Approved: February 8, 2001
Date

MINUTES OF THE SENATE NATURAL RESOURCES COMMITTEE.

The meeting was called to order by Chairperson Robert Tyson at 8:30 a.m. on February 2, 2001 in Room 423-S of the Capitol.

All members were present except: Senator Dwayne Umbarger - excused

Committee staff present: Raney Gilliland, Legislative Research Department
Jill Wolters, Office of Revisor of Statutes
Judy Krase, Committee Secretary

Conferees appearing before the committee:
Bill Howgill, Governor's liaison
Al LeDoux, Director, Ks Water Office
Brownie Wilson, Ks Water Office
Susan Stover, Ks Water Office
Dr. Lee Allison, State Geologist and Director, Ks Geological Survey
Terry Duvall, Ks Water Office

Others attending: See attached list

Senator Tyson announced that the chairman, vice-chairman and ranking minority will meet in 423-S Monday morning, February 5, at 8:30 to go over future agendas. He then stated that the subject matter today would be concerning recommendations on aquifer depletion restrictions.

The first conferee was Bill Howgill, the Governor's legislative liaison, who stated the Governor's vision for the maintenance and preservation of the High Plains/Ogallala Aquifer (Attachment 1).

The second conferee was Al LeDoux who commented about recent newspaper articles concerning high plains aquifer resources. He said one article in particular indicated that both the Speaker of the House and the President of the Senate thought that it was time to go slow and look at this issue, and after speaking with the Governor he recognized that this was the Governor's position also. With that he introduced Brownie Wilson.

Mr. Wilson, an analyst with the Kansas Water Office, presented testimony dealing with Kansas high plains aquifer resources (Attachment 2). He noted that the high plains aquifer is the most heavily utilized aquifer in the state. Questions and discussion followed.

The next conferee was Susan Stover from the Kansas Water Office and she spoke on the Ogallala Aquifer (Attachment 3).

Dr. Lee Allison, Kansas Geological Survey, spoke on science needs for managing the high plains aquifer (Attachment 4). He also handed out a brochure titled "The High Plains Aquifer Coalition" (Attachment 5).

Terry Duvall, Kansas Water Office, explained three water marketing contracts. One contract is with Miami County Rural Water District Number 1, with its source from the Hillsdale Reservoir, and two contracts, which are short term, are with Jost Farms with their source from Marion Reservoir (Attachment 6). She said water contracts are submitted to the legislature for review and disapproval, not for approval. She pointed out that they have another contract with Franklin County Rural Water District Number 1 which was recently approved by the water authority and will be coming to the legislature this year.

The meeting adjourned at 9:30 a.m.

The next meeting is scheduled for February 8 at 8:30 a.m. in Room 241-N.

SENATE NATURAL RESOURCES COMMITTEE
GUEST LIST
DATE: February 2, 2001

NAME	REPRESENTING
Emily Shaw	Kearney Law Office
Orville Cole	Sen. Tyson
Tom Bruno	Farm Credit
Todd Johnson	KLA
Terry Leonard	Ks Water Office
Al LeDoux	KWO-KWA
Brownie Wilson	KWO
Susan Stover	KWO
Cathy Tucker-Vogel	KWO
Margaret Fast	KWO
GREG A. FOLEY	KDA
David L. Pope	KDA
Thomas L. Huntzinger	KDA
David Miller	DOB
Kirsten Hanna	Volunteer - Sierra Club
Bill Hargill	Governor's Office
Lee Allen	Ks Geol. Survey
Tracy Streeter	Cons. Comm.
Doug Smith	Prager - Smith Company
Tadeusz Cole	Sen. Tyson Office Staff
[illegible]	KS Ag Stat Assn

STATE OF KANSAS

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OFFICE OF THE GOVERNOR

TO: Senate Committee on Environment

FROM: Bill Howgill, Legislative Liaison

RE: Zero Depletion in the High Plains Aquifer

DATE: February 2, 2001

Mr. Chairman and members of the committee, thank you for allowing me a few moments to speak this afternoon on the Governor's vision for the maintenance and preservation of the High Plains/Ogallala Aquifer.

In his 2001 State of the State address, Governor Graves said, "To achieve long-term viability of Kansas' communities, industries and agricultural producers, I support the recommendation made by my Task Force on Water: by 2020 we stop depletion of our state's precious aquifers." It is important that this committee and the citizens of Kansas who depend on the aquifer understand the Governor's position, which is not that the use of the aquifer be stopped. Rather, he wants to assure that the people who rely on this resource will have access to it for decades to come.

You will hear testimony from the Kansas Water Office on an idea known as The Two-Pool Concept. This concept, on which the Water Office will expound in a moment, is one that has been explained to the Governor and one, which in theory, he supports. However, he recognizes that different areas of the High Plains should be treated according to their circumstances and further understands that we need more data to be able to see the full range of potential solutions. This has culminated in his additional funding of the Kansas Geological Survey so that they can give us a clearer picture of the aquifer's geology. We are excited to have all the research available: a three dimensional mapping of the bottom of the aquifer to fully understand its depth; an academic analysis of the aquifer's varying geologic makeup—which will better explain water availability and recharge frequencies; and a determination if there are untapped areas of the aquifer that we have yet to realize.

What the Governor proposed in the State of the State was a means to determine what options exist--in addition to the two pools--that we should consider which will allow us to build some consensus on the best options to begin the long-term effort of implementing a strategy. It is for that reason the Governor began this discussion and asked the Geological Survey to make available all of the information.

We have asked interested parties—the Water Office, the Department of Agriculture, legislators, among others—to float the Two Pools Concept to test its viability and receive grass-roots feedback from local interests.

The Governor appreciates the committee's interest in this important issue. He looks forward to western Kansans' ability to manage areas of the aquifer to the betterment of western Kansas life.

Thank you for the opportunity to visit with you today. Mr. Chairman, I am happy to answer any questions you or the committee may have.

STATE OF KANSAS

Bill Graves, Governor

KANSAS WATER OFFICE
Al LeDoux
Director

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TESTIMONY BEFORE THE SENATE NATURAL RESOURFCES COMMITTEE FEBRUARY 2, 2001 AT 8:30 A.M. IN ROOM 423-S KANSAS HIGH PLAINS AQUIFER RESOURCES

By Brownie Wilson

Senate Natural Resources Committee
Date 2-2-01

Attachment # 2

Slide 1

The Kansas High Plains Aquifer

Kansas Water Office
901 S. Kansas Ave
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785-296-3185
http://www.kwo.org

Introductory Slide

Slide 2

House Substitute for Senate Bill 287- Aquifer Resources

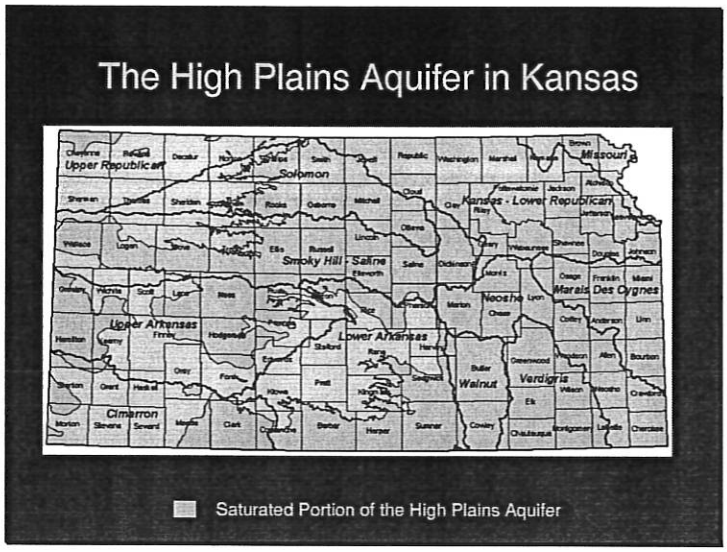
The 1999 Legislative Session- House Substitute for Senate Bill 287

By January 8, 2001, the Kansas Water Authority shall study and develop recommendations related to:

- Aquifer resources, recharge rates, availability of surface water resources and the long-term prospects related to any necessary transition to dryland farming in areas of the state to maintain sustainable yield and minimum streamflow levels
- The potential for competing water needs for at least the next 20 years and the means of addressing the competition

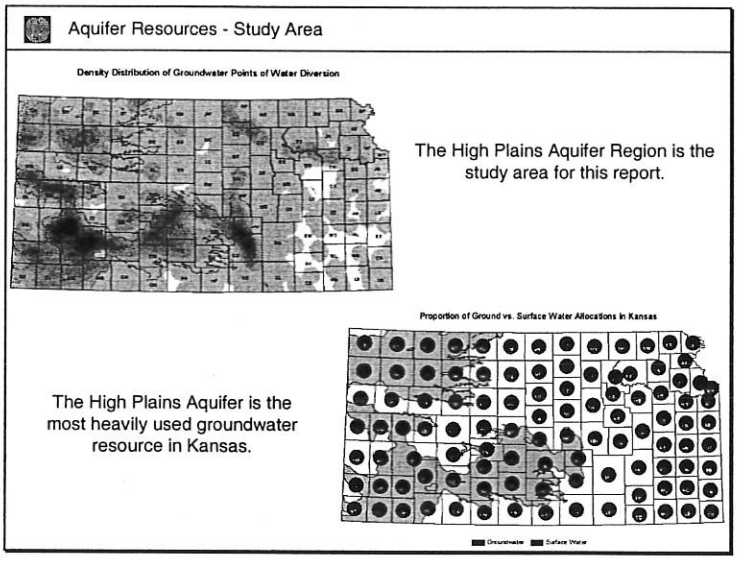
This assessment of the Kansas High Plains Aquifer was undertaken as part of several mandates directed to the Kansas Water Authority from House Substitute for Senate Bill 287 (1999 Legislative Session). The report on Aquifer Resources is the primary topic for this presentation, however, it has related issues to the potential for competing water needs.

Slide 3



This map shows the saturated portion of the High Plains Aquifer in Kansas.

Slide 4

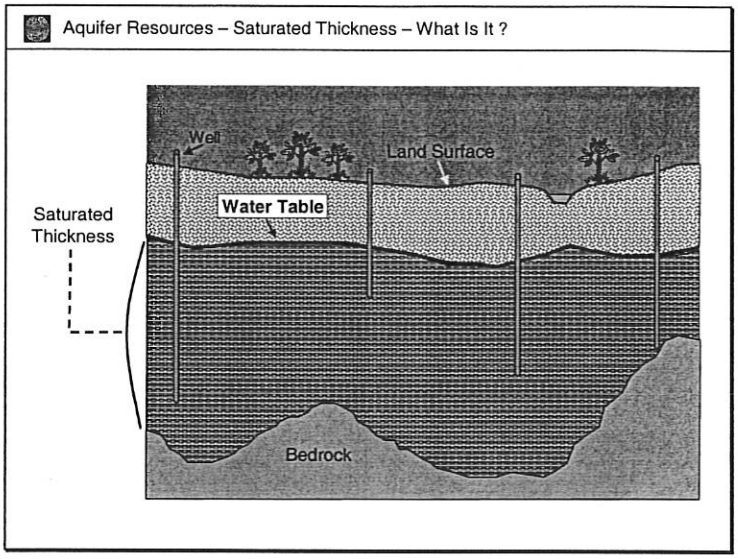


The aquifer resources report focuses on the High Plains Aquifer in Kansas. Although there are other aquifer units in Kansas, the High Plains Aquifer represents the most heavily utilized aquifer system in the state and represent the primary source of water for most of western and south,central Kansas.

The map in the upper left shows the density of all wells for currently active water right allocations where ground water is the source of supply. The red outline represents the saturated portion of the High Plains Aquifer. Although there are areas of extensive well development (e.g. Kansas-Lower Republican alluvium and the Wichita Well Field) throughout the state, the majority of ground water wells in Kansas as a whole are drilled within the High Plains Aquifer Region.

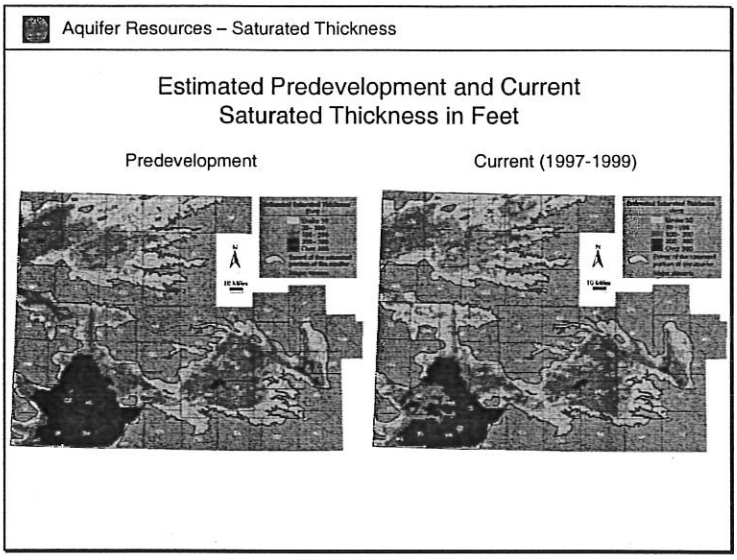
The map in the lower right shows the proportion of ground versus surface water allocations in the state. Again, notice ground water represent the dominant source of supply in the High Plains Aquifer region, although there are some large surface water components associated with surface irrigation ditch companies and reservoirs operations.

Slide 5



Saturated Thickness is the vertical thickness of a hydrogeologically defined aquifer in which the pore spaces are filled (saturated) with water. Saturated Thickness is commonly used as an indicator of the amount of available water and its rate of change. In addition, it is also often used in setting water management and use policies and regulations. Saturated Thickness is a key aquifer component used in this report.

Slide 6

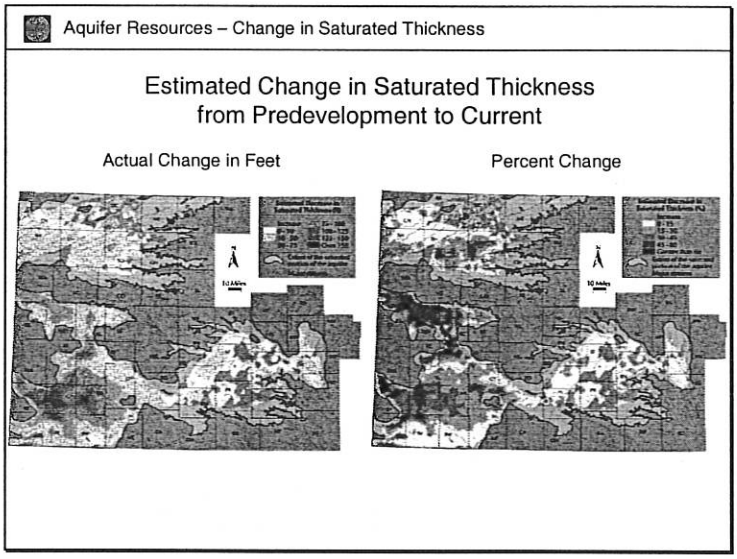


These maps portray the estimated saturated thickness in the Kansas High Plains Aquifer in predevelopment and current time periods. The "blank" or gray areas of the High Plains Aquifer on these maps do not have an adequate number of monitoring wells to permit useful estimates. In western Kansas, these areas are mostly fringe areas of the aquifer and are likely to be in the lowest (0-50 feet) category.

"Predevelopment" is defined as a period of time before extensive ground water development occurred. "Current" saturated thickness represents the average estimated saturated thickness from 1997 to 1999.

In both maps, ground water resources are unevenly distributed in ways primarily controlled by bedrock topography and patterns of recharge and discharge. South, central Kansas operate under "safe yield" policies and as a whole, have shown little change over time. The Ogallala portion of the High Plains Aquifer (e.g. GMD 4, 1, and 3) all show areas of substantial groundwater declines, however, Southwestern Kansas, where the bedrock is the deep beneath the land surface, has historically and still is relatively "water-rich" in terms saturated thickness.

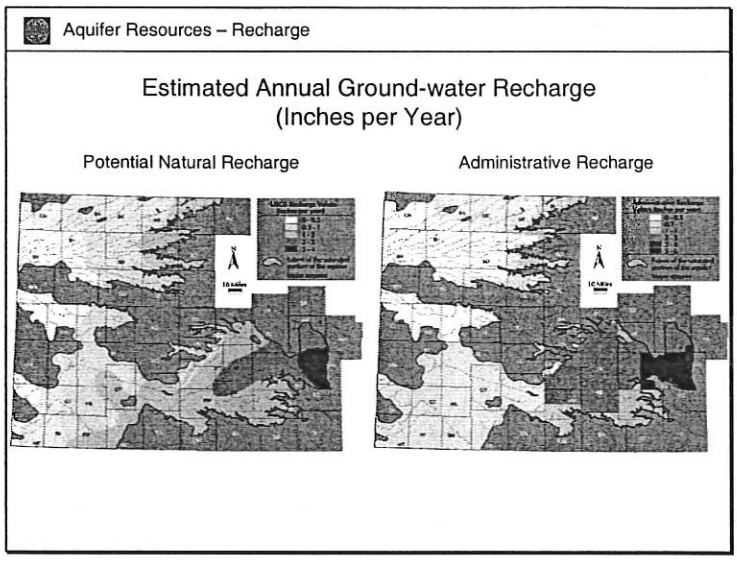
Slide 7



These maps show the actual and percent change in the saturated thickness of the High Plains Aquifer from predevelopment to present day. The maps show the greatest actual change in the saturated thickness has occurred in southwestern Kansas, however, because of the large volume of water currently still present, the percent changes in this area are not proportionately large. For areas that had marginal saturated thickness to start with, the percent change based on the total predevelopment saturated thickness may be somewhat misleading. For example, 30 to 50 feet is used as an approximation of the saturated thickness required to support large volume pumping. If the original saturated thickness was less than 100 feet, then a 50 percent change in the saturated thickness could actually represent 100 percent of the usable water for large volume requirements. The changes, relative and absolute, need to be interpreted in the light of predevelopment and current saturated thickness.

Although the total area showing an increase in saturated thickness (light blue) appears impressive, almost all these regions are either in the fringe areas of less than 50 feet saturated thickness, have relatively small levels of authorized water right allocations, and/or are in regions of poor water quality from natural mineral intrusion. The increases therefore represent more or less natural variations in unstressed portions of the aquifer, and in most areas do not reflect an actual increase in water available for use under current conditions.

Slide 8

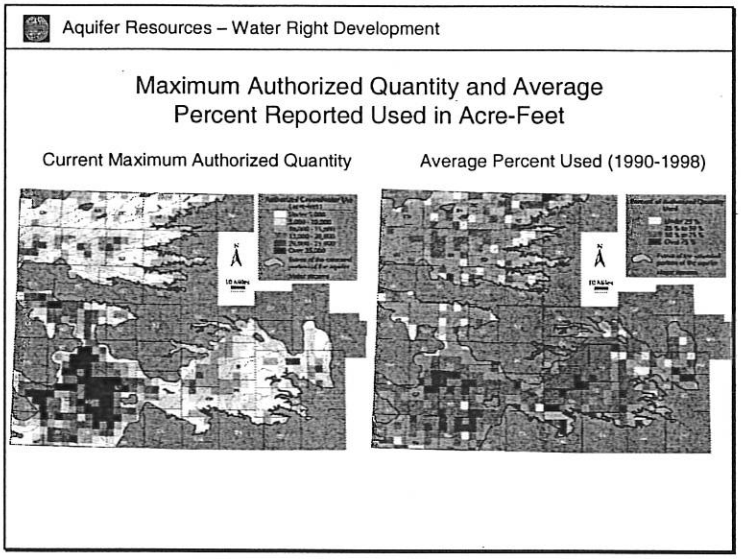


The potential natural recharge map shows the annual amount of precipitation-based recharge in inches for western and central Kansas as estimated in the US Geological Survey (USGS) Water Resources Investigations Report 87-4230. The distribution of annual recharge follows a similar pattern to that of annual precipitation across the state, that is, it progressively decreases as one moves westward across the state. The climatic conditions are such that not only is precipitation low in western Kansas, but most of it is lost to evaporation from the soil surface and transpiration from plants. More than 99% of the rainfall is returned to the atmosphere in 14 southwestern Kansas counties, and more than 95% is returned throughout the western half of the state, thus resulting in meager recharge to the High Plains aquifer in that region. (In eastern Kansas an average of 85% of the rainfall is returned to the atmosphere.) Thus, climatic conditions constitute a primary control on recharge, although vegetation and soils also influence recharge.

The administrative recharge map shows the amount of annual recharge, in inches, that is available for appropriation based on rules and regulations adopted by KDA-DWR. The map shows areas of special administrative recharge, such as the boundaries of the five Groundwater Management Districts (GMDs) and the KDA- DWR Unit Basins in south-central Kansas.

Of all the factors in the evaluation of groundwater resources, the rate of recharge is one of the most difficult to derive with confidence. Estimates of recharge are normally subject to large uncertainties and spatial and temporal variability. The USGS recharge estimates may be considered representative at the county level. No stream seepage, irrigation return flow, or other sources of recharge were considered in this USGS analysis.

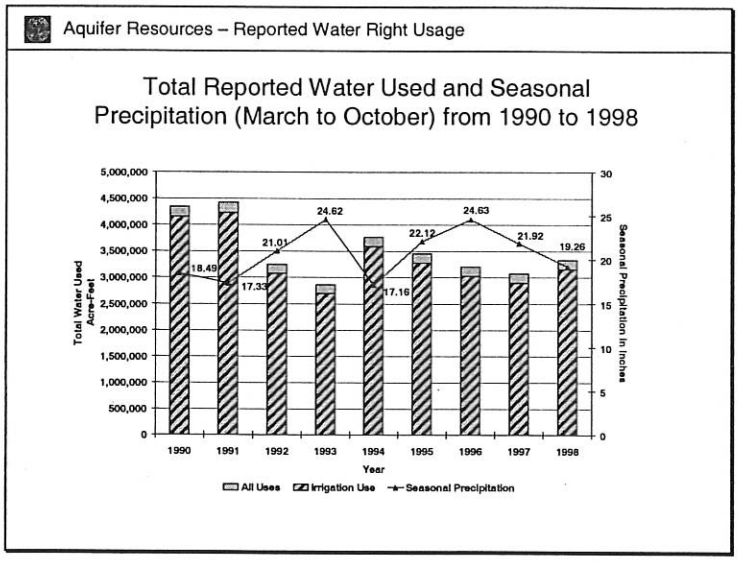
Slide 9



The current maximum authorized quantity map represents the amount of ground water currently authorized or allocated, by township, to water rights located within the High Plains Aquifer region. This is not the amount of water actually pumped but rather how much could be pumped if all water right allocations pumped their full authorized quantity. Due to climate, economic factors, and farm management practices, the actual reported amount of water used in an area is typically somewhat less than the total use authorized for that area.

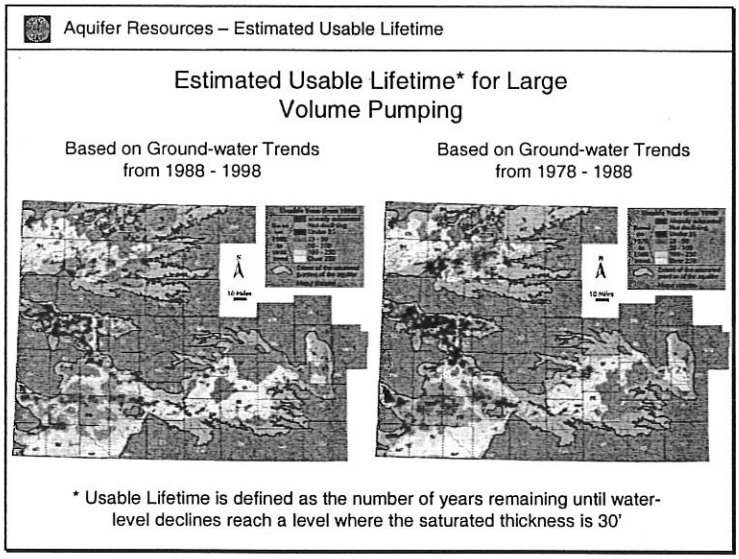
The average percent used map shows the average amount of ground water reported used, expressed as a percentage of the maximum authorized quantity appropriated, and is based on the average reported water use from 1990 to 1998 for each township. For all water rights within the Kansas High Plains Aquifer region as a whole, the average percent of the authorized allocations of groundwater is just over 50 percent.

Slide 10



This graph shows the total amount of ground water reported used by water rights within the High Plains aquifer in comparison with the seasonal precipitation from 1990 to 1998. For water rights within the Kansas High Plains aquifer region, groundwater consistently accounts for approximately 99 percent of the total reported use, and the average fraction of groundwater used for irrigation is approximately 95 percent of the total. The graph also shows the inverse relationship between water use and seasonal precipitation that occurs between the months of March to October. As would be expected, when more precipitation occurs during the growing season, the need for supplemental water use, primarily irrigation, decreases.

Slide 11



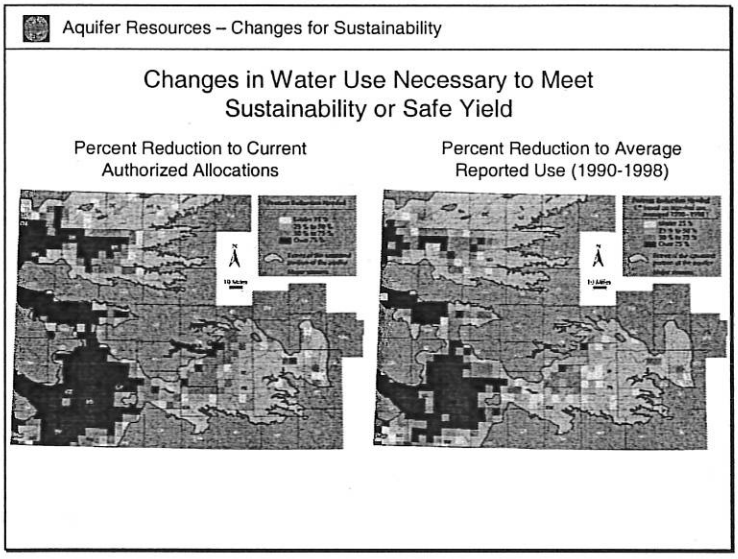
Usable lifetime is defined here as the number of years remaining until water-level declines reach the level where saturated thickness is 30' -- an approximate value at which large-volume pumping, primarily irrigation, is likely to be impractical, even though other low-volume wells can still function if they are completed at the base of the aquifer. At this point of 30 feet, it is assumed, other lower volume water demands, such as municipal, industrial, and stockwatering, can still operate within the safe yield of the aquifer if they are completed to bedrock. The water demands for these lower volume uses are anticipated to be within or less than amount of natural ground water recharge, and thus can be operated on a sustainable level.

Both maps presented here use the current estimated saturated thickness to determine areas in which the resource has already been exhausted for large volume pumping (saturated thickness 30' or less), and as a starting point for determining the number of years remaining in the aquifer's usable lifetime. The difference between the two maps comes from their use of water-level data from different time periods to calculate the trend in water level change -- the first map presented uses the difference between the average water-levels from 1987-1989 (1988) to 1997-1999 (1998) to establish a linear trend in water-level change based on a ten-year period. The second map is based on water-level trends between 1977-1979 (1978) to 1987-1989 (1988). The water-level trends are then applied to the current saturated thickness values to project the number of years it will take for the saturated thickness to reach the 30' mark assuming that the trend in groundwater change is constant.

These two time periods show a consistent linear trend in water level in most regions experiencing decline (see appendix on groundwater decline rates) although they represent significantly different climatic conditions. The decade of the 1990s has been significantly wetter than the 1980s, resulting in less water use and higher rates of recharge (see Water Usage). Other factors that may have contributed to the overall reduction in the rate of water-table declines in the 1990s include untimely climatic events, more efficient use of water, and increasing awareness that groundwater is a limited resource.

The estimates are not predictions of aquifer depletion, but rather projections -- what would probably happen if past rates and patterns of use continue into the future. It is also important to note that these estimates do not consider the increased costs of pumping, well replacement, etc., as water tables drop or future climatic conditions.

Slide 12



In order to reach a level of long-term sustainable use of a groundwater resource, average withdrawal must be no greater than average recharge. These maps show the percent change required in terms of the maximum authorized quantity and average reported use. The maps mirror to some extent the map of Current Maximum Authorized Quantity. Because large-scale recharge changes gradually across the region, and actual pumping is related to authorized pumping, the fraction, or percentage of use reduction required for sustainability is lower in areas of low or moderate water right development than it is in regions with high densities of water rights.

The most striking feature of the two maps is the very high percentage of reduction in authorized use required to match recharge. Overall, a lower percentage reduction in actual use is required. The difference is most noticeable in northwest Kansas and in regions close to the boundary of the saturated portion of the aquifer. Although reductions in actual use of a third to a half at the township level would bring extraction to the approximate magnitude of the recharge in some areas, the core irrigation regions in southwestern and western Kansas are pumping 3-4 times the estimated long-term recharge value.

Given that some amount of recharge is assumed to occur everywhere, some level of sustainable use is possible throughout the aquifer system. It is anticipated that this sustainable use would consist of lower volume water demands, such as municipal, industrial, and stockwatering, which can operate within the safe yield of the aquifer if they are completed to bedrock.

It is important to note that the apparent changes required in the 'safe yield' districts of the eastern High Plains are the result of using the natural recharge map as a basis rather than the administrative recharge map. If the recharge values defined by regulation were used, there would be very few areas of apparent over-appropriation in Groundwater Management Districts 2 and 5.

The values presented here are estimates intended to provide general information on the scale of the reduction. Recharge values are one of the more uncertain hydrologic parameters and the USGS recharge data used in these assessments is based on broad regional intervals (e.g. 1 to 2 inches) representative at the county scale. The amount of recharge used in these maps represents the maximum value from each recharge class interval for each township. As such, the estimated reduction probably represents the lower end of the estimated required reductions to meet sustainability.

Slide 13

Need More Information?

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STATE OF KANSAS

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TESTIMONY BEFORE SENATE NATURAL RESOURCES COMMITTEE FEBRUARY 2, 2001 AT 8:30 A.M. IN ROOM 423S OGALLALA AQUIFER

By Susan Stover

My name is Susan Stover, and I am with the Kansas Water Office. I want to thank you for this opportunity to speak to the Committee on the Ogallala Aquifer.

(Slide 1): The Kansas Water Authority recently reviewed a new idea for managing the Ogallala Aquifer. This idea, the "two pools" management of the Ogallala, would address the rate of groundwater depletion, provide time for transition to a reduced water use, protect some ground water for future generations, and have management decisions made on local aquifer conditions. This idea developed out of discussions between the Kansas Water Office, the Kansas Department of Agriculture-Division of Water Resources, the Kansas Geological Survey and the western Groundwater Management Districts. The Kansas Water Authority agreed this idea deserved further discussion and directed the Kansas Water Office and the Kansas Department of Agriculture, Division of Water Resources to present this new management idea at stakeholder and public meetings in western Kansas to get their input.

We prepared a four-page public information sheet that introduces this idea, to be used at those meetings. We want this to be a starting point for discussions, and expect revisions based on the input we receive from stakeholders and the public.

(Slide 2): The management approach proposed would be only for the Ogallala Aquifer. The Ogallala is the largest aquifer within the High Plains Aquifer, which also includes the Great Bend Prairie and the Equus Beds aquifers. This map outlines the High Plains Aquifer and shades the Ogallala portion in gray, with a rough eastern boundary noted by the dashed line. This management approach is proposed for the Ogallala because that is where most of the ground water declines problems occur.

Senate Natural Resources Committee
Date 2-2-01

Attachment # 3

(Slide 3): Recharge is part of the reason the Ogallala Aquifer has had more serious declines. This map shows the potential recharge rates for the High Plains Aquifer. In far western Kansas, recharge is estimated at roughly ¼ inch per year. Moving eastward, the rate of recharge increases, but most of the Ogallala receives little more than an inch per year, on average. Further east, in the Equus Beds Aquifer, this map indicates a potential recharge rate of 3-4 inches per year. The more water coming in to an aquifer on an annual basis, the more water that can be withdrawn with no net decrease. Western Kansas also has a lower precipitation rate than central Kansas, and very limited surface water supplies. People in western Kansas have a greater dependence and demand on ground water, than those that live further east.

(Slide 4): This slide is a schematic of the "two pools" management idea. The Ogallala Aquifer can be considered to consist of two volumes of water: one, the conservation pool, would be based on the amount of annual recharge plus an additional volume necessary for it to be a source that could be used by communities; the other, the usable pool, would be the existing volume in excess of the conservation pool. In most areas, the usable pool would be much larger than the conservation pool. The usable pool would be managed as it is now, and will be used up in some period of time depending on the level of use. This is the pool to emphasize the use of conservation measures, such as more efficient irrigation systems and less water intensive crops, to extend the life of the usable pool. Once the usable pool is exhausted, and only the conservation pool remains, then the water must be managed for sustainable yield. By that, we mean the withdrawals from the aquifer cannot exceed the average, annual recharge rate *minus* any natural outflows, such as to streams or wetlands. This is the point at which zero depletion must be attained. In theory, the conservation pool could sustain healthy communities for all time.

How might implementation of this management approach impact an individual water right holder? This approach would operate within the legal water framework currently in place. The same priorities and restrictions on an individual water right that exists under the Kansas Water Appropriation Act and the specific groundwater management district's management plan would still apply. Technically, a junior water right holder may be forced to stop pumping sooner under this management approach. When only the conservation pool remains, junior rights whose use of water would continue to deplete the aquifer must stop pumping. In practice, a water right holder may decide to stop pumping long before regulations force that person to stop; higher energy costs, low commodity prices, and physical difficulties of large volume pumping from an aquifer of thin saturated thickness may make it uneconomical or impractical to pump far before the usable pool is gone. Senior water rights, whose collective annual allocated water use does not exceed the annual recharge rate minus natural outflows, would be protected through management of the pool for sustainability.

(Slide 5): This map shows the estimated usable lifetime of the High Plains Aquifer for large volume pumping, such as irrigation, assuming current water level trends continue and the aquifer is effectively exhausted when the saturated thickness is 30 feet or less. The areas in red are those with an estimated 25 years or less before the aquifer may be exhausted. This map, which is included on the handout, communicates two important messages. The first is the vivid image that the depletion of the Ogallala is a real problem; this is an issue that will not go away. The second important message, I think, is that the map isn't all red; the entire Ogallala is not projected to be exhausted within 25 years. The Ogallala Aquifer is highly variable in thickness and other characteristics throughout western Kansas. The variation in the estimated usable lifetime shown on this map reflects, in part, the variation in the aquifer itself.

(Slide 6): Because of that variation within the aquifer, the two pools approach would manage based on conditions in an aquifer subunit. Geographic areas with similar aquifer characteristics would be delineated. Within each aquifer subunit, then, the two pools would be defined. Management decisions would then be based on local conditions.

(Slide 7): Another very important component to this approach is community input. Communities share a common interest as they share a common water resource. They should have an input on the management approach. Scientists would estimate the volume in a aquifer subunit's conservation pool, based on average, annual recharge and the minimal additional amount necessary to actually use it. Beginning with the information, communities then would have input on defining the conservation pool. Areas to consider include: 1) uncertainties with the scientific data. An example is the estimated recharge rate may be a range of values; communities may want to use a conservative number, or an optimistic number. 2) Water quality; there may be areas where there are salinity or other water quality concerns with the bottom of the aquifer. 3) Physical limits on pumping as the aquifer gets thinner and thinner. 4) Environmental impacts; as the water level drops, there will be fewer natural outflows. And 5) a community may want to add more volume to the conservation pool to provide more options for the future.

Communities would also have a voice in the time frame in which the usable pool will be exhausted. This can be done informally through voluntary, incentive based conservation programs, such as installation of more efficient irrigation systems, better management of those systems, water right purchase, and other options. This can also be done formally, working through the groundwater management districts.

(Slide 8): Communities include irrigators and other producers, cities and towns, businesses and industries, and any individual who relies on water in western Kansas. Individuals can be involved in the development of water policy and in defining the two pools by participating in the state water planning process.

(Slide 9): There are currently water organizations that traditionally represent communities on water resource issues. In western Kansas, these are the Groundwater Management Districts #1, 3, and 4, the Basin Advisory Committees, the Conservation Districts and the Watershed Districts. We expect them to be very important participants in this water management idea.

(Slide 10): This management approach provides us tools to plan for the future.

1) Reduced irrigation will have a large economic impact on western Kansas, not only on the individual operator, but also on the secondary and tertiary businesses. Whenever this reduction comes, whether it occurs next year, in the year 2020, when the aquifer is effectively gone or when the usable pool is gone, there will an economic impact. By planning for that change, we can lessen the severity of that impact.

2) The two pools management approach will help in that transition from intensive irrigation. Through this management approach, there will be an increased awareness of local aquifer conditions, and communities will have input on defining the two pools and their options for the future.

3) The time to deplete the usable pool is an important opportunity to adjust to a reduced water consumption, once the usable pool is gone and water use must stay within the recharge rate. It also provides an opportunity to extend the usable life of the pool.

4) Water for human consumption must be the high priority use from the conservation pool. I think we would all agree that water to keep people alive and healthy is the most important use of water. However, …

5) Seniority of the water right is based on first in time, and not the type of use. The Water Appropriation Act gives senior water rights priority to use the water when there is not enough to meet all needs, except for special situations.

6) Water rights can be sold, bought and leased. This approach would encourage use of the open market system to shift the most senior water rights that could withdraw from the conservation pool to meet municipal needs.

7) Cities and towns can project their needs and plan to take necessary action. In some areas, where a city is located may not be where water is available; this could be addressed through water transportation infrastructure.

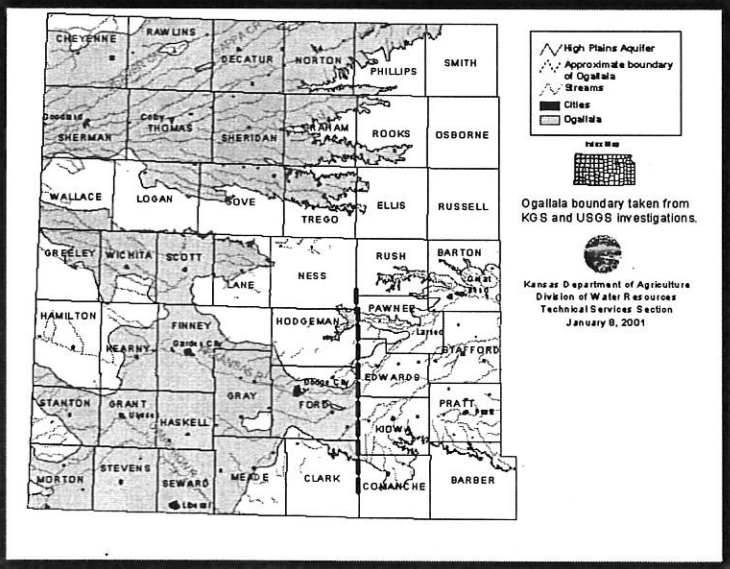
(Slide 11) Is the two pools management of the Ogallala a good idea for western Kansas? That is what we want to discuss and hear ideas from others. Most important is that people, especially those that live in western Kansas whose families and livelihoods depend on the Ogallala Aquifer, discuss a plan for the future of western Kansas. What will it look like? What sort of plan is needed to assure there will be water available for that future?

A New Idea for Managing the Ogallala Aquifer

- Address Rate of Depletion
- Help transition to less water use
- Protect ground water for future generations
- Manage on Local Aquifer Conditions

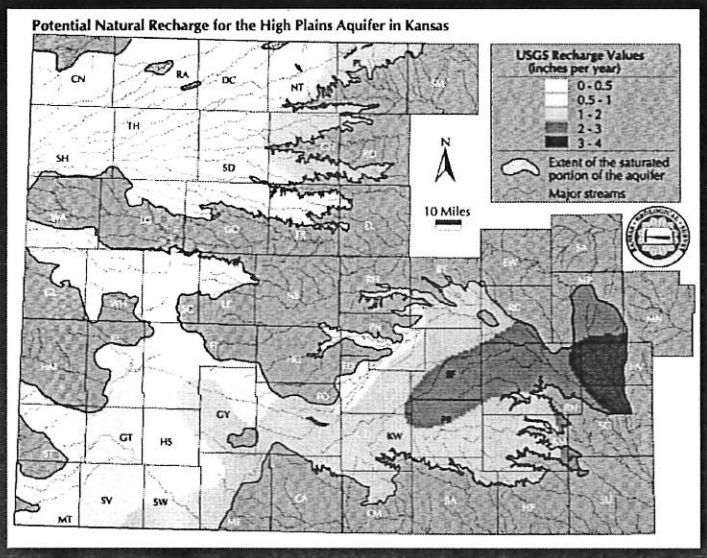
Kansas Water Office

Ogallala portion of the High Plains Aquifer



Kansas Water Office

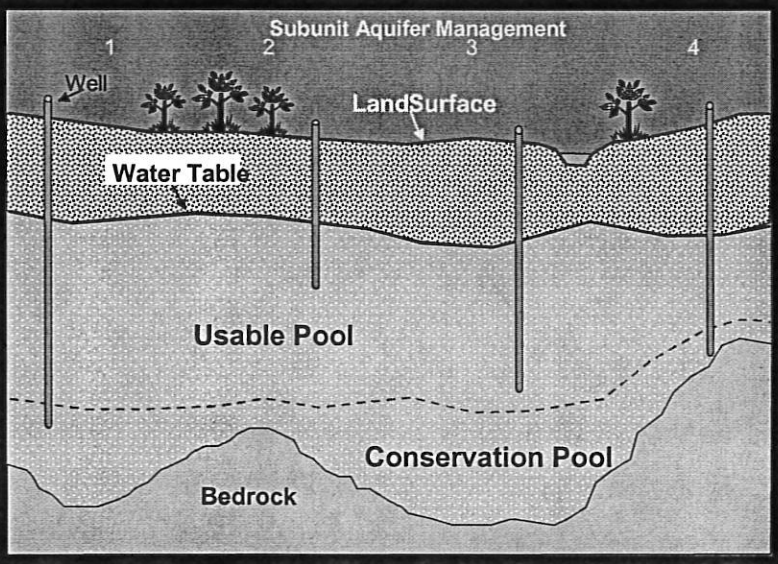
Low Recharge Potential for the Ogallala Aquifer



Source- Atlas of the Kansas High Plains Aquifer

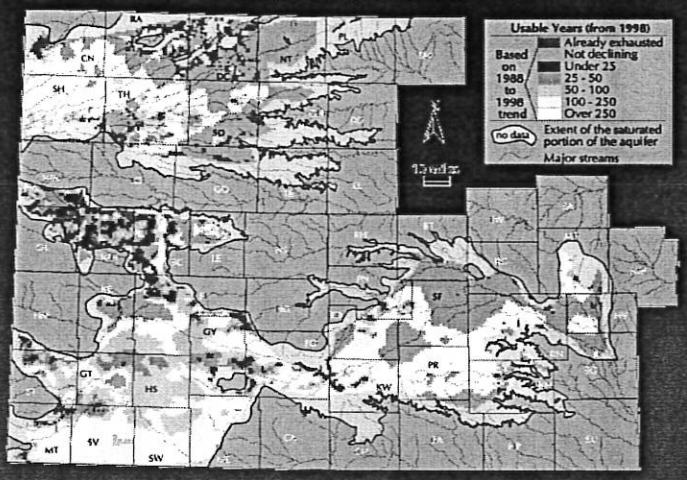
Kansas Water Office

Two Pools Approach for Aquifer Management



Kansas Water Office

Estimated usable lifetime for large volume pumping from the High Plains Aquifer, assuming current water-level trends continue and the aquifer is exhausted when saturated thickness is 30 feet or less



Source- Atlas of the Kansas High Plains Aquifer

Kansas Water Office

Aquifer Subunits

- Geographic Areas with Similar Aquifer Characteristics
- Two Pools Would be Defined Within Each Subunit
- Management Decisions Would be Made on Local Conditions

Kansas Water Office

Communities Share A Common Interest

Communities Would Have Input on Management Approach

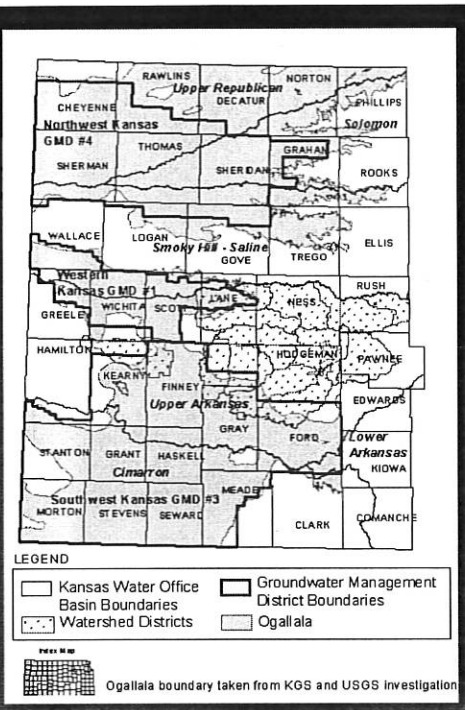
- Defining the Conservation Pool
  - Uncertainties with Scientific Data
  - Water Quality
  - Physical Limits on Pumping
  - Environmental Impacts
  - Water Options for the Future
- Time Frame in which Usable Pool will be Exhausted

Kansas Water Office

Communities Include:

- Irrigators and Other Producers
- Cities and Towns
- Businesses
- Industries
- Individuals Who Rely on Water in Western Kansas

Kansas Water Office



Water Resource Organizations

Kansas Water Office

Planning for the Future

- Reduced Irrigation Will Have an Economic Impact
- Two Pool Management Approach will Help in that Transition
- Time to Deplete Usable Pool Is an Opportunity to Adjust
- Water for Human Consumption Must be the Highest Priority Use From the Conservation Pool
- Seniority of the Water Right Determines Priority
- Water Rights Can be Sold, Bought, and Leased
- Cities and Towns Can Project Their Needs

Kansas Water Office

Plan for the Future of Western Kansas

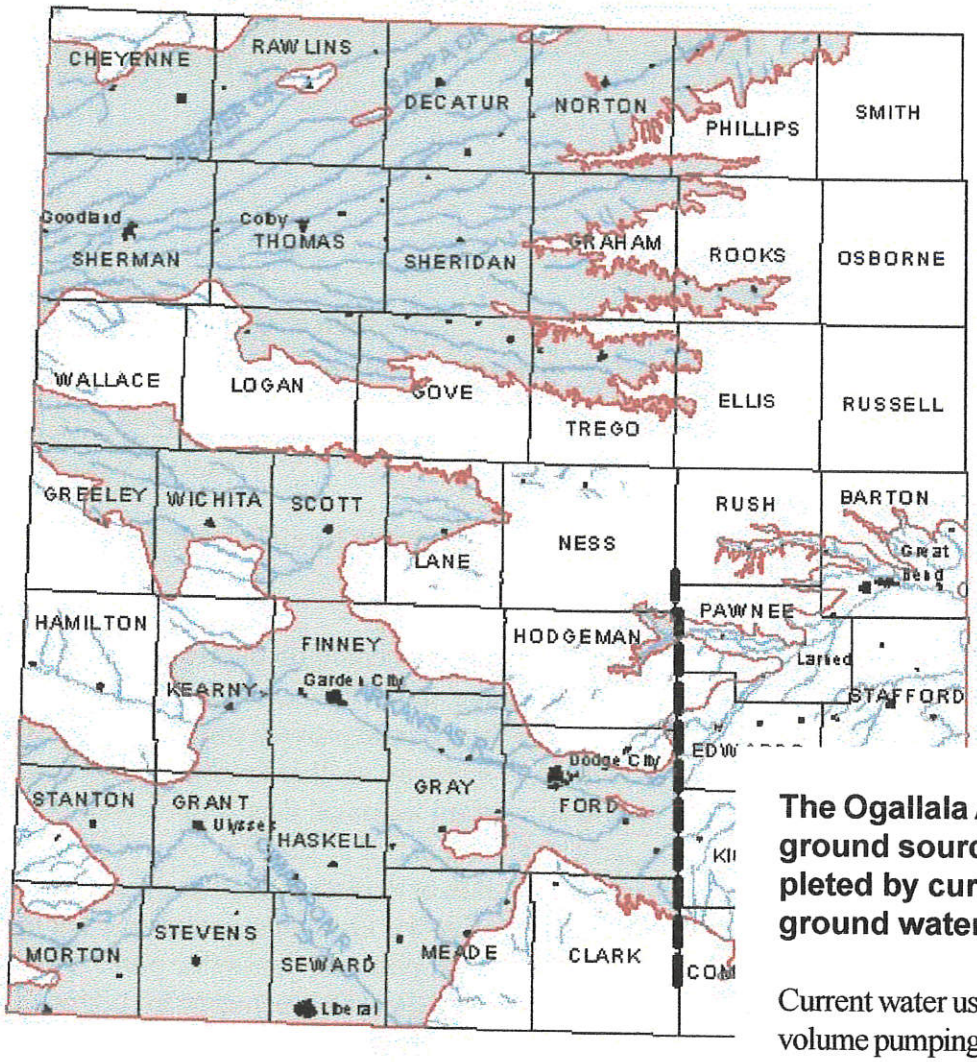
Stakeholders, Basin Advisory Committees, Public Meetings and Workshops: February – March 2001

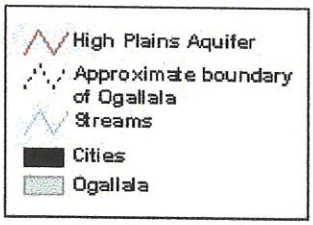
Report to Kansas Water Authority: April 11-12, 2001

Kansas Water Office

A New Idea for Managing the Ogallala Aquifer for the Future

A new idea for managing the Ogallala aquifer is proposed that will address the rate of depletion of ground water supplies in western Kansas and protect some of it for future generations.





Index Map

Ogallala boundary taken from KGS and USGS investigations.

Kansas Department of Agriculture
Division of Water Resources
Technical Services Section
January 8, 2001

The Ogallala Aquifer, a large underground source of water, is being depleted by current water usage and ground water development

Current water usage, primarily widespread large-volume pumping for irrigation, is depleting the primary supply for western Kansas. Water is being pumped faster than it can be replenished each year by precipitation that seeps through the soil and down to the aquifer. If current puming rates continue, the usable supply of ground water eventually will be exhausted.

The decline of the Ogallala Aquifer poses a tremendous challenge to the economy of western Kansas.

As ground water supplies become inadequate to support widespread, large volume irrigation, not only will farmers be affected, but so will the businesses and communities that are part of the irrigated agriculture economy. Water planning and management can help individuals, businesses, and communities prepare for the future.

The idea of managing "two pools" of water in the Ogallala: a plan for the future?

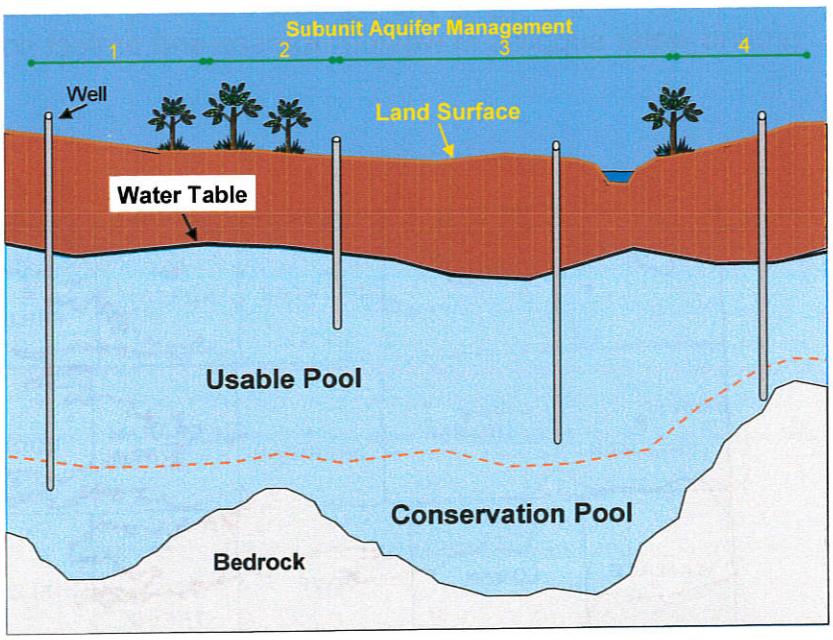
The two-pool idea could make the inevitable transition to reduced water consumption a successful one.

The two-pool idea is based on the premise that the remaining water supply in the Ogallala can be divided into two separate volumes of water. One volume, the conservation pool, would be based on the recharge rate, plus any additional volume necessary for the water to sustain communitites and the environment. The annual recharge is that portion of the annual precipitation that seeps down through the soil into the ground water. This small pool of water renewed each year by recharge is a supply that could sustain healthy communities for all time if annual pumpage remained less than the annual recharge minus the stream outflows. The other much larger pool of water, the usable pool, is the remaining quantity that will be depleted over time. It is stored in the aquifer and will eventually be used up within some period of time depending on the level of use.

In most areas of the Ogallala, existing pumping uses ground water in excess of the amount replenished by recharge minus stream outflows. If the two pools concept is adopted, water use must decrease as the level of aquifer depletion approaches the volume in the conservation pool.

Is this a good idea for western Kansas?

The distinction between the conservation pool and the usable pool could facilitate the management, transition, and planning for reduced, sustainable regional water use. Ultimately, to sustain healthy communities, water usage must be limited to an amount that will not deplete the conservation pool. Also, the length of time it takes to deplete the usable pool provides an opportunity to prepare for this decrease in water use.



Kansas Water Office, 2000

Communities must decide how to manage water use.

Communities share common interest in the ground water resource and in the management approach. Therefore they should provide some input to assumptions made by scientists that involve water management risks when technical data is uncertain. This is particularly important in helping determine how to control the rate of depletion, protect the conservation pool, and define the line that separates the volume in the conservation pool and the usable pool. They must also help decide the water management options for a healthy community and the time frame in which the usable pool will be depleted. Various local organizations, such as groundwater management districts, watershed and conservation districts, and basin advisory committees, that typically represent communities are essential participants in these matters.

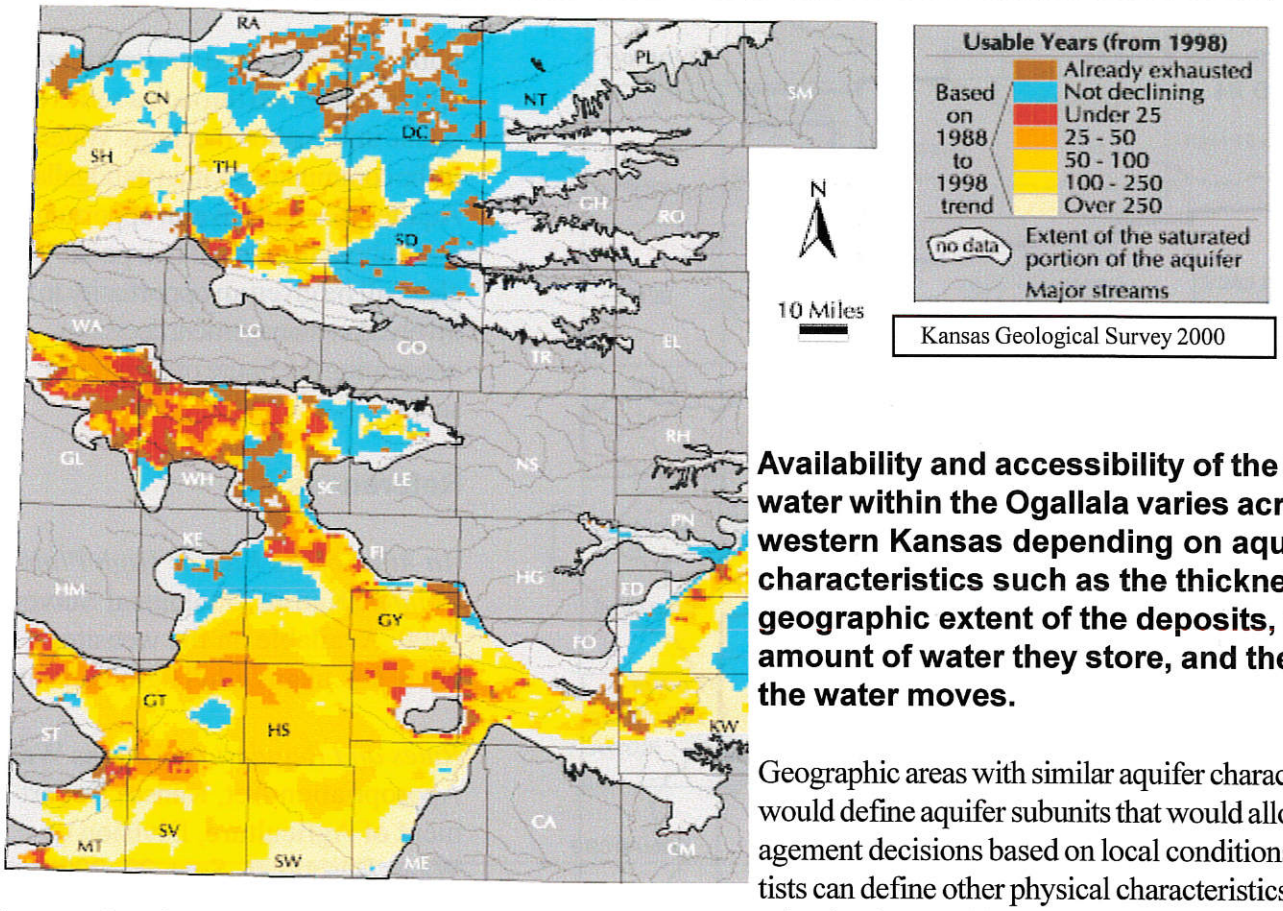
Communities include those who use water in western Kansas:

- o Irrigators, other producers
- o Businesses
- o Cities/towns
- o Industries
- o Individuals who rely on water in western Kansas

The Ogallala Aquifer is not uniform across western Kansas

The aquifer consists of stored ground water that is moving slowly through deposits of sand, gravel, silt and clay.

Estimated usable lifetime for large volume pumping from the High Plains Aquifer, assuming current water-level trends continue and the aquifer is exhausted when saturated thickness is 30 feet or less



Kansas Geological Survey 2000

Availability and accessibility of the ground water within the Ogallala varies across western Kansas depending on aquifer characteristics such as the thickness and geographic extent of the deposits, the amount of water they store, and the rate the water moves.

Geographic areas with similar aquifer characteristics would define aquifer subunits that would allow management decisions based on local conditions. Scientists can define other physical characteristics of the subunits that would affect the amount and availability of water such as:

- Water table level
- Recharge rate
- Ground water outflows to streams
- Aquifer decline rate trends

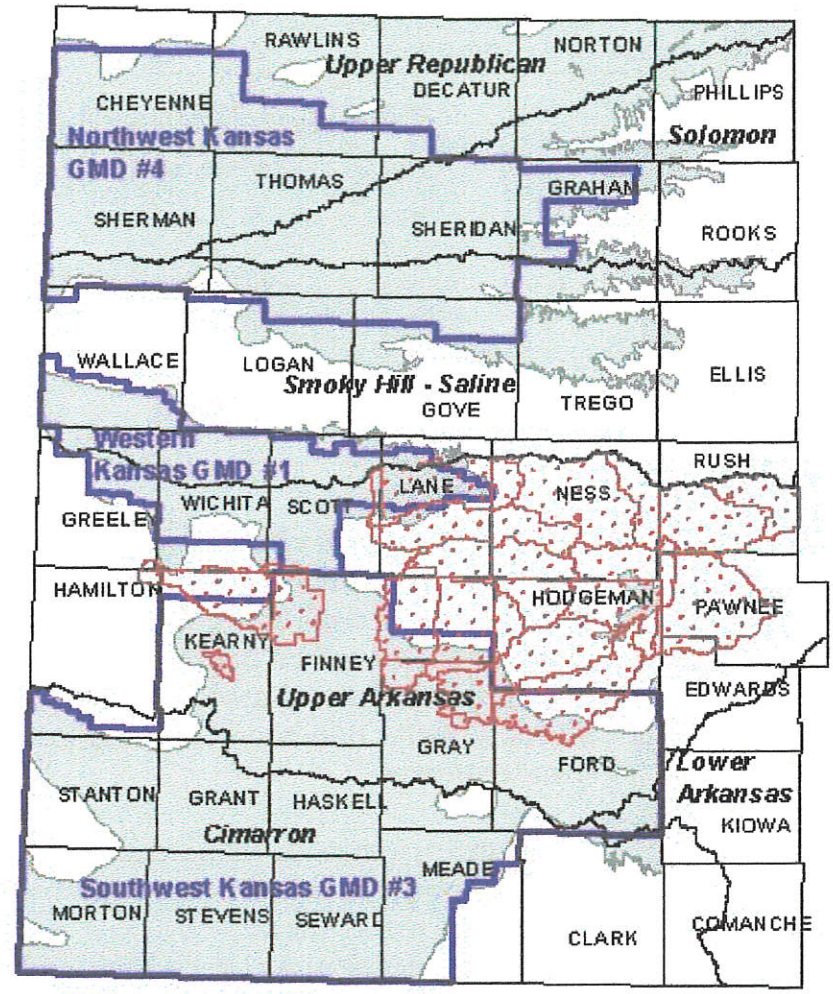
Many technical issues must be worked out to make this concept work. The volume of water contained in the conservation pool is determined by the annual recharge and the water level that must be maintained in the aquifer to make it available for use. The rate water is pumped will determine the time remaining to deplete the usable pool. Scientific analysis within each subunit will determine its geographic extent, estimated volumes in the two pools, and a refined time to deplete the usable pool based on given water use throughout the Ogallala.

The market for land and water rights within the context of the Water Appropriation Act and the related rules and regulations will serve to protect water users and to support transitions to decreased water use.

Water in the conservation pool would be administered according to prior appropriation, not on type of use; that is, first in time is first in right. A water right is a real property right that can be bought, sold, or leased. Communities can project when the usable pool might be exhausted, and plan for buying, if needed, senior water rights that would allow them to withdraw from the conservation pool. Availability of water in sufficient quantities for priority uses will determine the value of water rights as time passes. The existing Water Appropriation Act would continue to protect existing water rights as the usable pool is depleted.

This idea, if implemented, would be consistent with the Kansas Water Plan 2

Objective: By 2010, reduce water level declines within the Ogallala Aquifer and implement enhanced water management in targeted areas.



LEGEND

- Kansas Water Office Basin Boundaries
- Groundwater Management District Boundaries
- Watershed Districts
- Ogallala

Index Map

Ogallala boundary taken from KGS and USGS investigations.

The water planning process will work through local community organizations

Public education and consensus on a plan will be addressed through a series of public information meetings. Water users in the communities within the Ogallala Aquifer area will have an opportunity to learn about the idea of two pools. They also will be given an opportunity to be involved in management decisions concerning the future of their water supply.

References

An Atlas of the Kansas High Plains Aquifer, Kansas Geological Survey, 2000. Available on the website: www.kgs.ukans.edu/HighPlains/atlas

Rules and Regulations, Kansas Water Appropriation Act, Kansas Department of Agriculture, Division of Water Resources, Sept. 22, 2000.

Kansas Water Appropriation Act, K.S.A. 82a-730

Kansas Water Plan, Fiscal Year 2002, Kansas Water Authority, July, 2001. Available on the website: www.kwo.org

For current schedules and further information contact:

The Kansas Water Office
1-888-KAN-WATER or 785-296-3185
www.kwo.org

The Kansas Department of Agriculture/Division of Water Resources
785-296-3710

KWO & KDA/DWR
Public Information Sheet 1/2001

TESTIMONY
PRESENTED TO THE
SENATE NATURAL RESOURCES COMMITTEE

February 2, 2001

SCIENCE NEEDS FOR MANAGING THE HIGH PLAINS AQUIFER

M. Lee Allison, PhD
State Geologist and Director
Kansas Geological Survey
University of Kansas

My name is Lee Allison. I am the State Geologist of Kansas and Director of the Kansas Geological Survey (KGS). The Survey has a mission in state statute to make complete surveys of the state for natural resources of economic importance, including groundwater. The Survey is administratively housed at the University of Kansas.

KGS role in the High Plains – Ogallala aquifers

The High Plains aquifer is actually a collection of geological units that includes the Ogallala aquifer in western Kansas. The KGS has been carrying out a comprehensive research and monitoring program on the High Plains aquifer for many years in cooperation with a variety of state and local agencies. For more than 30 years the KGS along with the Division of Water Resources has measured water well levels in more than 1400 wells across western Kansas. This comprehensive database is a critical resource in understanding the distribution and amount of depletion in the aquifer. For example, preliminary results from the approximately 600 wells measured by the KGS in January as part of this year's measurements show that 85% of the High Plains wells had declines, versus only 55% in 1997. About 2% of the wells had a decline of 10 feet or more, compared to only 0.5% in 1997. These dramatic changes clearly demonstrate the impact of last year's drought on water usage.

We believe that we have an obligation to do more than produce unbiased, high quality scientific and technical data. We also need to translate our results into formats that non-scientists can understand, to widely disseminate these results, and to work with decision-making groups to make recommendations that incorporate the best data available.

KGS, with support from the Kansas Water Office, produced the "Atlas of the Kansas High Plains Aquifer" which all of you should have received. This is an example of interpreting large volumes of scientific information in ways that everyone can understand and use.

Aquifer management

The Kansas Water Office is developing a "two-pools" management approach for the Ogallala aquifer. For such a plan to work, additional information will be needed on the

shape and depth of the bottom of the aquifer. We also need to map the lateral variations in the aquifer characteristics in order to define the aquifer subunits used to establish a two-pools management plan.

I was pleased that the Governor, in his State of the State address last month saw the need for additional technical data collection and interpretation by the KGS. Detailed, reliable data is required to evaluate and implement any aquifer management plan, whether it is the two-pools concept or other plans that come forward as part of the continuing dialogue on how best to extend the life of this dwindling resource. This is a role KGS has played for many years, in oil and gas issues and mining, as well as in water resources. We expect to continue to serve as we always have, as scientific and technical advisors to the Kansas Water Authority, where I serve in *ex officio* capacity, and to the other state and local agencies and boards that deal with water issues.

A question that is sometimes asked, is whether we have sufficient data in hand to make the critically important decisions on the Ogallala that are needed. When you look at the High Plains Atlas, your first impression may be to say that we do have enough data. Obviously, we made all the maps that clearly show the problems. Doesn't that mean there must be enough data for us to now make decisions? In fact, most of the maps that are used in understanding and managing the Ogallala aquifer are based on only 1 or 2 wells per township. Are we prepared to tell a farmer in western Kansas that his water use and future may be based on the data from a well that may be as much as 6 miles away? When I talk with local water managers they tell me that much more data will be needed for them to make and justify determinations for water management on the scale that is proposed.

In addition to a possible increase in the density of data for adequate aquifer management we identified a preliminary list of other data that would be needed to develop an aquifer plan such as the two-pool plan. These include:

1. Assessment of a conservation pool in terms of sustainable amount that could be pumped, and additional saturated thickness needed for practical operation of wells in different areas of the Ogallala aquifer.

2. Determination of the approach to define aquifer subunits, such as hydrologic boundaries, ground-water divides, hydrological characteristics, aquifer extent, major differences in recharge, or saturated thickness, in conjunction with administrative boundaries.

3. Determination of recharge, stream outflow, and ground-water inflow and outflow to give estimates of net sustainable quantities of water to be pumped from areas of different saturated thickness in the Ogallala aquifer.

4. Estimates of total saturated thickness that will be needed for the conservation pool and how they vary across the aquifer.

5. Estimates of depth ranges from ground surface to conservation pool.

6. Assessment of uncertainties for estimating sustainable yield volumetrics of the conservation pool, including practical saturation thickness, water level measures, and depth to bedrock in different areas.

7. Determination of methods to reduce the largest uncertainties in calculating the conservation pool.

High Plains Aquifer Coalition

In June 2000, the geological surveys of the eight states that contain the High Plains aquifer formed the High Plains Aquifer Coalition, in alliance with the U.S. Geological Survey.

The purpose of the Coalition is to cooperate in joint investigations and scientific exchanges concerning the earth sciences (including hydrology, geology, geochemistry, geochronology, geophysics, geotechnical and geological engineering and related investigations) on topics of mutual interest. This agreement was specifically undertaken to advance the understanding of the three-dimensional distribution, character, and nature of the sedimentary deposits that comprise the High Plains aquifer in the eight-state Mid-continent region. It recognizes that the distribution, withdrawal, and recharge of groundwater, and the interaction with surface waters is profoundly affected by the geology and the natural environment of the High Plains aquifer in all eight States – New Mexico, Texas, Oklahoma, Colorado, Kansas, Nebraska, South Dakota, and Wyoming – thereby establishing a commonality of interests among the Surveys and citizens of these states. The Geological Surveys have agreed that reaching a fuller understanding of the three-dimensional framework and hydrogeology of the High Plains aquifer is needed to provide regional and national policymakers with the earth-science information required to make wise decisions regarding urban and agricultural land use, the protection of aquifers and surface waters, and the environmental well being of the citizens of this geologically unique region.

Subject areas of cooperation are those of regional interest and may include:

1. Research on the regional geologic framework, particularly the completion of detailed, quadrangle-size (1:24,000 scale), surface and subsurface geologic maps and models in digital format, and the public dissemination of these maps and models, as well as interpretive information derived from them.

2. Research on geologic processes relating to deposition of sedimentary sequences – their definition, nature, extent, origin, and bounding surfaces - forming the High Plains aquifer and adjacent aquifers.

3. Other areas of earth-science research and development as may be mutually agreed upon.

4. Research on the region's hydrogeology and its fluid systems.

5. Research on processes controlling the quantity and quality of water recharging the High Plains aquifer, including the effect of past and future changes in climate and land-use activities on recharge.

6. Research on enhancing the recharge of the High Plains aquifer.

7. Research on the porosity, permeability, storativity, and specific yield of the aquifer.

8. Research on the geological and hydrological processes controlling regional differences and temporal changes in water quality.

9. Research on the vertical and lateral exchange of groundwater between different formations that make up the High Plains and adjacent aquifers and the effect of such exchange on water quality in the High Plains aquifer.

10. Research on the age of groundwater recharging and moving through the aquifer.

11. Research on improved techniques for modeling the occurrence, movement, and quality of water in the High Plains aquifer.

12. Research on using geophysical techniques, procedures, and models for regional application in mapping subsurface deposits in the Mid-continent region.

13. Transfer of technology and information among the Surveys and to both the private and public sectors.

All eight states and the USGS have now approved the coalition charter. Our first cooperative effort was a preliminary proposal to the National Science Foundation for a 5-year, $7.3 million program to develop commonality and web-based access among all the High Plains databases in the 8-state region. This would include creating digital databases in those states that have not yet done so. We expect to hear in early March whether we will be invited to submit a formal proposal for funding.

Conclusion

In conclusion, the KGS has a long history of providing the data and analyses necessary to make informed decisions about the state's ground water resources. We are prepared to undertake the Governor's direction to us on the Ogallala aquifer. We will do so by continuing to work through the same state and local agencies and boards that we have always worked with. We are a science agency but realize that we have an obligation to explain and interpret the technical data and how it affects public policy.

We have ideas on what data will be needed to fully develop and implement management plans for the Ogallala aquifer, whether that plan is the two-pool concept or alternatives that may arise in the ongoing discussions.

We also are taking the lead in creating a regional cooperative effort among science agencies in the Mid-continent. It is important to develop an integrated understanding of the aquifer. We need to know what is happening to the aquifer across our borders and how that affects Kansas. A regional approach will also be necessary to justify appropriating federal funds to address the many problems associated with extending the life of our ground water resources.

Thank you for your attention.

Programs:

- Joint research and development projects, which may include joint planning and/or joint project execution and/or a cost-sharing arrangement

- Scientific, engineering, and technical information including publications, reports, technical data, samples, specimens, and other materials, including data bases, computer codes, results, and methods of research and development as needed for cooperative projects

- Exchange and/or sharing of instruments and components to help characterize, model, predict, test, or verify earth materials and their occurrences

- Collaborative exchange visits of individual scientists

- Joint organization of symposia, conferences, and workshops

For more information contact

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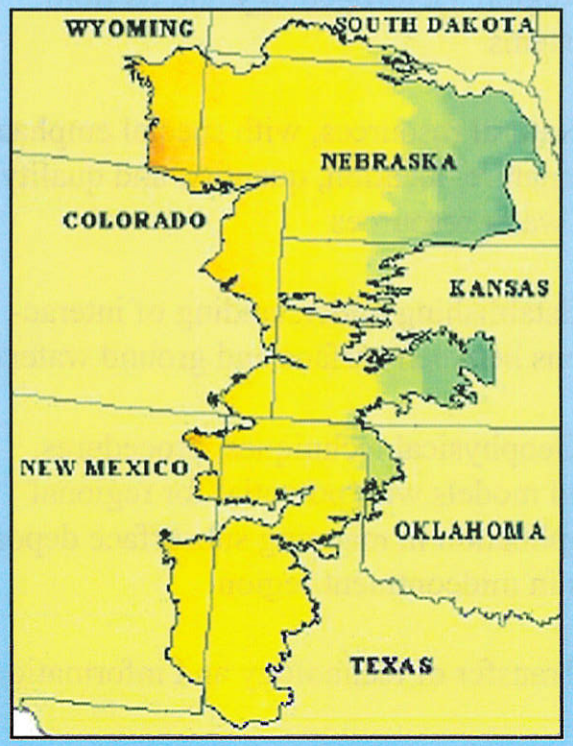
U.S. Department of the Interior

PROPOSAL FOR

THE HIGH PLA AQUIFER COALITION



Investigations into:

- Regional geologic framework, particularly completion of detailed, quadrangle-size (1:24,000-scale), surface and subsurface geologic maps and models in digital format, and public dissemination of these maps and models, as well as interpretive information derived from them

- Geologic processes relating to deposition of sediments forming the High Plains aquifer and related deposits

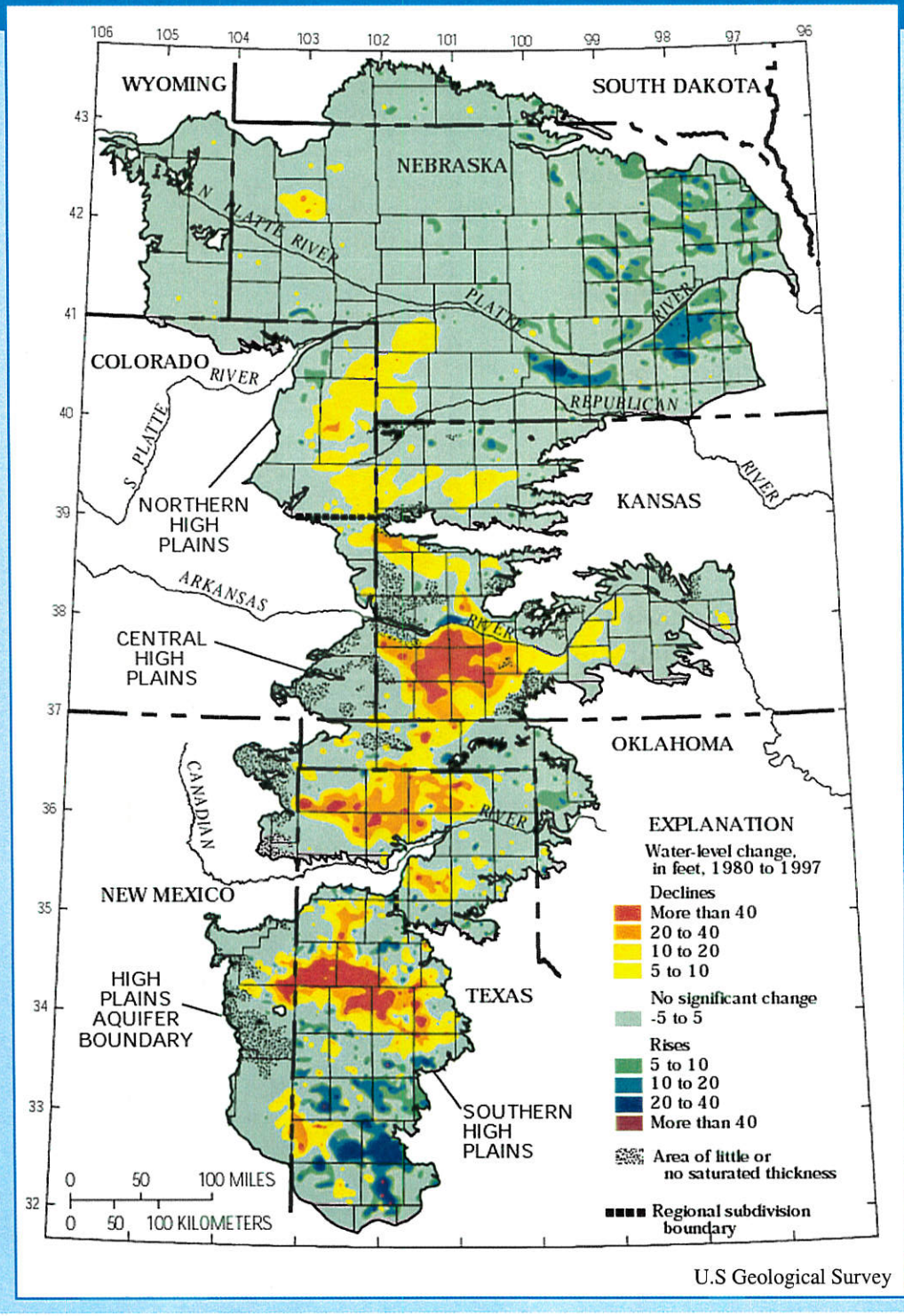
- Region's hydrogeology and its fluid systems

- Natural resources, with special emphasis on nature, location, quantity, and quality of water resources

- Establishing understanding of interactions between surface and ground waters

- Geophysical techniques, procedures, and models with potential for regional application in mapping subsurface deposits in midcontinent region

- Transfer of technology and information



TESTIMONY BEFORE
SENATE NATURAL RESOURCES
FEBRUARY 2, 2001 AT 8:30 A.M. IN ROOM 423-S
WATER MARKETING CONTRACTS
By Terry Duvall

Under the State Water Marketing Program, created in 1974, municipal and industrial water supply users may contract with the State of Kansas for water supply from state-owned storage space in large federal reservoirs located in the eastern half of the state. The reservoirs currently used for the Water Marketing Program include: Big Hill, Clinton, Council Grove, Elk City, Hillsdale, John Redmond, Marion, Melvern, Milford, and Perry. There are currently 34 contracts with municipal and industrial users for water supply from these reservoirs.

Each time a new contract is negotiated with a water user, the Kansas Water Authority must review and approve the contract. The statutes also require that new contracts be submitted to the Kansas Legislature. The Legislature has 30 days to adopt a concurrent resolution to disapprove a contract.

During calendar year 2000 a contract with Miami County Rural Water District Number 1 was negotiated and approved by the Kansas Water Authority and that contract has been submitted for your review. The source of water for this contract is Hillsdale Reservoir. Miami County Rural Water District Number 2 will be treating the water for Miami County Rural Water District Number 1. Miami County Rural Water District Number 2 also has contracted for water supply from Hillsdale and has a newly upgraded treatment plant at the reservoir. Other customers for Hillsdale water supply include the City of Spring Hill, Johnson County Rural Water District Number 7 and the City of Gardner. These contracts combined, including Miami County Rural Water District Number 1, leaves 56% of the water supply yield from Hillsdale available for other users.

Also submitted to you this year were two contracts for surplus water from Marion Reservoir, negotiated with Jost Farms for short-term irrigation water use from that source. Since the contract period, June through September, has already expired there is no opportunity for legislative review of these contracts for disapproval. Water use from state-owned storage for irrigation use is only available if there is uncommitted "surplus" water supply in the reservoir. Such contracts are limited to no more than one year.

If you have any questions about these contracts, I will try to answer them. Thank you.