A Watershed Conditions Report For the State of Kansas

HUC 11030003

(Arkansas-Dodge City) Watershed

Kansas Department of Health & Environment

Bureau of Water

Watershed Management Section

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Topeka, KS 66612

Watershed Conditions Report
For
HUC 8 11030003 (Arkansas-Dodge City)

Prepared by
Kansas Department of Health and Environment (KDHE)
Nonpoint Source Section
12/27/00

EXECUTIVE SUMMARY

This Watershed Conditions Report is designed to serve as a water quality "atlas", and is intended to provide stakeholders in water quality with a tool to assess the condition of water resources within their watershed. This watershed, being located in western Kansas, is very dry with few surface water sites for water quality monitoring. As a result, protecting the available water is considered a high priority in the Unified Watershed Assessment. The Arkansas River segments sampled in this watershed are generally in poor condition with majority of the segments sampled not supporting their designated uses. The primary pollutant concern for the Arkansas River segments in HUC 8 1103003 is fecal coliform bacteria (FCB), sulfate, and pH. Fecal coliform bacteria is found in the digestive systems of warm blooded animals. In the environmental coliform bacteria is an indicator of potential disease producing organisms. Sulfate is a naturally occurring mineral that can cause taste and odor problems in drinking water. pH determines the alkalinity or acidity of water in the lake. If the water is too basic or acidic it can potentially stress or kill the aquatic life and vegetation.

There are several small city and county lakes and private ponds within HUC 8 11030003. There is currently limited information on pollution concerns for lakes in this watershed due to the lack of monitoring sites.

Groundwater resources in HUC 8 11030003 include the alluvial aquifers of the Arkansas River, the High Plains aquifer, and the Dakota aquifer. Water from these aquifers is generally in good condition with naturally occurring minerals and nitrate as the primary pollutant concerns.

PURPOSE

The Watershed Conditions Report is designed to serve as a water quality "atlas" for a given watershed, and is intended to provide Watershed Stakeholders Committees (WSC) with a tool to assess the condition of water resources within their watershed.

BACKGROUND

The Clean Water Act mandates that States assess the quality of their waters and implement Total Maximum Daily Loads (TMDLs) for water bodies that do not meet their designated uses. The following is a summary of steps taken by the State of Kansas to comply with these requirements of the Clean Water Act.

The Kansas Department of Health and Environment (KDHE) prepared the Kansas Unified Watershed Assessment in 1998. This assessment classifies the State's watersheds into four categories. A Category I classification means the watershed is in need of restoration due to having water quality impairments or degradation of other natural resources related to an aquatic habitat, ecosystem health and other factors related to aquatic life resources. Category II watersheds are in need of protection. Category III are watersheds with pristine or sensitive aquatic system conditions on lands administered by federal, state, or tribal governments. Category IV watersheds are those for which there is insufficient data to make accurate classification. KDHE has assigned a restoration priority score to each Category I watershed.

As mandated by section 303(d) of the Clean Water Act, lakes and streams within the Category I watersheds, which do not meet water quality standards, are published biannually in the 303(d) list. Subsequently, lakes and streams which appear on the 303 (d) list are scheduled to have a Total Maximum Daily Load (TMDL) prepared. KDHE is currently preparing TMDLs for impaired stream segments located within the highest restoration priority watersheds.

To restore water quality within the Category I watersheds, KDHE recommends the implementation of a Watershed Restoration and Protection Strategy (WRAPS). The ultimate goal of the WRAPS process is to create and implement a plan to restore the health of water bodies that do not meet their water quality standards. Additionally, the WRAPS process will insure that water bodies that currently meet their water quality standards are protected.

KDHE recommends that the WRAPS process be implemented on a local level by a Watershed Stakeholders Committee (WSC). The WSC would have the responsibility of working with local and state agencies to develop a WRAPS plan. This plan should identify the following: public outreach methods; required monitoring activities based on water quality goals and outcomes; specific water quality problems; watershed coordinator/evaluator; actions to be taken to achieve water quality goals and outcomes; schedule for implementation of needed restoration measures; and funding needs.

Streams and Rivers

HUC 8 11030003

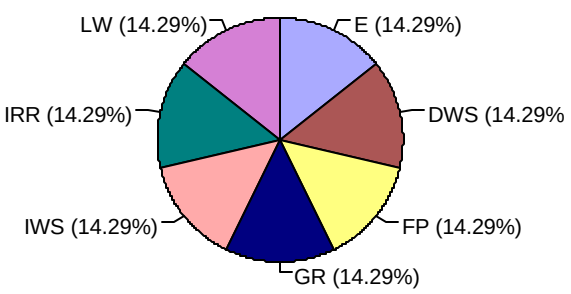
The Huc 8 11030003 watershed is ranked eighth in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, 100% of the total miles of water in this watershed do not meet their designated uses. The Arkansas River is the largest river in the watershed. See Attachment 1 for a map of streams and rivers in HUC 8 11030003.

Designated Uses

This watershed is mostly a drainage basin for the Arkansas River, however, a few smaller streams and creeks are also present throughout the area. There are 54 public water supplies within the watershed, many of which draw water from the Arkansas River and it's alluvium. According to the Kansas Surface Water Register, the most common designated use for streams and rivers in this watershed include: aquatic life uses, food procurement; recreation, and domestic water supply (the information below is for the Arkansas River only).

Figure 1

Huc 11030003 Surface Water Uses



- E=Expected Aquatic Life Use Water
- FP=Food Procurement
- DWS=Designated for domestic water supply use.
- GR=Designated for ground water recharge.
- LW=Designated for livestock watering use.
- IRR=Designated for irrigation use.
- IWS=Designated for Industrial Water Supply

TMDL/Contaminate Concerns

Streams and rivers throughout Kansas have been sub-divided into segments. By dividing the streams and rivers into segments they can be better analyzed and understood. A reach of river or stream may have segments which vary greatly in water quality, based on surrounding land uses. The figures below display the impairments of the streams and rivers based on the number of segments sampled.

Surface waters not meeting their designated uses will require total maximum daily loads (TMDLs). Only the Arkansas River is monitored in this watershed explaining why 100% of the stream/river segments sampled need TMDLs. The primary pollutant concerns of the Arkansas River sampled are fecal coliform bacteria (FCB), sulfate, and pH. Primary pollutant concerns for the Arkansas River in this watershed are FCB, sulfate, and pH levels. The water quality monitoring data for the Arkansas River has been monitored for approximately 4 years. A copy of the data is included in Attachment 2.

Fecal Coliform Bacteria (FCB) is a bacteria present in human and animal waste. It serves as an indicator of potential disease causing organisms. Sulfate is a naturally occurring mineral that can cause taste and odor problems in drinking water. pH determines the alkalinity or acidity of water in the lake. If the water is too basic or too acidic it can potentially stress or kill the aquatic life and vegetation.

Potential Pollution Sources

Potential sources of FCB contamination include feedlots, wastewater treatment facilities, septic systems, and wildlife. Sulfates are dissolved into groundwater as the water moves through various sulfur containing rock formations.

Analyzing the land uses within this watershed helps to understand which land uses might have greater influences on the source of the impairments. Below is a list of land uses throughout the watershed. Grassland is considered grazingland for livestock.

- Urban Area.... .7%
- Row Crop....33.6%
- Grassland....65%
- Wooded area.... .04%
- Water area.... 0%
- Other.... .02%

Feedlots: In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 48 registered CAFOs located within HUC8 11030003 (this number, which is based on best available information, may be dated and subject to change). Waste disposal practices and waste water effluent quality are closely monitored by KDHE for these registered CAFOs to determine the need for runoff control practices or structures. Because of this monitoring, registered CAFOs are not considered a significant threat to water resources within the watershed. A portion of the State's livestock population exists on small unregistered farms. These small unregistered livestock operations may contribute a significant source of fecal coliform bacteria and nutrients, depending on the presence and condition of waste management systems and proximity to water resources.

Wastewater Treatment Facilities: There are approximately 2 municipal and industrial wastewater treatment facilities within the watershed (this number may be dated and subject to change). These facilities are currently regulated by KDHE under National Pollutant Discharge Elimination System (NPDES) permits. These permits determine the maximum amount of pollutants allowed to be discharged to the "waters of the State". Due to the chlorination processes involved in municipal waste treatment, these facilities are not considered to be a significant source of fecal coliform bacteria; however they may be a significant source of nutrients.

Septic Systems: There are currently hundreds of septic systems within the watershed and this number is increasing. When properly designed, installed, and maintained, septic systems can act as an effective means of wastewater treatment. However, poorly maintained or "failing" septic systems can leach pollutants into nearby surface waters and groundwater. The exact number of failing septic systems within the watershed is unknown; however the number may be increasing due to the current trends in suburban development. Local Environmental Protection Programs and county health departments provide excellent sources of information regarding the proper design, installation, and maintenance for septic systems.

Wildlife: Wildlife located throughout the watershed are not usually considered a significant source of nonpoint source pollutants. However, during seasonal migrations, concentrations of waterfowl can add significant amounts of fecal coliform bacteria and nutrients into surface water resources.

Row Crop Agriculture: As stated above, approximately 34% of the watershed's land is used for row crop agriculture. Row crop agriculture can be a significant source of nonpoint source pollution. Common pollutants from row crop agriculture include sediment, nutrients, pesticides, and fecal coliform bacteria. Many producers within the watershed regularly implement and maintain BMPs to limit the amount of nonpoint source pollutants leaving their farm. Some common BMPs include: the use of contour plowing; use of cover crops; maintaining buffer strips along field edges; and proper timing of fertilizer application.

Urban/Suburban Runoff: Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is only about .7% urban. Limiting paved surfaces is the key to slowing urban nonpoint source pollution. The use of grass swales, open spaces, and storm water retention ponds are recommended to slow runoff in urban areas.

Lakes & Wetlands

Huc 8 11030003 is the home to few small city and county lakes. Majority of the lakes are used for recreational purposes such as camping and fishing but for the most part they are used for food procurement. See Attachment 1 for a map of lakes in HUC 8 11030003.

Designated Uses

According to the Surface Water Register, only one lake, Lake Charles, is monitored in this watershed. Lake Charles is designated for expected aquatic life use and food procurement.

TMDL/Contaminate Concerns

Surface waters not meeting their designated uses will require total maximum daily loads (TMDL's). Currently, none of this watershed's lakes or wetlands require TMDLs.

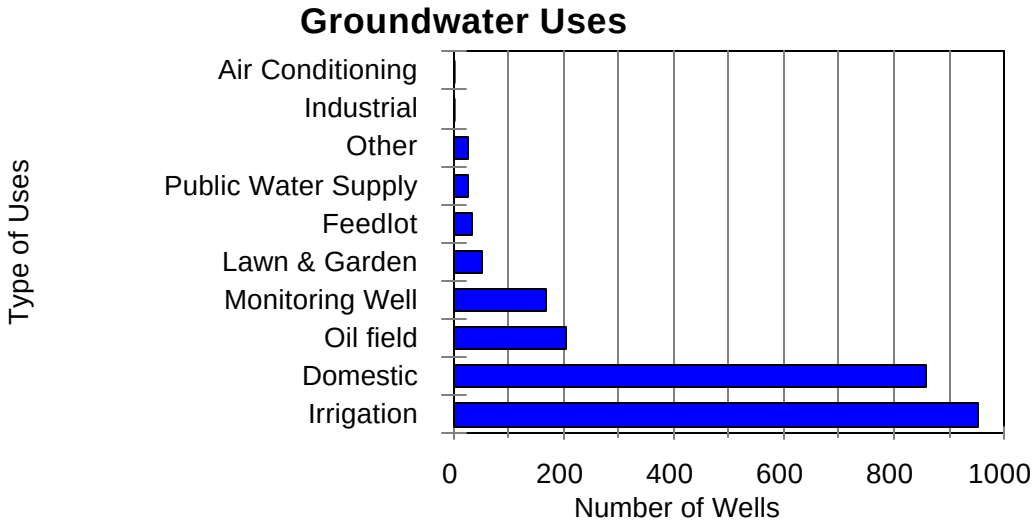
Groundwater

Major groundwater aquifers underlying this watershed include portions of the High Plains Aquifer, Dakota Aquifer and alluvial aquifers of the Arkansas River and its tributaries.

Designated Uses

There are approximately 2,302 groundwater wells located within the watershed. Water from these wells is used for irrigation, domestic use, oil fields and monitoring wells.

Figure 3



Aquifer Characteristics

Alluvial Aquifer: Alluvial aquifers of the Arkansas River and its tributaries exist throughout the watershed. Alluvial aquifers provide the primary water source for many public water supplies located within the watershed. Water quality in alluvial aquifers is generally good; however nitrates, minerals, pesticides, and bacteria can be pollutant concerns.

High Plains Aquifer: Portions of the High Plains aquifer exist in the northern portion of the watershed. Water from this aquifer is often used for irrigation. This water is typically hard to very hard but in good condition with no dominating pollutants.

Dakota Aquifer:

Portions of the Dakota aquifer exist in the central portion of the watershed. Water from this aquifer is used for irrigation, public use, and rural-domestic water supply. Water from this aquifer is good; however chloride and sodium content increase with depth.

Potential Pollution Types and Sources

Common groundwater pollutants include: nitrates, chloride, sulfates, bacteria and atrazine. Nitrate impaired groundwater is perhaps the most prevalent groundwater contamination problem in the State.

Nitrate: Nitrate is a naturally occurring compound and is an essential component of all living matter. However, high concentrations of nitrate in drinking water can cause adverse health effects including "blue baby" syndrome. Sources of nitrate include municipal waste water treatment plant discharges, runoff from livestock operations, leaching of fertilizer from urban and agricultural areas, and failing septic systems.

Chloride: Chloride is a naturally occurring mineral found in Kansas lakes, streams, and groundwater. In high concentrations, chloride can cause deterioration of domestic plumbing, water heaters, and municipal water works. The primary source of chloride impacted groundwater is intrusion of salt water from deeper formations, due to improperly constructed water wells which allow confined aquifers to come into contact with each other.

Sulfates: Sulfate is a naturally occurring mineral that can cause taste and odor problems in drinking water. Sulfates are dissolved into groundwater as the water moves through various sulfur containing rock formations.

Bacteria: Fecal coliform bacteria are found in the digestive systems of warm blooded animals. In the environment coliform bacteria is an indicator of potential disease causing organisms. Potential sources of bacteria contamination in groundwater include livestock facilities, septic systems, pets, and wildlife. Many wells are impacted by bacteria due to improper construction which allows water from the surface to funnel directly into the well.

Ammonia: Ammonia is a chemical which is toxic to fish and aquatic organisms. Sources of ammonia are livestock, septic tanks, fertilizer, municipal and industrial waste.

TSS: TSS stands for Total Suspended Solids which are particles such as soil, algae, and finely divided plant material suspended in water. Sources of TSS are soil erosion from cropland, stream banks, or construction sites, and municipal and industrial waste.

VOCs: Volatile organic compounds, also called purgeable organics, are components of fuels and solvents. They are ingredients in many household and industrial products. Sources of VOCs are leaking fuel storage tanks, trash dumps, and some agricultural pesticides.

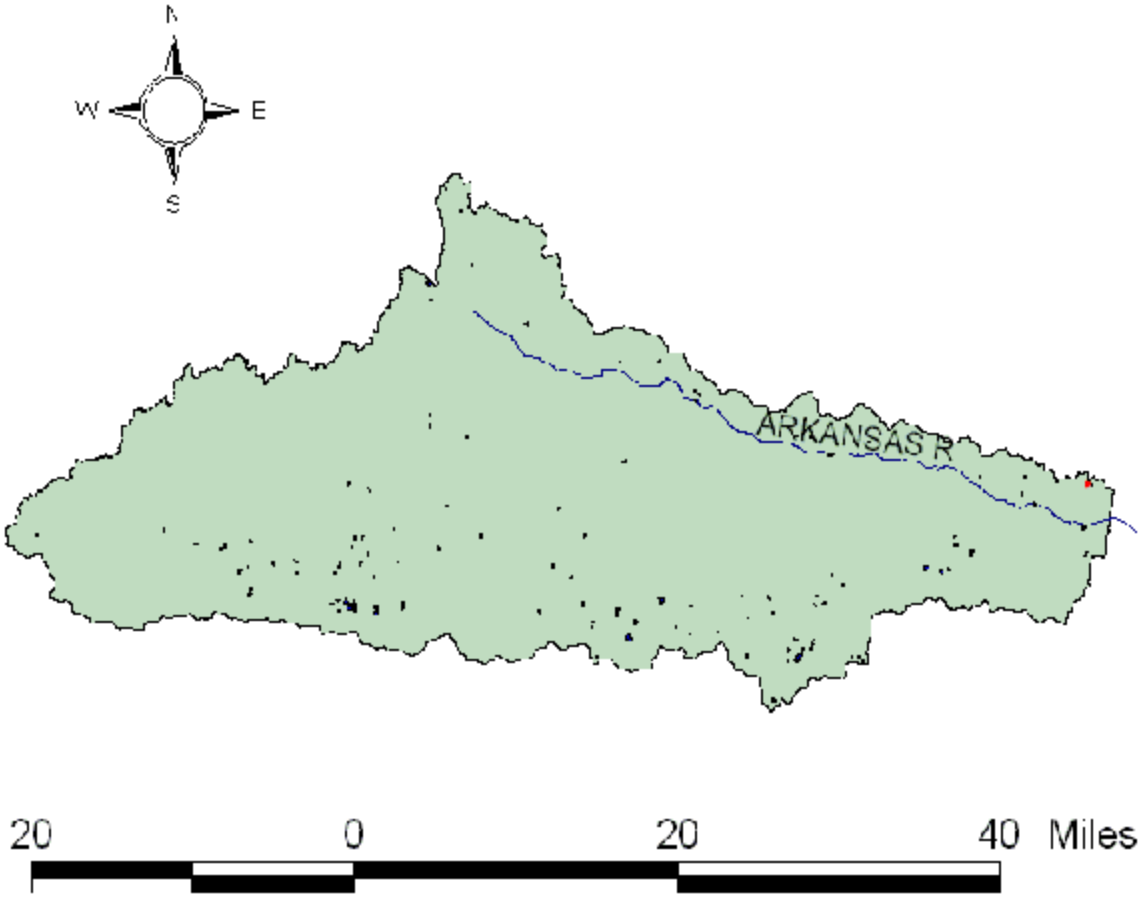
Iron: Iron is a naturally occurring element found in the soil throughout Kansas. It is an annoyance as it has an objectionable taste, causes a red stain to porcelain fixtures and laundry, and causes plumbing irritations.

Manganese: Manganese is a naturally occurring element and causes an unpleasant taste in drinking water, stains porcelain and laundry, and collects deposits in plumbing. It is naturally occurring throughout the soils in the state.

Attachment 1

Maps

Huc -11030003- Arkansas Dodge City
Streams, Rivers, Lakes, and Lake Monitoring Sites



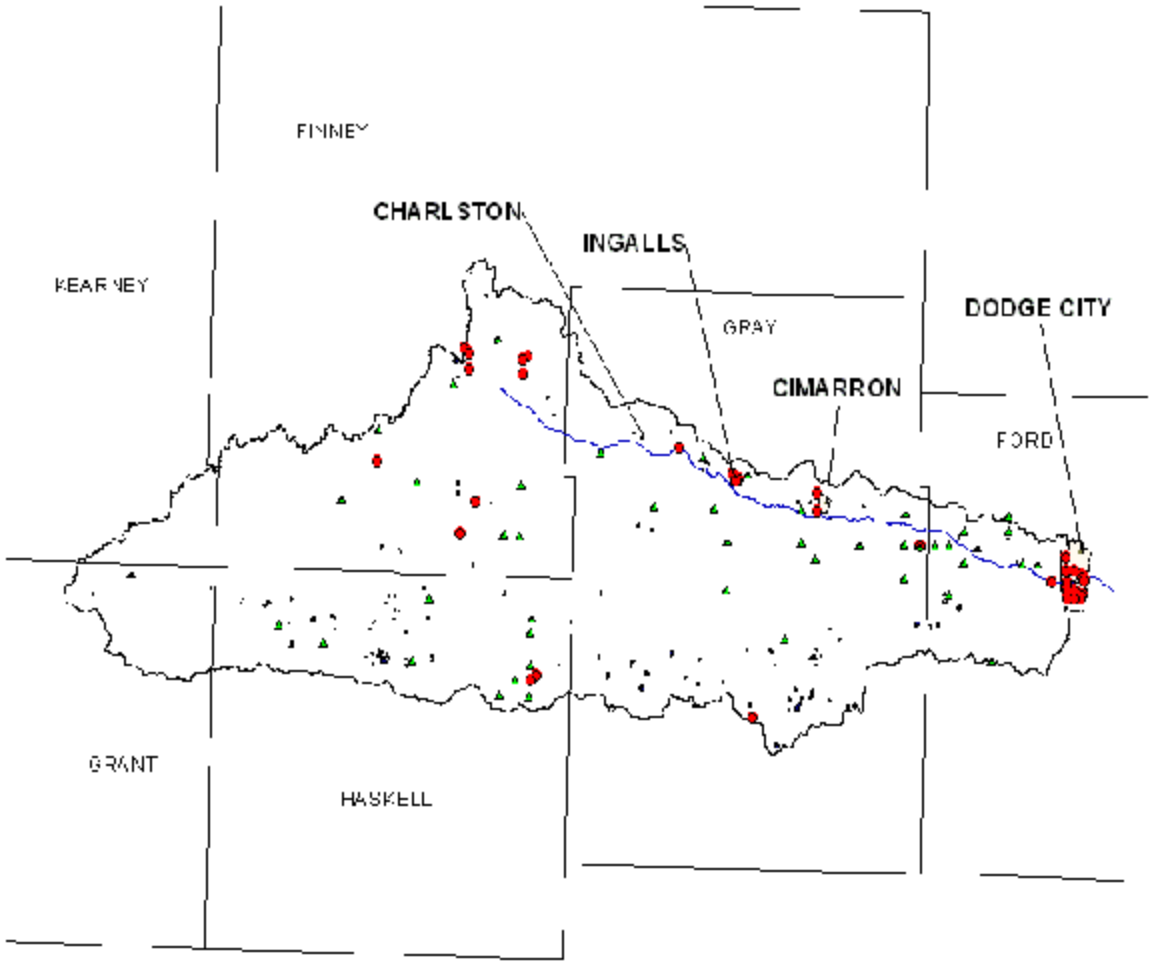
Lakes

Lake Monitoring Sites

Streams & Rivers

Huc 11030003

Huc -11030003- Arkansas Dodge City Watershed Boundary

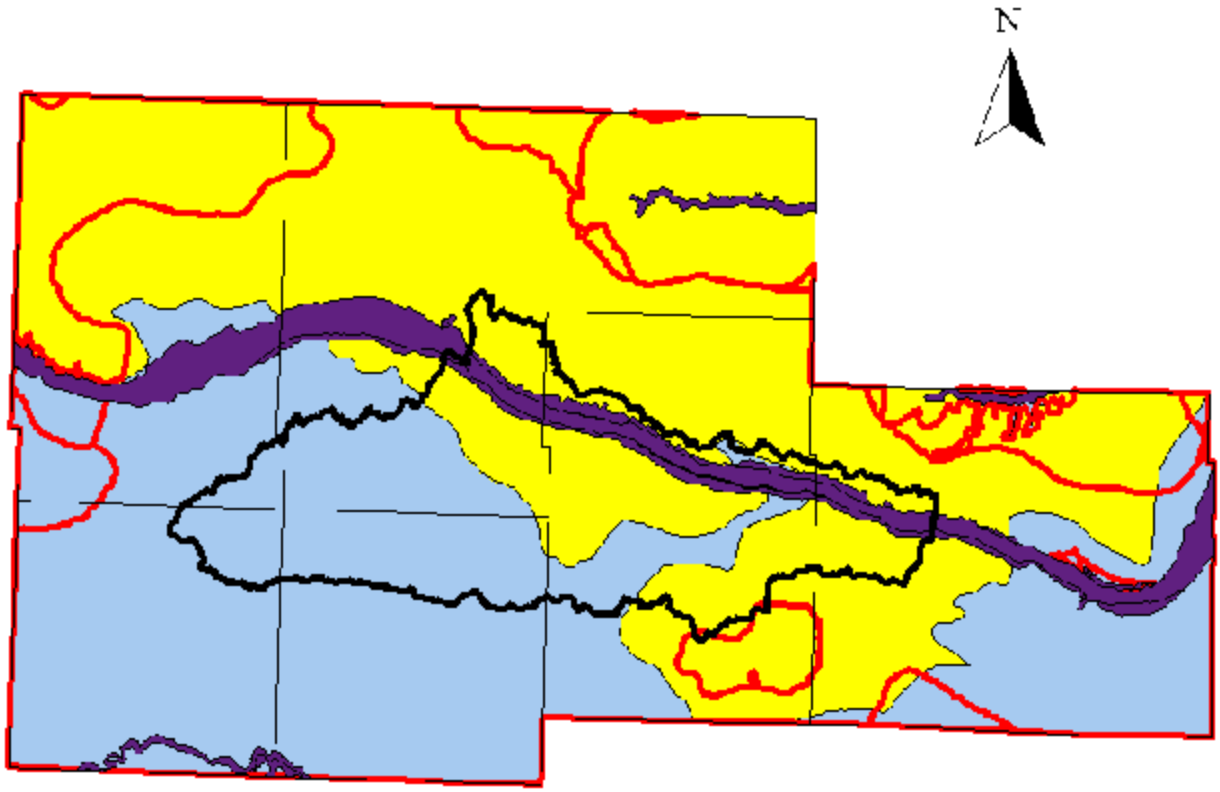


Feedlots.shp
Public Water Supplies
Cities
Streams & Rivers
Lakes
Huc 11030003
County Boundary

N
W
E
S

8 0 8 16 Miles

Huc 8 11030003 Arkansas-Dodge City Groundwater Aquifers



30 0 30 60 Miles

County Boundary
Watershed Boundary
Alluvial Aquifer
High Plains Aquifer
Dakota Unconfined Aquifer
Dakota Confined Aquifer

KDHE
Bureau of Water
19 November 2001
Jaime Zieserris

Attachment 2

Stream/River Data

KDHE Water Quality Monitoring Network
Surface Water Sampling Data
Arkansas River
1994 Through 1999

Site Name	HUC8	Sample Date	Ammonia	K (ND)	Atrazine	K (ND)	BOD	K (ND)	FCB	K (ND)	Nitrate	K (ND)	TSS	P	K (ND)
Water Quality Standard			pH*		3.00		None		00/2,000*		10.00		None*	None*	
SC286	11030003	25-Jul-95	0.14		0.30	K	2.50		**1100**		0.19		280	0.31	
SC286	11030003	28-Nov-95	0.85				2.60		**6000**	L	1.74		21	0.14	
SC286	11030003	27-Feb-96	1.21		0.30	K	7.10		**6000**	L	3.36		33	0.32	
SC286	11030003	25-Jun-96	0.33		0.30	K	4.50		**1200**		1.11		240	0.23	
SC286	11030003	27-Aug-96	0.01	K			2.60		**2070**		1.42		112	0.16	
SC286	11030003	22-Oct-96	0.58		0.30	K	3.80		**9000**		1.87		20	0.12	
SC286	11030003	17-Dec-96	0.63				5.40		10		2.35		26	0.13	
SC286	11030003	29-Jan-97	0.53				2.34				2.66		26	0.17	
SC286	11030003	18-Mar-97	0.35		0.30	K	2.67		**17000**		2.25		35	0.17	
SC286	11030003	20-May-97	1.02				2.19		**2600**		1.16		8	0.20	
SC286	11030003	16-Sep-97	0.21				4.26		**3000**		1.42		70	0.17	
SC286	11030003	18-Nov-97	0.16		0.30	K	3.06		**8000**		2.33		114	0.16	
SC286	11030003	17-Feb-98	0.03				7.35		**4400**		1.94		106	0.17	
SC286	11030003	21-Apr-98	0.14		0.30	K	1.00	K	**7000**		1.56		412	0.32	
SC286	11030003	16-Jun-98	0.03				2.13		30		1.47		10	0.19	
SC286	11030003	18-Aug-98	0.08		0.30	K	6.06		190		0.61		108	0.14	
SC286	11030003	20-Oct-98	0.21				2.31		**33000**		1.84		128	0.18	
SC286	11030003	15-Dec-98	0.09		0.30	K	1.00	K	400		2.34		34	0.06	
SC286	11030003	08-Feb-99	0.12				3.21				2.22		54	0.12	
SC286	11030003	12-Apr-99	0.09				3.54				1.87		17	0.09	
SC286	11030003	12-Apr-99			0.30	K									
SC286	11030003	12-Apr-99	0.07				4.02				1.90		27	0.09	
SC286	11030003	07-Jun-99	0.02	K	0.30	K	4.77				0.41		260	0.27	
SC286	11030003	09-Aug-99	0.12				2.49				1.21		440	0.47	
SC286	11030003	11-Oct-99	0.20		0.30	K	4.80				1.38		142	0.18	
SC286	11030003	13-Dec-99			0.30	K									
% Samples Exceeding Standard					2%				27%		0%				
Total Number of Samples			230		108		229		161		220		230	230	

Notes:

Results expressed in "**bold**" type exceed applicable water quality standards.

pH* = Water quality standard is pH dependent and varies between 0.254 and 3.480 mg/L for pH 9.0 through 6.5, respectively for chronic exposure.

* Water quality standards for these constituents are currently in narrative form with no quantitative standard for comparative use.

900/2,000* = No sample shall exceed 900 FCB organisms per 100 ml between April 1 and October 31. From November 1 through March 31, the relavant standard is 2,000 FCB organisms per 100 ml.

K= "K" denotes that sample was not detected above method detection limit value shown in the adjacent data cell.

FCB=Fecal Coliform Bacteria (Count Per 100 Milliliters)

BOD=Biological Oxygen Demand

TSS=Total Suspended Solids

P=Phosphorus

Atrazine concentration shown in micrograms per liter. All other data concentrations shown in milligrams per liter unless noted otherwis