is outside of the 300 foot radius and closer than 2,640 feet from a neighboring well, the actual distance between the wells must be maintained.

7) The WKGMD No.1 will review all applications which meet the above stated policy and may in addition, review applications on the basis of whether or not the application is in the public interest.

8) The board also adopts the policy that any well installed to divert water from the Dakota Formation must be at least two miles (10,560 feet) from any other well (other than domestic) located in the same formation, and constructed such that any over or underlying formations are sealed off from the water producing zone and no vertical migration of water between formations is allowed.

C. Nonuse Policy

K.S.A. 82a-718 states that every water right of every kind shall be deemed abandoned and shall terminate when without due and sufficient cause no lawful, beneficial use is henceforth made of water under such right for three (3) successive years. The Division of Water Resources has further defined due and sufficient cause for nonuse of water in section 5-7-1 of their rules and regulations item (4). This section states that due and sufficient cause for non-use includes the instance when the purpose for which water is used is temporarily discontinued for a definite period of time to permit soil, moisture and water conservation. This must be documented by:

(A) furnishing to the chief engineer a copy of a contract showing that land which has been lawfully irrigated with a water right which has not been abandoned is enrolled in a multi-year federal or state conservation program which has been approved by the chief engineer:

(B) enrolling the water right in the water right conservation program pursuant to K.A.R. 5-7-4; or

(C) any other method acceptable to the chief engineer which can be adequately documented by the owner in advance.

The WKGMD No.1 promotes responsible management of groundwater supplies. In over appropriated areas the district encourages water right holders to enroll the water right in the water right conservation program if no water use is planned, preventing the termination of the water right for non-use. Over appropriated areas are defined as areas in which the groundwater levels are depleted in excess of fifteen (15) percent of the 1950

static water levels, the total saturated thickness is less than forty (40) feet, or the amount of water authorized exceeds the defined annual recharge as set forth in K.A.R. 5-3-11, which averages approximately .5 inches over the WKGMD No.1.

D. Metering Policy

All wells located within the boundary of the Western Kansas Groundwater Management District No.1 which withdraw water from any aquifer, other than domestic, shall be equipped with an acceptable metering device.

A representative of the district shall have the right to read the meter whenever deemed necessary. (Authorized by K.S.A. 1980 Supp.82a-1028(o); implementing K.S.A. 1980 Supp.82a-1029(1); effective May 1, 1981)

(a) In Line Flow Meter

An in line flow meter may be installed meeting the specifications of the Division of Water Resources for quality, type and installation standards. This is the preferred option since it is considered more reliable and accurate, particularly for wells which experience significant seasonal water table decline and non-uniform operating conditions during the season.

(b) Hour Meter

If the landowner believes the inline flow meter option is infeasible, they may request a waiver of the inline flow meter option and request to install an hour meter of acceptable specifications to the WKGMD No.1. If the District grants a waiver the landowner shall:

1) Install the hour meter on a stand or post adjacent to but separate from the pumping plant base. The wiring must be enclosed in conduit from the pumping plant to the hour meter. The hour meter must be enclosed in a weather proof box with cover, and wiring of 16 gauge installed from the meter to the pumping plant and all electrical connections associated with the proper function of the hour meter must be firmly attached.

2) Furnish to the WKGMD No.1 a certified test of the flow rate of the well. This test must have been conducted under actual operating conditions of the project during one of the previous five pumping seasons. If these conditions differ significantly due to water table declines or different types of delivery systems, a flow rate measurement must be made under each condition.

The WKGMD No.1 will certify individuals capable of testing wells within the District. These certified testers will be required to attend a WKGMD No.1 approved testing program and furnish their own District approved test meter.

In GMD #1 the Chief Engineer shall not require a water flow meter on existing diversion works or delivery systems if the following 3 conditions are met:

the normal operating diversion rate is less than 200 gpm.

the diameter of the existing pipe is too large for the normal operating flow rate which results in the pipe flowing partially full or the existing diversion works and delivery system would not allow proper installation of an inline flow meter that would accurately measure flow rate.

the owner agrees in writing to notify the GMD #1 whenever the diversion works and or the delivery system, at the point of diversion, is modified and that they will install a water flow meter at that time unless a waiver is given by the Chief Engineer.

E. Sub-basin Delineation

The 2001 Kansas Water Authority report to the Governor and State Legislature recommended the development of state policy that serves to sustain the replenishable portions of the State's groundwater, provide transitional guidance when the groundwater starts to become exhausted, and delineates the Ogallala portion of the High Plains aquifer into subunits.

The Western Kansas Groundwater Management District No.1 has been directed by the Ogallala Aquifer Management Advisory Committee to develop an aquifer protocol to delineate the aquifer into aquifer sub-units. The purpose behind this is their feeling that the GMD's have focused mainly on conservation and education issues and need to develop a more sophisticated management approach. This committee and the Technical Advisory Committee were formed by the Kansas Water Office to provide options and recommendation to the Kansas Water Authority for inclusion into the State Water Plan.

This district was selected by the TAC as an area to test different approaches to delineate aquifer sub-units. It was the feeling of the TAC that a geo-statistical clustering method would provide the best data. A number of different clustering parameters were used ranging from five to fifteen. As a part of this District's protocol, this clustering methodology will be utilized.

As a first step in defining the protocol to be used in this district, we will work with the Kansas Geological Survey in determining which clustering definition will be used. It is anticipated that the clustering exercises will focus on current saturated thickness, current changes in the water table, and existing water right development (average reported use and authorized quantities. Other secondary data parameters may also be included such as the distribution of vested water right development and other aquifer characteristics. Once that has been done, sub-basins will be delineated based on similar hydrologic conditions. It is planned that this will be completed by November 2004. The results of the clustering

analysis will be used by the District to define aquifer subunits of appropriate size to successfully implement enhanced and focused water management. The threshold values will be based on the amount of water remaining, the rates of decline, and the actual usage within the defined areas. A secondary consideration may be areas, which have difficulty providing domestic water needs.

The next step in this process will be to group these sub-basins into similar areas. The areas will be based on the premise of comparing the current amount of available water in storage, the rates of decline and the existing water demands as well as programs that may assist in the reduction of the consumptive use in the area. When completed, the Management Program of the district will be modified to reflect this information. This should be accomplished by early 2005. Once the areas have been designated, additional verification of data will need to be made prior to goals being established. One of the reasons for this is that the bedrock contours are made on fifty-foot intervals. This very easily could allow for a significant variation in our saturated thickness in areas of bedrock fluctuation. The accuracy of a measurement at a specific well for a specific point in time is highly accurate. The water table however, moves under the influence of atmospheric pressure, and continues to recover until the next pumping season. In addition, wells are pumped during the winter months, which tend to make finding the actual static water level very difficult. Because of this, we are using an average of three years to develop our data. There are also areas that no data is available.

After the verification of data has been completed, the board will hold public meetings in each of the designated areas to advise, listen and develop water use goals. Once the goals have been established, the Management Program will again have to be revised to include the programs selected. Some of the options to be discussed will include:

a) Enforcement of the existing water appropriation act
b) Water right buy-back or some other retirement program
c) Mandatory flow meter requirement of all wells
d) Intensive Groundwater Use Control Area, or some other special management option developed by the local stakeholders, to limit the consumptive use
e) Assistance in the transition to dryland farming
f) Tax incentive programs

It is anticipated that this might be accomplished in 2006 unless additional time is required to verify aquifer data. Once the goals have been selected and the data verified the board should be able to begin the implementation process. One of the primary concerns will be the socioeconomic impact this program will have on these areas. Quick action to reduce groundwater withdrawals could have a devastating effect on the local economy as well as the tax base of the area. In the alternative, doing nothing could also be detrimental, however at a slower pace. The social-economic impacts of the enhanced water management options will be compared for each area. At some point in time, a water budget needs to be developed to see if we are achieving our goals.

It should be kept in mind that as the information changes or is updated, the priorities may change as well as the time frames for completion.

F. Battery of Wells

Within the boundaries of the WKGMD No.1, a new application or an application for a change of point of diversion from one well to a battery of wells shall not be approved unless the application meets the following criteria:

(a) it is a "battery of wells" as defined in K.A.R. 5-1-1(e);

(b) that if the change application has been filed pursuant to an appropriation right, the certificate shall be issued prior to approval of the change application;

(c) that the maximum annual quantity and maximum instantaneous diversion rate approved shall not exceed the maximum annual quantity and the maximum instantaneous diversion rate actual used during any one of the three consecutive full calendar years prior to the application; and

(d) the application meets the district's criteria for safe yield and that all wells in the battery meet the minimum spacing from all other wells

G. 15 Acre Foot Exemption

In any area of the WKGMD No.1 which is not closed by regulation or an intensive groundwater control area order by the Chief Engineer to new non-domestic, non-temporary permits and term permits for five years or less, applications to appropriate groundwater must meet the following criteria;

(1) the sum of the annual quantity requested by the proposed appropriation and the total annual quantities authorized by prior permits allowed because of an exemption pursuant to this requirement does not exceed 15 acre feet in a 1/2 mile radius surrounding the proposed point of diversion;

(2) well spacing in the area have been met;

(3) the approval of the application does not authorize and additional quantity of water out of an existing authorized well with a non-domestic permit or water right, which would result in a total combined annual quantity of water authorized form that well in excess of 15 acre feet; and

(4) all other criteria for processing a new application to appropriate water at that location have been met.

Exceptions to this regulation may be granted on an individual basis by recommendation by the board in conjunction with the approval of the Chief Engineer. The applicant may be required by the board to submit information necessary in order to make the determination.

H. Tailwater Control

In an effort to control and prevent wastage of water, WKGMD No.1 has established regulation 5-21-2, which states impart "No water user shall allow water which is pumped or diverted from any aquifer to leave the land under the water user's direct supervision and control."

The policy of WKGMD No.1 to enforce this regulation is to allow an investigation to be conducted by a staff member. If a violation is occurring, a letter is sent to the water user informing him of the violation and requesting some corrective action be taken. The district follows this procedure for the first two times a complaint is made or received. The third time a complaint is received, the board member from the county the violation is originating and a staff member both investigate the complaint. At that time, all of the information collected to date is submitted to the districts attorney for the filing of a petition for a permanent injunction.

I. Records Inspection

The official custodian of the WKGMD No.1 records shall be the manager of the district. Records shall be open for inspection during regular business hours of 8:00 a.m. to 5:00 p.m. Monday through Friday except for state holidays and at other times the staff may be required to close. An hourly charge may be made for computer time and staff time needed to produce, supervise the inspection of and the replacement of records.

VIII. MANAGEMENT OPERATIONS

A. Headquarters and Staff

The WKGMD No.1 headquarters is located in Scott City, Kansas. It is operated by a staff of the district manager, administrative assistant, technicians, chief pilot and our project manager/meteorologist which is headquartered in the project office in Lakin. In addition to this staff, the district also contracts for pilots to fly in our weather modification program.

IX. DISTRICT PROJECTS

A. Water Level Monitoring

Annual water level measurements are taken each year through a cooperative program between the Division of Water Resources, U.S. Geological Survey and the Kansas Geological Survey. From this information, maps of WKGMD No.1 are developed to determine both the percent decline in our groundwater levels and the remaining saturated thickness. If there has been a significant change during the past years, new maps are adopted by the board for use in the management operations of the district. The district in addition to this, measures select wells each year at the request of the landowners to provide them with their individual information.

B. Demonstration Programs

The WKGMD No.1 sponsored a cooperative program in 1976 through 1978 between Kansas State University; the U.S. Geological Survey and local water users in a concentrated water management program. A great deal of information was obtained in this program and published by the U.S.G.S. in three reports. U.S.G.S. Water Resources Investigations 79-105, 80-39 and 80-91. One of the more interesting items learned in this program was the higher than expected efficiency level of the application of water and their concern for improved water management techniques.

The area which was selected represented an average saturated thickness for the district and was located in Northeast Wichita County. All wells were metered and select fields were equipped with soil moisture monitoring equipment to determine when and how much water should be applied. Evapotranspriation studies were also conducted to show the water loss by different crops and to determine their water needs. Solar radiation measurements were taken daily in Scott City and furnished with the other necessary parameters to the evapotranspiration lab in Manhattan, Kansas. In addition to this, each well was monitored to determine the amount of energy per unit of water pumped and to find the efficiencies of each pumping system. At the conclusion of the two-year study, the U.S.G.S. conducted an aquifer-modeling program to show the effects of pumpage as well as the longevity of the aquifer under differing management schemes. There were five different management plans used in the modeling of the study area. These included reducing the withdrawal in half as well as allowing an increase in pumping. This data is available upon request of the district office.

C. Pilot Recharge Projects

One of the programs which WKGMD No. 1 initiated when it was formed was to attempt to artificially increase the recharge rates in specific areas throughout the district.

This program was initiated on both dryland and irrigated land in the district. After several years of monitoring both surface flows, and groundwater levels, it was found that recharge quantities could be improved if a sufficient quantity of water was available.

In 1981, the WKGMD No. 1 began a pilot recharge project in conjunction with the Kansas Water Office to attempt to determine what kind of structures would be the best suited, as well as what impact these structures would have on our groundwater resources. Each of the five groundwater districts constructed different types of systems to evaluate their impacts. This district constructed an earthen fill structure and contracted with the U.S.G.S. for the instrumentation. It was found that the earthen fill structure was probably the most cost effective method of recharge. Relatively large amounts of water can be recharged into the aquifer with a properly constructed facility, but in west-central Kansas, the main limiting factor is the availability of surface runoff water.

D. Western Kansas Weather Modification Program

Another program which WKGMD No. 1 sponsors is an operational weather modification program. This program was initiated in 1975 in an attempt to increase the natural rainfall and reduce crop-damaging hail in Western Kansas during the growing season. After following the experimental work, which was done in the early 70's in Northwest Kansas, it was the feeling of the district that we could perhaps reduce the stress being imposed on our groundwater resources. This program has been conducted each year since that time. Due to the interest received from other counties, this program has enlarged to include most all of Southwest Kansas. The original headquarters for the program is located at the Kearny county airport in Lakin, Kansas, where the project manager/meteorologist and radar are located. Effective in 1997, the program has again enlarged to include a portion of an additional nine counties in Northwest Kansas located within the boundary of the Northwest Kansas Groundwater Management District No. 4. A second radar facility was installed at the municipal airport in Colby, Kansas to service this area. In 2001, the target area was again changed back to the original area in west central and southwest Kansas.

In 1994 the Kansas Water Office conducted an evaluation to see what effects could be found from this program. In comparing six counties, which had continuously participated in the program each year, and eight counties in Northwest Kansas, which had never been involved in seeding, they found a twenty seven (27) percent reduction in crop damaging hail. Since 1987, when the seeding agent was modified, they found hail reductions approaching fifty (50) percent. The analysis for rain increase was unable to show any positive results. Because of their findings, a position paper was developed to include weather modification in the *Kansas Water Plan.* This then provided an avenue to

secure a limited amount of funding from the Kansas Water Plan Fund. It made available an additional ten thousand dollars for each of the approved counties if they participated in the program. In addition, the Kansas Water Office will also match any funding for the program which is paid by the WKGMD No.1 as long as matching funds are available.

Seeding at cloud base is conducted for both rain increase and hail suppression by injecting silver iodide into the cloud updrafts. The on-top aircraft is utilized to inject carbon dioxide (dry ice) into the tops of the building cloud turrets. Both of these seeding agents are effective when the cloud temperature is 32 degrees Fahrenheit or colder. Introduction of such materials into the supercooled region of the cumulus formation causes the liquid cloud droplets to freeze. With millions of repetitions of this freezing action in the cloud, a great amount of heat is produced. This heat of fusion makes the cloud more buoyant, thrusting it higher, helping it grow larger and enabling it to produce more rain for a longer period than it would have without seeding.

Hail is formed in massive cumulonimbus clouds, which have particularly strong updrafts. Since these "hailers" are cold clouds, attempts to suppress hail involve introducing somewhat larger quantities of silver iodide and carbon dioxide into specific areas within these clouds. The addition of these artificial freezing nuclei increases the competition for available supercooled cloud droplets within the cloud. As a result, the hailstones cannot grow very large because their growth depends upon availability of liquid water. If the hailstones are small enough, they will have time to melt as they fall from cloud to ground level.

Several evaluations have been conducted on this program throughout the years. The first evaluation was conducted by Colorado International Corporation of Boulder, Colorado. Their limited work indicated that the program was achieving its objectives of reducing hail and increasing rainfall. The second evaluation was conducted by the Illinois Department of Energy and Natural Resources for the National Science Foundation. This evaluation covered the period of 1975 to 1979. The evaluation was done to determine what techniques should be utilized in evaluating a weather program. The results of our program were compared with the evaluation of a Texas program and showed a significant reduction in hail of 48%, based on the hail insurance loss/cost values. The third evaluation conducted on this program was done by the Bureau of Reclamation, Engineering and Research Center. Their final report indicated, "The absence of any significant effect on seasonal rainfall is in agreement with a study of the Kansas project by Hsu and Chen (Illinois Department of Energy and Natural Resources), using data through 1979. The results are not in conflict with the findings by Huff et al. that seeding may have caused small rainfall increases on days when seeding was conducted primarily to stimulate rainfall rather than to suppress hail. The natural variability of rainfall from large storms, some of which were seeded for hail suppression, could easily mask changes in rainfall from smaller storms seeded to stimulate rainfall". The evaluation further states that "The suggestion that seeding may have led to decreases in hail damage in the eastern part of the target area of as much as 50 percent is in line with Hsu and Chen and with analyses of several other hail suppression programs in the Great Plains". An evaluation was later conducted by

Emporia State University on the rain increase phase of the program. They found an eleven percent increase in rainfall in the target area.

As was mentioned above, the newest evaluation was the one completed by the Kansas Water Office in 1994. Because of these evaluations, it is the districts feelings that the program is indeed obtaining our goals and objectives. This has now been increased by the recent evaluation done for the U.S. Air Force Research Laboratory on tornado prevention as stated above.

E. Well Measurement Program

The WKGMD No.1 also has a program to assist the water users in our district in the better use and management of our water resources. This program includes technical assistance to conduct well discharge measurements on individual wells. These measurements are generally done after the wells have been pumped for a period of time to allow for the drawdown of the water in the well. With the knowledge of precisely how much water the user has to work with, an improved irrigation management plan can be developed. In addition to this, the district also offers assistance in the determination of static groundwater levels. This program is conducted during the early part of the year when our groundwater levels are relatively stabilized.

F. Soil Moisture Monitoring Program

Since the conclusion of the WKGMD No.1's demonstration program, the district has offered assistance to water users in the installation and use of soil moisture monitoring equipment. This gives the water user the capability to schedule irrigation applications based more closely on the needs of the crops. This program has not been very widely accepted during recent times.

G. Water Quality Monitoring

In order to keep aware of the groundwater quality throughout the WKGMD No.1, a network of wells should be established to monitor water quality. These wells should be located in areas where there might be a threat of possible pollution. An agreement has been made with a private laboratory to conduct the water analysis. Results of this analysis will be made public through the districts newsletters. Another concern throughout the district is the elevated nitrate levels. Some think this is due to stockwater pollution ponds not being required to be sealed, but rather to allow 1/4 inch per day infiltration. Through an agreement with the Kansas Department of Health and Environment, any problem areas will be reported directly to them. Other water quality problems include leaking

underground fuel storage tanks and grain fumigants coming in contact with the public water supplies. This has occurred in almost every community in the district.

H. Well Location Program

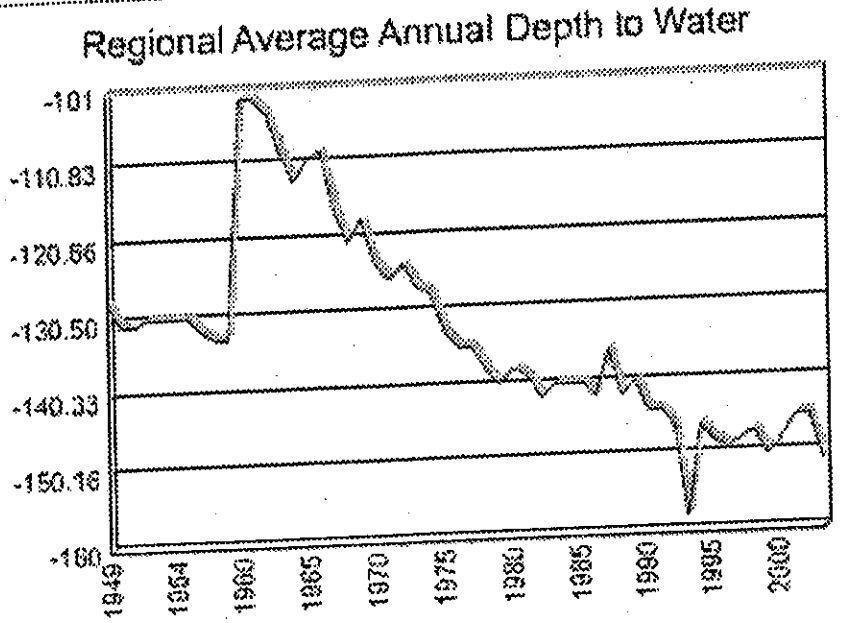
In the past the WKGMD No.1 has had a cooperative program with the U.S.G.S. to survey the well locations throughout the district. For the past several years the WKGMD No.1 has begun surveying the well locations ourselves to determine the wells, which we considered being active and those which appeared abandoned. We also have been looking at each meter installation, whether it is an hour meter or flow meter, to insure that the water users have complied with the meter program. The compliance has been extremely good and the most recent survey data is still being compiled. The principal work remaining are the discharge measurements on each well equipped with an hour meter. These are to be completed every five years. An effort is made to test these wells late in the pumping season or after the wells have been used fairly extensively to obtain as reasonable a test as possible. We do not conduct tests on wells which have just recently began pumping.

TABLE A

GREELEY COUNTY

Regional Average Trends

Winter Averages Annual Averages Change Graph



(depth to water is feet below land surface)

Regional averages shown in this graph are simply the average depth to water for all wells that were measured in a given year. As such, individual wells may or may not be measured or represented in each year during the time period. Depending on the years specific wells are measured can greatly skew an annual average value. To find specific wells that are measured every year through a time period, please use the Data Setup page.

Year	Number of Wells	Number of Measurements	Average Depth to Water
1949	1	1	-127.96
1950	1	1	-130.55
1951	1	1	-130.6
1952	1	1	-130.17
1953	1	1	-130
1954	1	1	-130.06
1956	1	1	-130.35
1957	1	1	-131.91
1958	1	1	-132.77
1959	1	1	-132.5
1960	2	2	-101.52

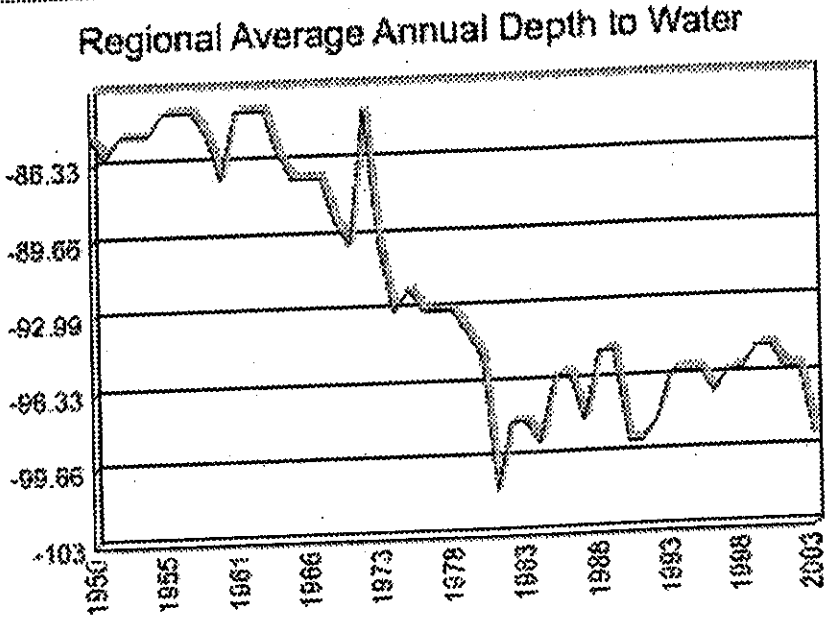
1961	3	3	-102.21
1962	2	2	-103.63
1963	5	5	-108.53
1964	3	3	-113.27
1965	11	12	-109.96
1966	12	17	-109.32
1967	14	20	-116.7
1968	21	28	-121.44
1969	22	27	-118.23
1970	25	32	-124.13
1971	26	25	-126.37
1972	31	49	-124.33
1973	25	26	-127.34
1974	24	31	-128.01
1975	23	28	-133.38
1976	22	22	-134.53
1977	34	35	-135.05
1978	33	34	-138.36
1979	30	30	-139.59
1980	35	35	-137.57
1981	30	30	-139.19
1982	33	33	-141.53
1983	34	34	-140.01
1984	32	32	-140.05
1985	15	15	-140.25
1986	18	18	-141.65
1987	16	16	-136.14
1988	17	17	-141.74
1989	15	15	-140.31
1990	18	18	-143.97
1991	18	18	-143.66
1992	16	16	-145.69
1993	10	10	-158.15
1994	17	17	-145.89
1995	17	17	-147.67
1996	17	17	-148.84

1997	17	17	-148.11
1998	18	18	-147.22
1999	17	17	-149.58
2000	17	16	-147.52
2001	17	13	-144.7
2002	16	15	-145.36
2003	16	13	-151.08

LANE COUNTY

Regional Average Trends

Winter Averages Annual Averages Change Graph



(depth to water is feet below land surface)

Regional averages shown in this graph are simply the average depth to water for all wells that were measured in a given year. As such, individual wells may or may not be measured or represented in each year during the time period. Depending on the years specific wells are measured can greatly skew an annual average value. To find specific wells that are measured every year through a time period, please use the Data Setup page.

Year	Number of Wells	Number of Measurements	Average Depth to Water
1950	1	2	-85.1
1951	1	2	-85.61
1952	1	2	-84.84
1953	1	1	-84.55
1954	1	2	-84.56
1955	1	2	-84.36
1956	1	2	-84.38
1957	1	2	-84.41
1958	1	2	-84.53
1959	2	2	-87.12
1961	1	1	-84.1

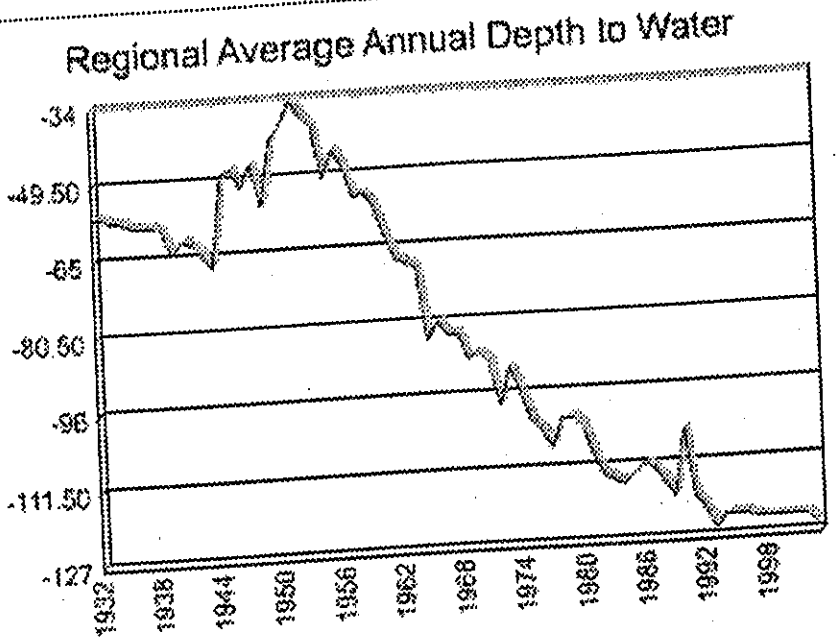
1962	1	1	-84.31
1963	1	1	-83.93
1964	2	2	-85.7
1965	2	2	-86.68
1966	2	2	-86.61
1967	2	2	-87.32
1970	2	2	-89.08
1971	2	2	-89.52
1972	5	6	-84.11
1973	18	26	-90.13
1974	13	13	-93.34
1975	14	16	-92.19
1976	14	14	-93.44
1977	23	23	-93.37
1978	20	20	-93.42
1979	22	22	-94.35
1980	23	23	-95.01
1981	17	17	-101.44
1982	21	23	-98.2
1983	19	19	-98.47
1984	22	22	-99.01
1985	19	19	-96.37
1986	18	18	-95.77
1987	16	16	-97.93
1988	17	17	-94.67
1989	18	17	-94.88
1990	19	19	-98.91
1991	20	20	-98.96
1992	18	18	-98.24
1993	18	18	-96.13
1994	19	19	-95.67
1995	19	19	-96.14
1996	18	18	-96.82
1997	19	19	-95.58
1998	20	20	-96.33
1999	19	19	-94.82

2000	18	17	-94.82
2001	19	19	-95.52
2002	19	18	-96.06
2003	19	17	-99.17

SCOTT COUNTY

Regional Average Trends

Winter Averages Annual Averages Change Graph



(depth to water is feet below land surface)

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Year	Number of Wells	Number of Measurements	Average Depth to Water
1932	1	17	-56.18
1933	1	8	-56.17
1934	1	17	-56.5
1935	1	13	-57.39
1936	1	9	-57.52
1937	1	13	-57.74
1938	1	10	-58.24
1939	1	15	-58.77
1940	4	26	-64.34
1941	9	29	-61.19
1942	12	27	-61.88

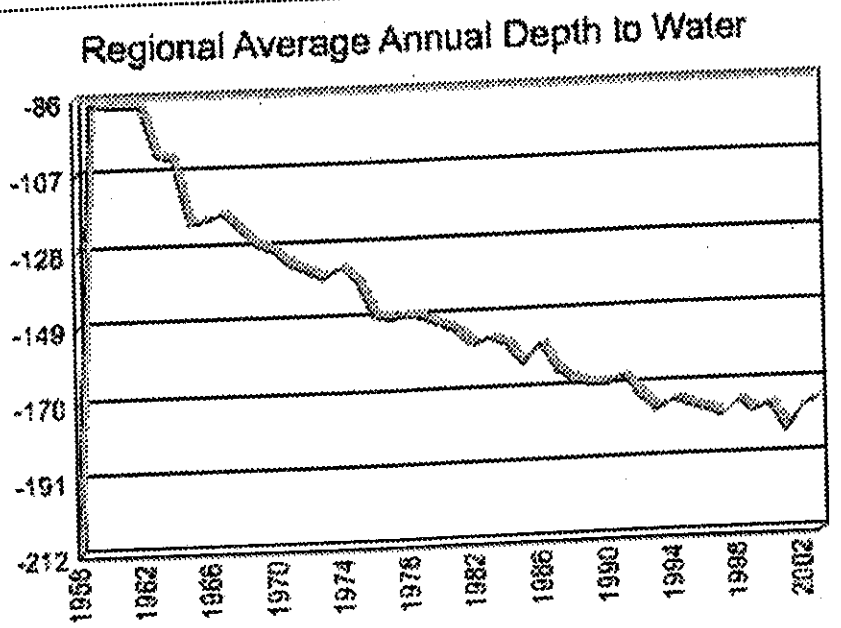
1943	6	25	-63.98
1944	5	23	-66.57
1945	7	26	-48.32
1946	7	29	-46.69
1947	7	25	-51.15
1948	4	19	-46.3
1949	4	11	-54.98
1950	3	22	-40.56
1951	3	23	-38.69
1952	5	25	-34.36
1953	4	20	-36.52
1954	4	22	-38.9
1955	4	14	-50.03
1956	3	15	-44
1957	3	21	-48.06
1958	4	20	-53.96
1959	6	30	-52.86
1960	7	34	-56.3
1961	26	55	-62.16
1962	9	46	-67.1
1963	7	47	-68.43
1964	7	33	-68.72
1965	21	53	-84.11
1966	49	83	-80.36
1967	53	94	-83.12
1968	59	102	-82.72
1969	61	91	-88.01
1970	67	100	-86.68
1971	65	101	-89.49
1972	67	91	-97.84
1973	74	112	-90.02
1974	62	87	-95.11
1975	62	79	-100.66
1976	59	62	-102.94
1977	74	81	-106.76
1978	70	92	-101.32

1979	67	89	-101.03
1980	77	111	-102.61
1981	65	69	-108.92
1982	77	82	-112.52
1983	80	88	-114.44
1984	74	80	-114.85
1985	40	44	-112.92
1986	41	47	-111.14
1987	39	45	-111.53
1988	34	40	-115.25
1989	29	32	-117.71
1990	41	66	-103.71
1991	44	47	-118.08
1992	34	36	-120.88
1993	33	33	-125.06
1994	37	34	-122.32
1995	33	33	-121.52
1996	37	32	-122.13
1997	37	37	-122.61
1998	42	40	-122.62
1999	37	38	-122.84
2000	35	32	-123.04
2001	37	36	-123.48
2002	37	33	-122.82
2003	37	35	-124.85

WALLACE COUNTY

Regional Average Trends

Winter Averages Annual Averages Change Graph



(depth to water is feet below land surface)

Regional averages shown in this graph are simply the average depth to water for all wells that were measured in a given year. As such, individual wells may or may not be measured or represented in each year during the time period. Depending on the years specific wells are measured can greatly skew an annual average value. To find specific wells that are measured every year through a time period, please use the Data Setup page.

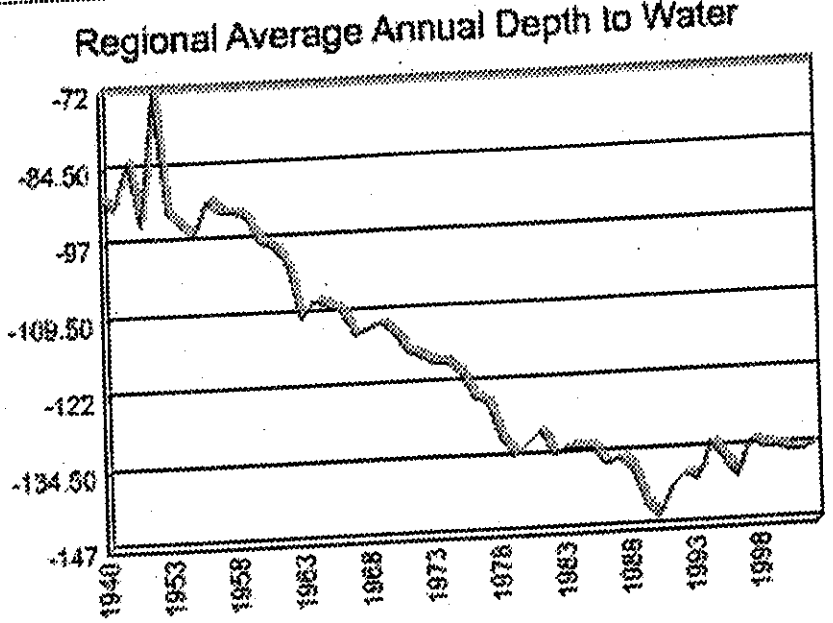
Year	Number of Wells	Number of Measurements	Average Depth to Water
1958	1	1	-210.59
1959	1	1	-86.84
1960	1	1	-87.63
1961	1	1	-87.57
1962	1	1	-88.29
1963	4	5	-101.79
1964	3	3	-102.87
1965	17	18	-121.18
1966	22	22	-120.38
1967	31	35	-117.98
1968	32	39	-123.4

1969	37	37	-127.08
1970	45	57	-129.31
1971	40	41	-132.9
1972	42	50	-134.62
1973	39	41	-137.04
1974	38	46	-133.87
1975	37	46	-138.14
1976	38	38	-147.87
1977	44	46	-149.01
1978	44	44	-148.36
1979	40	40	-149.37
1980	43	43	-151.45
1981	37	37	-153.05
1982	40	40	-156.6
1983	40	40	-155
1984	40	40	-157.35
1985	24	24	-162.72
1986	23	23	-157
1987	25	25	-164.8
1988	21	21	-167.99
1989	23	23	-168.59
1990	24	24	-168.66
1991	25	25	-166.85
1992	24	24	-173.29
1993	15	15	-176.64
1994	23	23	-173.51
1995	24	24	-175.68
1996	22	22	-176.8
1997	25	24	-178.66
1998	26	26	-175.03
1999	25	23	-178.43
2000	25	23	-176.3
2001	25	17	-184.04
2002	23	17	-176.74
2003	24	17	-174.9

WICHITA COUNTY

Regional Average Trends

Winter Averages Annual Averages Change Graph



(depth to water is feet below land surface)

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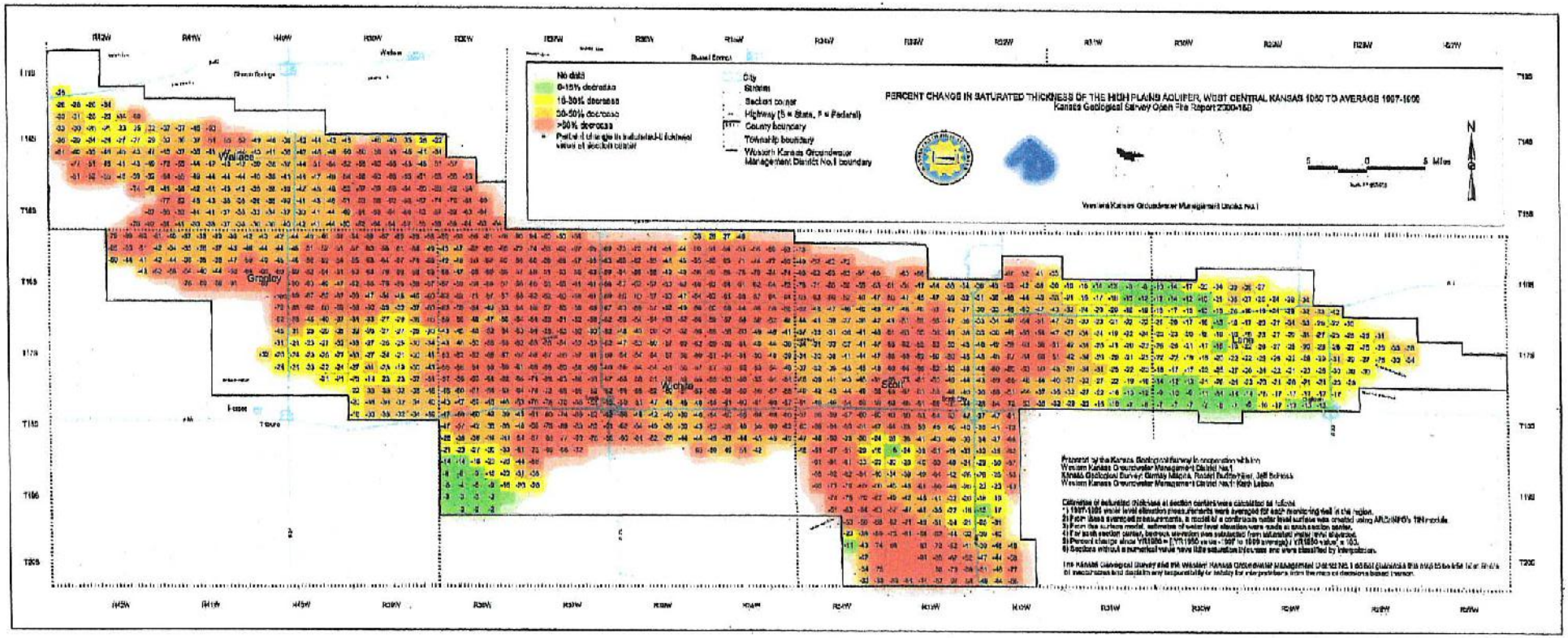
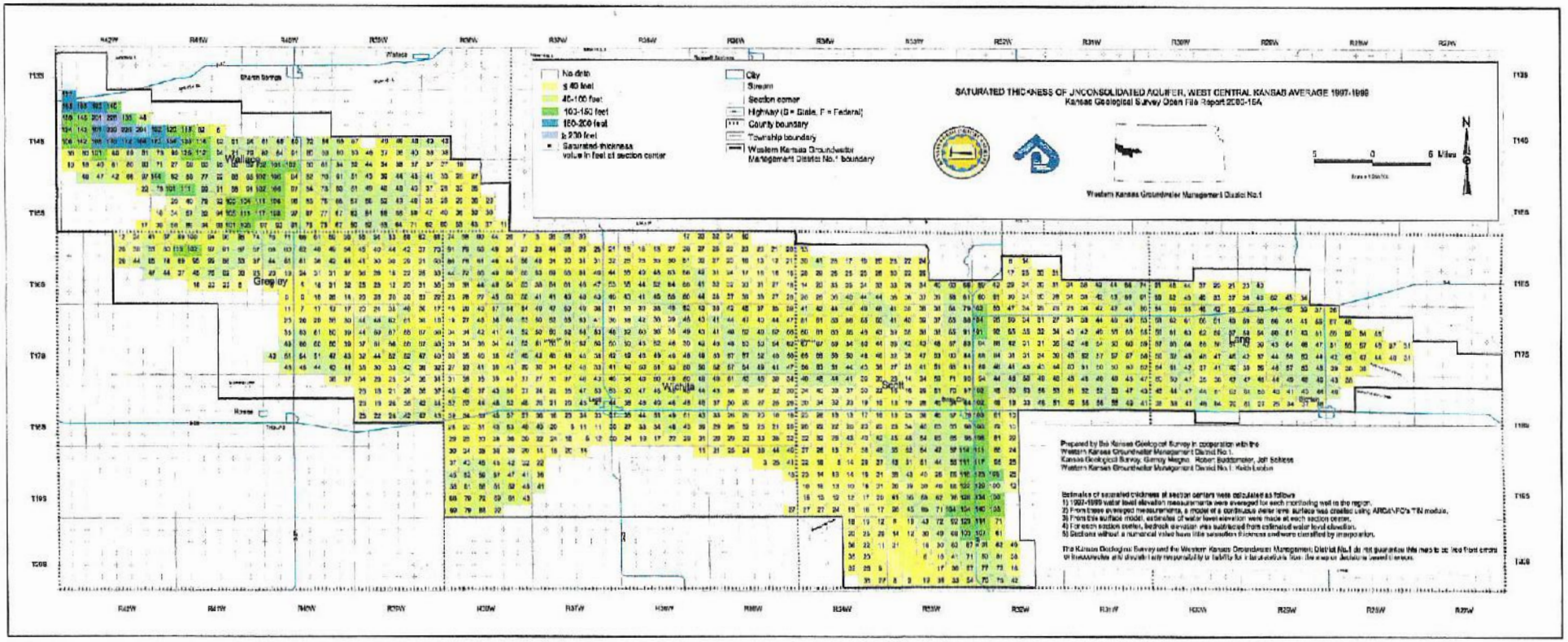
Year	Number of Wells	Number of Measurements	Average Depth to Water
1940	1	1	-89
1947	3	3	-91.04
1948	7	8	-83.15
1950	4	4	-94.19
1951	42	67	-72.02
1953	2	2	-92.32
1954	2	7	-93.57
1955	4	12	-95.77
1956	3	9	-89.65
1957	2	9	-92.05
1958	3	13	-91.72

			-92.97
1959	6	14	-96.56
1960	4	14	-97.53
1961	5	16	-100.59
1962	7	19	-110.39
1963	6	12	-107.23
1964	9	19	-107.74
1965	50	123	-109.04
1966	66	197	-113.26
1967	73	207	-111.7
1968	82	172	-111.45
1969	84	173	-113.24
1970	86	174	-115.78
1971	89	191	-116.98
1972	92	186	-118.37
1973	92	200	-118.46
1974	87	122	-119.76
1975	82	115	-124.14
1976	75	100	-125.16
1977	86	115	-131.25
1978	80	162	-133.75
1979	79	173	-132.15
1980	87	159	-130.15
1981	70	96	-133.5
1982	82	114	-133.14
1983	84	111	-132.99
1984	75	103	-133.43
1985	46	73	-136.28
1986	46	77	-134.63
1987	45	71	-137.15
1988	39	62	-142.64
1989	44	117	-145.48
1990	41	154	-139.88
1991	47	83	-137.85
1992	38	72	-139.14
1993	30	52	-133.39
1994	38	45	

1995	36	49	-135.91
1996	37	53	-138.58
1997	40	36	-132.82
1998	47	43	-133.87
1999	38	36	-133.75
2000	37	36	-134.69
2001	37	36	-134.81
2002	37	66	-133.97

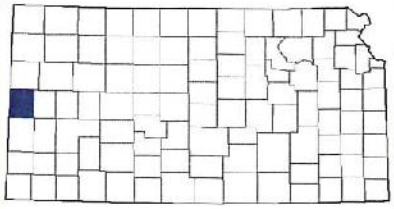

PERCENT CHANGE IN SATURATED THICKNESS OF THE HIGH PLAINS AQUIFER, WEST CENTRAL KANSAS 1950 TO AVERAGE 1997-1998
Kansas Geological Survey Open File Report 2000-160
No data
0-15% decrease
15-30% decrease
30-50% decrease
>50% decrease
City
Stream
Section corner
Highway (S = State, F = Federal)
County boundary
Township boundary
Western Kansas Groundwater Management District No.1 boundary
Western Kansas Groundwater Management District No.1
Gray
Ford
Kiowa
Edwards
Pawnee
Hodgeman
Finney
Lane
Scott
Wichita
Greeley
Hamilton
Kearny
Prepared by the Kansas Geological Survey in cooperation with the
Western Kansas Groundwater Management District No.1
Kansas Geological Survey: Dennis Hedges, Rachel Buddy-Miller, Jeff Bohling
Western Kansas Groundwater Management District No.1: Keith Lawson

Map A


SATURATED THICKNESS OF UNCONSOLIDATED AQUIFER, WEST CENTRAL KANSAS AVERAGE 1997-1999
Kansas Geological Survey Open File Report 2000-15A
No data
≤ 40 feet
40-100 feet
100-150 feet
150-200 feet
≥ 200 feet
Saturated thickness value in feet at section center
City
Stream
Section corner
Highway (S = State, F = Federal)
County boundary
Township boundary
Western Kansas Groundwater Management District No.1 boundary
Western Kansas Groundwater Management District No.1
5 0 6 Miles
N
Wallace
Greeley
Wichita
Scott
Lane
Prepared by the Kansas Geological Survey in cooperation with the
Western Kansas Groundwater Management District No.1.
Kansas Geological Survey, Genny Meyer, Robert Buddemeier, Jon Schloss
Western Kansas Groundwater Management District No.1: Keith Lawton
Estimates of saturated thickness at section centers were calculated as follows:
1) 1997-1999 water level elevation measurements were averaged for each monitoring well in the region.
2) From these averaged measurements, a model of a continuous water table surface was created using ARC/INFO's TIN module.
3) From this surface model, estimates of water level elevation were made at each section center.
4) For each section center, bedrock elevation was subtracted from estimated water level elevation.
5) Sections without a numerical value have little saturated thickness and were classified by inspection.
The Kansas Geological Survey and the Western Kansas Groundwater Management District No.1 do not guarantee this map to be free from errors or inaccuracies and disclaim any responsibility or liability for interpretations from the map or decisions based thereon.

Map B

2017 CENSUS OF AGRICULTURE *County Profile*



Greeley County
Kansas

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	227	-13
Land in farms (acres)	474,883	-5
Average size of farm (acres)	2,092	+10
Total	($)	
Market value of products sold	251,308,000	+104
Government payments	6,405,000	+22
Farm-related income	8,110,000	-17
Total farm production expenses	217,221,000	+79
Net cash farm income	48,603,000	+190
Per farm average	($)	
Market value of products sold	1,107,085	+136
Government payments (average per farm receiving)	35,784	+62
Farm-related income	55,546	-4
Total farm production expenses	956,919	+106
Net cash farm income	214,109	+235

1 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	24
Livestock, poultry, and products	76

Land in Farms by Use (%) [a]

Cropland	92
Pastureland	7
Woodland	(Z)
Other	1

Acres irrigated: 19,807
4% of land in farms

Land Use Practices (% of farms)

No till	26
Reduced till	37
Intensive till	26
Cover crop	2

Farms by Value of Sales

	Number	Percent of Total [a]
Less than $2,500	56	25
$2,500 to $4,999	9	4
$5,000 to $9,999	16	7
$10,000 to $24,999	13	6
$25,000 to $49,999	16	7
$50,000 to $99,999	26	11
$100,000 or more	91	40

Farms by Size

	Number	Percent of Total [a]
1 to 9 acres	4	2
10 to 49 acres	5	2
50 to 179 acres	55	24
180 to 499 acres	32	14
500 to 999 acres	27	12
1,000 + acres	104	46

2017 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [b]	Counties Producing Item	Rank in U.S. [b]	Counties Producing Item
Total	**251,308**	**18**	**105**	**361**	**3,077**
Crops	**60,096**	**51**	**105**	**970**	**3,073**
Grains, oilseeds, dry beans, dry peas	59,516	50	105	664	2,916
Tobacco	-	-	-	-	323
Cotton and cottonseed	-	-	23	-	647
Vegetables, melons, potatoes, sweet potatoes	-	-	82	-	2,821
Fruits, tree nuts, berries	-	-	57	-	2,748
Nursery, greenhouse, floriculture, sod	-	-	65	-	2,601
Cultivated Christmas trees, short rotation woody crops	-	-	21	-	1,384
Other crops and hay	580	97	105	2,254	3,040
Livestock, poultry, and products	**191,212**	**16**	**105**	**215**	**3,073**
Poultry and eggs	(D)	8	104	(D)	3,007
Cattle and calves	31,784	60	105	487	3,055
Milk from cows	(D)	3	64	(D)	1,892
Hogs and pigs	(D)	1	97	30	2,856
Sheep, goats, wool, mohair, milk	25	72	102	2,113	2,984
Horses, ponies, mules, burros, donkeys	115	26	99	1,354	2,970
Aquaculture	-	-	14	-	1,251
Other animals and animal products	-	-	87	-	2,878

Total Producers [c]	371
Sex	
Male	226
Female	145
Age	
<35	55
35 – 64	175
65 and older	141
Race	
American Indian/Alaska Native	-
Asian	1
Black or African American	-
Native Hawaiian/Pacific Islander	-
White	369
More than one race	1
Other characteristics	
Hispanic, Latino, Spanish origin	7
With military service	32
New and beginning farmers	99

Percent of farms that:

Have internet access	74
Farm organically	(Z)
Sell directly to consumers	-
Hire farm labor	39
Are family farms	92

Top Crops in Acres [d]

Wheat for grain, all	115,808
Sorghum for grain	68,989
Corn for grain	54,264
Forage (hay/haylage), all	3,972
Proso millet	(D)

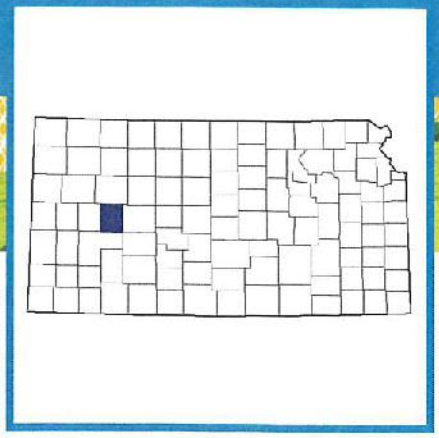
Livestock Inventory (Dec 31, 2017)

Broilers and other meat-type chickens	-
Cattle and calves	34,675
Goats	-
Hogs and pigs	(D)
Horses and ponies	133
Layers	70
Pullets	-
Sheep and lambs	150
Turkeys	-

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

[a] May not add to 100% due to rounding. [b] Among counties whose rank can be displayed. [c] Data collected for a maximum of four producers per farm. [d] Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. [e] Position below the line does not indicate rank. (D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

2017 CENSUS OF AGRICULTURE *County Profile*



Lane County
Kansas

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	242	-23
Land in farms (acres)	417,017	-8
Average size of farm (acres)	1,723	+20
Total	($)	
Market value of products sold	266,374,000	+23
Government payments	6,680,000	+21
Farm-related income	4,686,000	-55
Total farm production expenses	252,568,000	+25
Net cash farm income	25,172,000	-17
Per farm average	($)	
Market value of products sold	1,100,719	+60
Government payments (average per farm receiving)	29,687	+55
Farm-related income	26,933	-43
Total farm production expenses	1,043,670	+62
Net cash farm income	104,016	+8

1 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	(D)
Livestock, poultry, and products	(D)

Land in Farms by Use (%) [a]

Cropland	75
Pastureland	25
Woodland	(Z)
Other	1

Acres Irrigated: 10,198
2% of land in farms

Land Use Practices (% of farms)

No till	26
Reduced till	37
Intensive till	16
Cover crop	(Z)

Farms by Value of Sales

	Number	Percent of Total [a]
Less than $2,500	104	43
$2,500 to $4,999	3	1
$5,000 to $9,999	9	4
$10,000 to $24,999	12	5
$25,000 to $49,999	18	7
$50,000 to $99,999	23	10
$100,000 or more	73	30

Farms by Size

	Number	Percent of Total [a]
1 to 9 acres	8	3
10 to 49 acres	12	5
50 to 179 acres	56	23
180 to 499 acres	40	17
500 to 999 acres	31	13
1,000 + acres	95	39

2017 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [b]	Counties Producing Item	Rank in U.S. [b]	Counties Producing Item
Total	**266,374**	**16**	**105**	**326**	**3,077**
Crops	**(D)**	**85**	**105**	**(D)**	**3,073**
Grains, oilseeds, dry beans, dry peas	(D)	(D)	105	(D)	2,916
Tobacco	-	-	-	-	323
Cotton and cottonseed	-	-	23	-	647
Vegetables, melons, potatoes, sweet potatoes	-	-	82	-	2,821
Fruits, tree nuts, berries	-	-	57	-	2,748
Nursery, greenhouse, floriculture, sod	-	-	65	-	2,601
Cultivated Christmas trees, short rotation woody crops	-	-	21	-	1,384
Other crops and hay	(D)	102	105	2,636	3,040
Livestock, poultry, and products	**(D)**	**14**	**105**	**(D)**	**3,073**
Poultry and eggs	9	45	104	1,808	3,007
Cattle and calves	(D)	12	105	52	3,055
Milk from cows	-	-	64	-	1,892
Hogs and pigs	157	49	97	794	2,856
Sheep, goats, wool, mohair, milk	62	51	102	1,598	2,984
Horses, ponies, mules, burros, donkeys	(D)	81	99	2,423	2,970
Aquaculture	-	-	14	-	1,251
Other animals and animal products	-	-	87	-	2,878

Total Producers [c]	**384**
Sex	
Male	253
Female	131
Age	
<35	21
35 – 64	202
65 and older	161
Race	
American Indian/Alaska Native	-
Asian	-
Black or African American	-
Native Hawaiian/Pacific Islander	-
White	384
More than one race	-
Other characteristics	
Hispanic, Latino, Spanish origin	1
With military service	40
New and beginning farmers	75

Percent of farms that:

Have internet access	**61**
Farm organically	**-**
Sell directly to consumers	**-**
Hire farm labor	**30**
Are family farms	**95**

Top Crops in Acres [d]

Wheat for grain, all	69,191
Sorghum for grain	56,904
Corn for grain	20,061
Soybeans for beans	1,791
Forage (hay/haylage), all	1,632

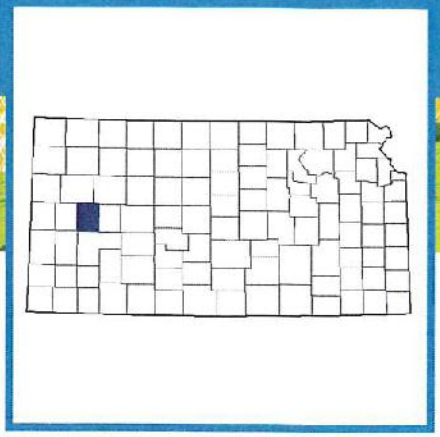
Livestock Inventory (Dec 31, 2017)

Broilers and other meat-type chickens	-
Cattle and calves	69,002
Goats	486
Hogs and pigs	268
Horses and ponies	169
Layers	116
Pullets	(D)
Sheep and lambs	-
Turkeys	(D)

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

[a] May not add to 100% due to rounding. [b] Among counties whose rank can be displayed. [c] Data collected for a maximum of four producers per farm. [d] Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. [e] Position below the line does not indicate rank. (D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

2017 CENSUS OF AGRICULTURE *County Profile*



Scott County
Kansas

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	236	-12
Land in farms (acres)	460,338	+2
Average size of farm (acres)	1,951	+16
Total	($)	
Market value of products sold	1,135,039,000	+16
Government payments	6,872,000	+39
Farm-related income	5,164,000	-75
Total farm production expenses	1,089,441,000	+12
Net cash farm income	57,634,000	+78
Per farm average	($)	
Market value of products sold	4,809,488	+32
Government payments (average per farm receiving)	39,266	+64
Farm-related income	31,488	-73
Total farm production expenses	4,616,274	+28
Net cash farm income	244,213	+103

6 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	8
Livestock, poultry, and products	92

Land in Farms by Use (%) [a]

Cropland	79
Pastureland	19
Woodland	(Z)
Other	2

Acres Irrigated: 29,117
6% of land in farms

Land Use Practices (% of farms)

No till	31
Reduced till	34
Intensive till	17
Cover crop	3

Farms by Value of Sales

	Number	Percent of Total [a]
Less than $2,500	59	25
$2,500 to $4,999	6	3
$5,000 to $9,999	6	3
$10,000 to $24,999	9	4
$25,000 to $49,999	21	9
$50,000 to $99,999	16	7
$100,000 or more	119	50

Farms by Size

	Number	Percent of Total [a]
1 to 9 acres	11	5
10 to 49 acres	31	13
50 to 179 acres	36	15
180 to 499 acres	41	17
500 to 999 acres	24	10
1,000 + acres	93	39

2017 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [b]	Counties Producing Item	Rank in U.S. [b]	Counties Producing Item
Total	**1,135,039**	**2**	**105**	**26**	**3,077**
Crops	**86,926**	**20**	**105**	**650**	**3,073**
Grains, oilseeds, dry beans, dry peas	86,194	17	105	458	2,916
Tobacco	-	-	-	-	323
Cotton and cottonseed	-	-	23	-	647
Vegetables, melons, potatoes, sweet potatoes	-	-	82	-	2,821
Fruits, tree nuts, berries	-	-	57	-	2,748
Nursery, greenhouse, floriculture, sod	(D)	(D)	65	(D)	2,601
Cultivated Christmas trees, short rotation woody crops	-	-	21	-	1,384
Other crops and hay	(D)	96	105	(D)	3,040
Livestock, poultry, and products	**1,048,113**	**2**	**105**	**12**	**3,073**
Poultry and eggs	(D)	(D)	104	(D)	3,007
Cattle and calves	1,030,703	2	105	4	3,055
Milk from cows	(D)	14	64	(D)	1,892
Hogs and pigs	(D)	20	97	(D)	2,856
Sheep, goats, wool, mohair, milk	12	78	102	2,321	2,984
Horses, ponies, mules, burros, donkeys	19	60	99	2,173	2,970
Aquaculture	-	-	14	-	1,251
Other animals and animal products	(D)	58	87	(D)	2,878

Total Producers [c]	380
Sex	
Male	272
Female	108
Age	
<35	17
35 – 64	218
65 and older	145
Race	
American Indian/Alaska Native	-
Asian	1
Black or African American	-
Native Hawaiian/Pacific Islander	-
White	379
More than one race	-
Other characteristics	
Hispanic, Latino, Spanish origin	3
With military service	27
New and beginning farmers	59

Percent of farms that:

Have internet access	**79**
Farm organically	**3**
Sell directly to consumers	**-**
Hire farm labor	**49**
Are family farms	**83**

Top Crops In Acres [d]

Wheat for grain, all	96,324
Corn for grain	80,605
Sorghum for grain	69,526
Corn for silage or greenchop	3,955
Forage (hay/haylage), all	3,072

Livestock Inventory (Dec 31, 2017)

Broilers and other meat-type chickens	-
Cattle and calves	294,728
Goats	(D)
Hogs and pigs	(D)
Horses and ponies	311
Layers	(D)
Pullets	-
Sheep and lambs	65
Turkeys	(D)

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

[a] May not add to 100% due to rounding. [b] Among counties whose rank can be displayed. [c] Data collected for a maximum of four producers per farm. [d] Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. [e] Position below the line does not indicate rank. (D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

2017 CENSUS OF AGRICULTURE *County Profile*

Wallace County
Kansas

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	281	-4
Land in farms (acres)	445,809	-9
Average size of farm (acres)	1,587	-4
Total	($)	
Market value of products sold	81,786,000	-16
Government payments	5,388,000	-16
Farm-related income	5,272,000	-41
Total farm production expenses	72,203,000	-6
Net cash farm income	20,243,000	-43
Per farm average	($)	
Market value of products sold	291,052	-12
Government payments (average per farm receiving)	23,530	-9
Farm-related income	29,956	-30
Total farm production expenses	256,950	-2
Net cash farm income	72,040	-40

(Z) Percent of state agriculture sales

Share of Sales by Type (%)

Crops	68
Livestock, poultry, and products	32

Land in Farms by Use (%) [a]

Cropland	68
Pastureland	31
Woodland	(Z)
Other	1

Acres irrigated: 33,873
8% of land in farms

Land Use Practices (% of farms)

No till	24
Reduced till	32
Intensive till	20
Cover crop	1

Farms by Value of Sales

	Number	Percent of Total [a]
Less than $2,500	106	38
$2,500 to $4,999	3	1
$5,000 to $9,999	7	2
$10,000 to $24,999	12	4
$25,000 to $49,999	24	9
$50,000 to $99,999	37	13
$100,000 or more	92	33

Farms by Size

	Number	Percent of Total [a]
1 to 9 acres	3	1
10 to 49 acres	11	4
50 to 179 acres	65	23
180 to 499 acres	52	19
500 to 999 acres	38	14
1,000 + acres	112	40

USDA
United States Department of Agriculture
National Agricultural Statistics Service
www.nass.usda.gov/AgCensus

2017 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [b]	Counties Producing Item	Rank in U.S. [b]	Counties Producing Item
Total	**81,786**	**69**	**105**	**1,339**	**3,077**
Crops	**55,821**	**55**	**105**	**1,021**	**3,073**
Grains, oilseeds, dry beans, dry peas	55,290	55	105	713	2,916
Tobacco	-	-	-	-	323
Cotton and cottonseed	-	-	23	-	647
Vegetables, melons, potatoes, sweet potatoes	-	-	82	-	2,821
Fruits, tree nuts, berries	-	-	57	-	2,748
Nursery, greenhouse, floriculture, sod	-	-	65	-	2,601
Cultivated Christmas trees, short rotation woody crops	-	-	21	-	1,384
Other crops and hay	532	98	105	2,298	3,040
Livestock, poultry, and products	**25,964**	**73**	**105**	**1,440**	**3,073**
Poultry and eggs	(Z)	84	104	2,120	3,007
Cattle and calves	(D)	99	105	(D)	3,055
Milk from cows	-	-	64	-	1,892
Hogs and pigs	(D)	12	97	(D)	2,856
Sheep, goats, wool, mohair, milk	30	67	102	2,028	2,984
Horses, ponies, mules, burros, donkeys	6	71	99	2,347	2,970
Aquaculture	-	-	14	-	1,251
Other animals and animal products	-	-	87	-	2,878

Total Producers [c] 461

Sex	
Male	282
Female	179
Age	
<35	52
35 – 64	254
65 and older	155
Race	
American Indian/Alaska Native	2
Asian	2
Black or African American	-
Native Hawaiian/Pacific Islander	-
White	457
More than one race	-
Other characteristics	
Hispanic, Latino, Spanish origin	3
With military service	28
New and beginning farmers	129

Percent of farms that:

Have internet access	**74**
Farm organically	**1**
Sell directly to consumers	**(Z)**
Hire farm labor	**30**
Are family farms	**89**

Top Crops in Acres [d]

Wheat for grain, all	74,177
Corn for grain	68,462
Sorghum for grain	30,337
Forage (hay/haylage), all	4,607
Sunflower seed, all	2,247

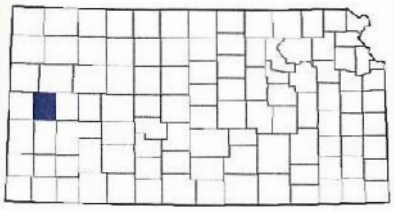
Livestock Inventory (Dec 31, 2017)

Broilers and other meat-type chickens	10
Cattle and calves	16,548
Goats	74
Hogs and pigs	(D)
Horses and ponies	187
Layers	61
Pullets	-
Sheep and lambs	(D)
Turkeys	-

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

[a] May not add to 100% due to rounding. [b] Among counties whose rank can be displayed. [c] Data collected for a maximum of four producers per farm. [d] Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. [e] Position below the line does not indicate rank. (D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

2017 CENSUS OF AGRICULTURE *County Profile*



Wichita County
Kansas

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	254	-4
Land in farms (acres)	437,945	-6
Average size of farm (acres)	1,724	-1
Total	($)	
Market value of products sold	559,347,000	-10
Government payments	6,749,000	+18
Farm-related income	7,036,000	-22
Total farm production expenses	509,132,000	-15
Net cash farm income	64,000,000	+49
Per farm average	($)	
Market value of products sold	2,202,155	-7
Government payments (average per farm receiving)	31,536	+28
Farm-related income	42,385	-12
Total farm production expenses	2,004,458	-11
Net cash farm income	251,967	+56

3 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	13
Livestock, poultry, and products	87

Land in Farms by Use (%) [a]

Cropland	84
Pastureland	14
Woodland	(D)
Other	(D)

Acres irrigated: 40,862
9% of land in farms

Land Use Practices (% of farms)

No till	31
Reduced till	30
Intensive till	24
Cover crop	3

Farms by Value of Sales

	Number	Percent of Total [a]
Less than $2,500	71	28
$2,500 to $4,999	7	3
$5,000 to $9,999	4	2
$10,000 to $24,999	20	8
$25,000 to $49,999	16	6
$50,000 to $99,999	12	5
$100,000 or more	124	49

Farms by Size

	Number	Percent of Total [a]
1 to 9 acres	6	2
10 to 49 acres	20	8
50 to 179 acres	35	14
180 to 499 acres	48	19
500 to 999 acres	26	10
1,000 + acres	119	47

2017 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [b]	Counties Producing Item	Rank in U.S. [b]	Counties Producing Item
Total	**559,347**	**6**	**105**	**84**	**3,077**
Crops	**71,507**	**39**	**105**	**821**	**3,073**
Grains, oilseeds, dry beans, dry peas	71,454	35	105	572	2,916
Tobacco	-	-	-	-	323
Cotton and cottonseed	-	-	23	-	647
Vegetables, melons, potatoes, sweet potatoes	-	-	82	-	2,821
Fruits, tree nuts, berries	-	-	57	-	2,748
Nursery, greenhouse, floriculture, sod	-	-	65	-	2,601
Cultivated Christmas trees, short rotation woody crops	-	-	21	-	1,384
Other crops and hay	53	104	105	2,716	3,040
Livestock, poultry, and products	**487,841**	**6**	**105**	**53**	**3,073**
Poultry and eggs	6	55	104	1,870	3,007
Cattle and calves	(D)	6	105	26	3,055
Milk from cows	-	-	64	-	1,892
Hogs and pigs	(D)	3	97	(D)	2,856
Sheep, goats, wool, mohair, milk	59	52	102	1,633	2,984
Horses, ponies, mules, burros, donkeys	2	77	99	2,391	2,970
Aquaculture	-	-	14	-	1,251
Other animals and animal products	-	-	87	-	2,878

Total Producers [c]	479
Sex	
Male	326
Female	153
Age	
<35	63
35 – 64	284
65 and older	132
Race	
American Indian/Alaska Native	-
Asian	1
Black or African American	-
Native Hawaiian/Pacific Islander	-
White	476
More than one race	2
Other characteristics	
Hispanic, Latino, Spanish origin	18
With military service	32
New and beginning farmers	158

Percent of farms that:

Have internet access	**76**
Farm organically	**6**
Sell directly to consumers	**-**
Hire farm labor	**42**
Are family farms	**85**

Top Crops in Acres [d]

Wheat for grain, all	107,184
Corn for grain	76,115
Sorghum for grain	38,375
Corn for silage or greenchop	3,663
Forage (hay/haylage), all	1,416

Livestock Inventory (Dec 31, 2017)

Broilers and other meat-type chickens	152
Cattle and calves	128,670
Goats	195
Hogs and pigs	(D)
Horses and ponies	194
Layers	145
Pullets	-
Sheep and lambs	(D)
Turkeys	90

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

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 (Office Use Only) No._____

GMD1 Cost Share Program – Application

- Fill out and turn in application and appropriate invoices to GMD1 Staff
- Upon Staff review and approval, a check will be issued to the appropriate dealer. *(Please note that payments cannot be issued directly to the applicant.)*

Please see attached for rules and qualifications

1. **Applicant: (Print or type)**

Name: _____ Address: _____

City & State: _____ Zip Code: _____ Phone: _____

Email: _____ Landowner: ____ Tenant: ____

2. **Provide Land Location(s) and Technology(s) See Page 3 *(Attached)***

3. **Sign and date below.**

Approved Applicant agrees that a new technology system is to be installed at the location(s) indicated on this application. Payment will be made directly to the Vendor upon receipt of the invoice by the District Office. Data collected from these technologies to be available to WKGMD1 upon request and may be subject to a courtesy check to view product implementation.

Signature: _____ Date: _____

(For Staff Use Only)

Date Approved: _____

Approved By: _____

Total Amount to be paid: _____

Check Number: _____

WKGMD1
P.O. Box 604
906 W. 5th
Scott City, KS 67871
Gmd1@wbsnet.org
Phone 620-872-5563

 (Office Use Only) No._____

1. QTR. ____ Sec. ____ TWP. _____RG. ____County: _____KS. Water Right #_____

Technology Type: _____

Brand (If known): _____

2. QTR. ____ Sec. ____ TWP. _____RG. ____County: _____KS. Water Right # _____

Technology Type: _____

Brand (If known): _____

3. QTR. ____ Sec. ____ TWP. _____RG. ____County: _____KS. Water Right # _____

Technology Type: _____

Brand (If known): _____

4. QTR. ____ Sec. ____ TWP. _____RG. ____County: _____KS. Water Right # _____

Technology Type: _____

Brand (If known): _____

5. QTR. ____ Sec. ____ TWP. _____RG. ____County: _____KS. Water Right # _____

Technology Type: _____

Brand (If known): _____

6. QTR. ____ Sec. ____ TWP. _____RG. ____County: _____KS. Water Right # _____

Technology Type: _____

Brand (If known): _____

7. QTR. ____ Sec. ____ TWP. _____RG. ____County: _____KS. Water Right # _____

Technology Type: _____

Brand (If known): _____

Briefly describe how this will assist with water use efficiency or conservation:

_____

_____

_____

_____

_____

WKGMD1
P.O. Box 604
906 W. 5th
Scott City, KS 67871
Gmd1@wbsnet.org
Phone 620-872-5563

Cost Share – Rules and Qualifications

1. Up to **$2,200** per qualifying technology. *See Master Technology List for examples.*
   Note: unlisted technologies may still be considered at staff discretion. Possible technologies include but are not limited to mobile drip irrigation, bubblers, sub surface drip irrigation, automatic tank shut off valves etc.
2. **$50.00 or 50%** *(whichever is less)* of a subscription fee for water use tracking applications. *(One per well)*
3. **$1,500** per listed technology:
   a. Pivot control systems
   b. EC soil field mapping
   c. Aerial field imagery
4. **$750** per weather station.
5. Up to a maximum of **$4.50** per nozzle for lowering nozzle height.
6. Up to a maximum of **$1,500** for 1st moisture probe; **$1,000** per additional probes as funds allow.

- All applicants must be within the GMD1 boundaries.
- Applications may be for irrigation or for stock water right use.
- Applications awarded on a 1st come 1st serve basis and as funds allow.
- Limit of 7 Technologies per Applicant per calendar year. (Ex. 7 Technologies per applicant or per entity but not both)
- One moisture probe per QTR. Applicants may apply for multiple probes (with the exception of previous approved locations)
- The Board of Directors maintains discretion on approvals or waivers on a case-by-case basis.

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