CIMARRON RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Cavalry Creek
Water Quality Impairment: Fecal Coliform Bacteria

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Upper Cimarron–Bluff **Counties:** Clark, Comanche, Ford and Kiowa

HUC 8: 11040008

HUC 11s (HUC 14s): **050** (010, 020, 030, 040, 050, and 060)

Drainage Area: 276.6 miles^2

Main Stem Segment: 3, starting at confluence of Bluff Creek and traveling upstream to Coldwater (**Figure 1**).

Tributary Segment: Kiowa Creek (12)
Wiggins Creek (1173) *unimpaired*
West Kiowa Creek (1180) *unimpaired*
Middle Kiowa Creek (1182) *unimpaired*

Designated Uses: Special Aquatic Life Support, Domestic Water Supply, Food Procurement, Ground Water Recharge, Industrial Water Supply Use, Irrigation Use, and Livestock Watering Use for Cavalry Creek and Tributary Segments
Primary Contact Recreation on Cavalry Creek
Secondary Contact Recreation on Wiggins Creek and Middle and West Kiowa Creek.
Special Aquatic Life Support for Kiowa Creek and Wiggins Creek.

1998 303(d) Listing: Table 1–Predominant Non-point Source Impacts

Impaired Use: Secondary Contact Recreation on all listed segments; Primary Contact Recreation on Main Stem Segment.

Water Quality Standard: Fecal Coliform Bacteria: 900 colonies per 100 ml for Primary Contact Recreation in April-October (K.A.R. 28-16-283(c)(7)(B)) (disapproved); 2,000 colonies per 100 ml for Secondary Contact Recreation (K.A.R. 28-16-28e(c)(7)(C))

Cavalry Creek TMDL Reference Map

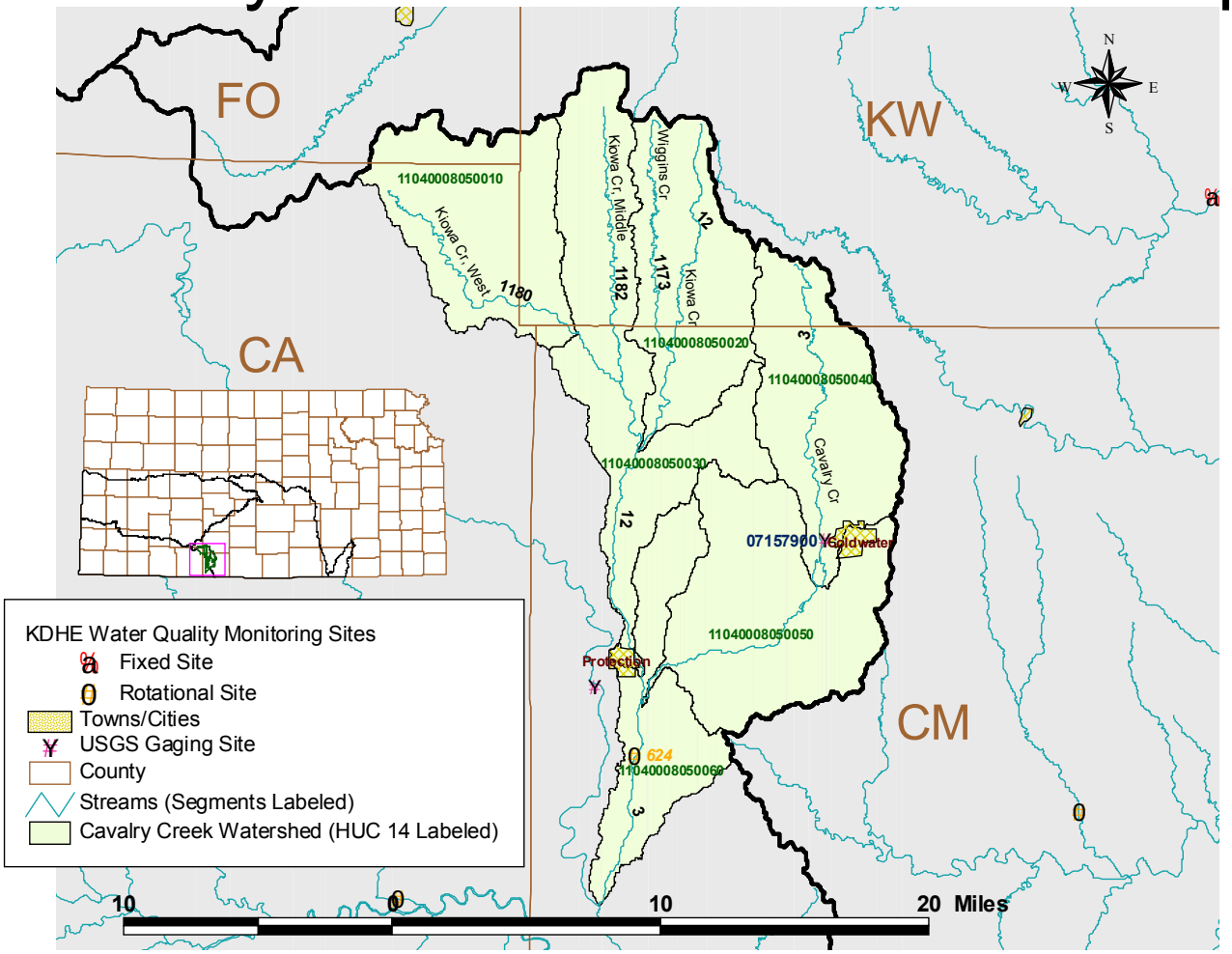

Figure 1

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 1998 303(d): Fully Supporting Secondary Contact Recreation

Monitoring Sites: Station 624 near Protection (**Figure 1**)

Period of Record Used: 1993, 1997 and 1999 (Kansas Biological Survey samples in 1999)

Flow Record: USGS Station 07157900; calculated flow based on measurements at 07157900 and data from Station 07157500 (Crooked Creek near Nye)

Long Term Flow Conditions: 10% Exceedence Flow = 26 cfs; 7Q10 = 1 cfs

Current Conditions: Since loading capacity varies as a function of the flow present in the stream, this TMDL represents a continuum of desired loads over all flow conditions, rather than fixed at a single value. The calculated flow duration data were examined from the Cavalry Creek Gaging Site. The seasonal component of the duration data could not be examined because of lack of a permanent gage on Cavalry Creek. High flows and runoff equate to lower flow durations, baseflow and point source influences generally occur in the 75-99% range. A load curve was established for the Primary and Secondary Contact Recreation criterion by multiplying the flow values along the curve by the applicable water quality criterion and converting the units to derive a load duration curve of colonies of bacteria per day. This load curve represents the TMDL since any point along the curve represents water quality at the standard at that flow. Historic excursions from WQS are seen as plotted points above the load curves. Water quality standards are met for those points plotting below the applicable load duration curves.

An excursion was seen during May under higher flow conditions. Seven percent of the samples from water quality site 624 were over the criteria. This would represent a baseline condition of full support of the designated uses for the site.

NUMBER OF SAMPLES OVER BACTERIA STANDARD OF 2000 Cts/100 mL BY FLOW

Station	Season	0 to 10%	10 to 25%	25 to 50%	50 to 75%	75 to 90%	90 to 100%	Cum Freq.
Protection (624)	Annual	1	0	0	0	0	0	1/15 = 7%

Desired Endpoints of Water Quality (Implied Load Capacity) at Site 624 over 2005 - 2009:

The ultimate endpoint for this TMDL will be to achieve Kansas Water Quality Standards fully supporting both Primary Contact Recreation and Secondary Contact Recreation. This TMDL will, however, be phased. Kansas adopted a Primary Contact Recreation standard of 900 colonies per 100 ml but EPA subsequently disapproved that standard. This standard was used to establish a load duration curve shown in the TMDL curve. It is recognized, however, that the Primary Contact Recreation Standard will be revised in the future in accordance with national guidance. A revised Primary Contact Recreation TMDL curve will be established in Phase Two of this TMDL to reflect changes in this Standard. For Phase One the endpoint will be to achieve the Secondary Contact Recreation value of 2,000 colonies per 100 ml and this Phase One load curve is also shown in the TMDL figure. The Kansas Standards allow for excursions above these criteria when the stream flow exceeds flow that is surpassed 10% of the time, for this instance, 26 cfs.

Monitoring data plotting below the TMDL curve will indicate attainment of the water quality standards.

This endpoint will be reached as a result of expected, though unspecified, reductions in loading from the various sources in the watershed resulting from implementation of corrective actions and Best Management Practices, as directed by this TMDL. Achievement of the endpoint indicate loads are within the loading capacity of the stream, water quality standards are attained and full support of the designated uses of the stream has been restored.

3. SOURCE INVENTORY AND ASSESSMENT

NPDES: There are no NPDES permitted municipal wastewater dischargers within the watershed.

Livestock Waste Management Systems: Five operations are registered, certified or permitted within the watershed. Potential animal units for the facilities totals 2,899. The actual number of animal units on site is variable, but typically less than potential numbers.

Land Use: Most of the watershed is grassland (64% of the area) and cropland (35% of the area). The cropland is mainly located in the Cavalry Creek drainage area and in the lower portion of the watershed. Based on 1997 water use reports, about 8% of the cropland in the watershed is irrigated. The off-season grazing density of livestock is fairly high for the lower portion of the watershed, while the upper portion of the watershed's off-season grazing density is average when compared to densities in the Cimarron Basin. The growing season density is average for the entire watershed when compared to densities in the Cimarron Basin.

On-Site Waste Systems: The watershed's population density is low, 1-12 persons/square mile. The rural population projections for Clark, Comanche and Kiowa Counties through 2020 show moderate declines. While failing on-site waste systems can contribute bacteria loadings, their impact can only be considered very limited, given the density of the rural population.

Contributing Runoff: The watershed's average soil permeability is 3.7 inches/hour according to NRCS STATSGO data base. About 44% of the watershed produces runoff even under relative low (1.5''/hr) potential runoff conditions. Under very low (<1"/hr) potential conditions, this potential contributing area is greatly reduced (9%). Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. As the watersheds' soil profiles become saturated, excess overland flow is produced. Generally, storms producing less than 0.5"/hr of rain will generate runoff from only 3% of this watershed, chiefly along the stream channels.

Background Levels: Some fecal bacteria counts may be associated with environmental background levels, including contributions from wildlife, but it is likely that the density of animals such as deer is fairly dispersed across the watershed resulting in minimal loading to the streams below the levels necessary to violate the water quality standards.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

The nature of bacteria loading is too dynamic to assign fixed allocations for wasteloads and non-point loads. Instead, allocation decisions will be made which reflect the expected reduction of bacteria loading under defined flow conditions. These flow conditions will be defined by the presumed ability of point or non-point sources to be the dominant influence on stream water quality. Therefore, the allocation of wasteloads and loads will be made by demarcating the annual TMDL curve at a particular flow duration level. Flows lower than that designated flow will represent conditions which are the responsibility of point sources to maintain water quality standards, those flows greater than the designated flow are the responsibility of non-point sources.

Point Sources: A Wasteload Allocation of zero will be established by this TMDL because of the lack of point sources in the watershed. Should future point sources be proposed in the watershed and discharge into the impaired segments, the current wasteload allocation will be revised by adjusting current load allocations to account for the presence and impact of these new point source dischargers.

Non-Point Sources: Based on the lack of point sources in the watershed, non-point sources are seen as a significant cause of water quality violations. Background levels are not significant as a cause of the problem. Activities to reduce fecal pollution should be directed toward the smaller, unpermitted livestock operations and rural homesteads and farmsteads along the river. Implementation of non-point source pollution control practices should be taken within one mile of the river or any directly contributing tributary.

Activities to reduce fecal pollution should be directed toward the smaller, unpermitted livestock operations and rural homesteads and farmsteads along the river. Without a Wasteload Allocation, the Load Allocation assigns responsibility for maintaining water quality across all flow conditions. Best Management Practices will be directed toward those activities such that there will be minimal violation of the applicable bacteria criteria at higher flows.

Defined Margin of Safety: Because there will not be a traditional load allocation made for fecal bacteria, the margin of safety will be framed around the desired endpoints of the applicable water quality standards. Therefore, evaluation of achieving the endpoints should use values set 100 counts less than the applicable criteria (1,900 colonies for secondary contact recreation) to mark full support of the recreation designated use of the streams in this watershed. By this definition, the margin of safety is 100 colonies per 100 ml and would be represented by a parallel line lying below each seasonal TMDL curve by a distance corresponding to loads associated with 100 colonies per 100 ml.

State Water Plan Implementation Priority: Because the frequency of excursions from the water quality standard is presently less than 10%, additional sampling is needed at this rotational monitoring site to confirm the level of support for this stream. This TMDL will be a Medium Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Upper Cimarron - Bluff Subbasin (HUC 8: 11040008) with a priority ranking of 52 (Low Priority for restoration work).

Priority HUC 11s and Stream Segments: Current priority will focus on the mainstem of Cavalry Creek, until additional monitoring indicates other tributaries are impaired.

5. IMPLEMENTATION

Desired Implementation Activities

1. Install proper manure and livestock waste storage
2. Install grass buffer strips along streams.
3. Install pasture management practices, including proper stock density on grasslands
4. Remove winter feeding sites in proximity to streams
5. Reduce livestock use of riparian areas
6. Insure proper on-site waste system operations in proximity to main streams.

Implementation Programs Guidance

NPDES and State Permits - KDHE

a. Livestock permitted facilities will be inspected for integrity of applied pollution prevention technologies.
b. Registered livestock facilities with less than 300 animal units will apply pollution prevention technologies.
c. Manure management plans will be implemented.

Non-Point Source Pollution Technical Assistance - KDHE

a. Support Section 319 demonstration projects for pollution reduction from livestock operations in watershed.
b. Provide technical assistance on practices geared to small livestock operations which minimize impact to stream resources.
c. Guide federal programs such as the Environmental Quality Improvement Program, which are dedicated to priority subbasins through the Unified Watershed Assessment, to priority watersheds and stream segments within those subbasins identified by this TMDL.

Water Resource Cost Share & Non-Point Source Pollution Control Programs - SCC

a. Provide alternative water supplies to small livestock operations
b. Develop improved grazing management plans
c. Reduce grazing density on pasturelands
d. Install livestock waste management systems for manure storage
e. Implement manure management plans
f. Install replacement on-site waste systems

g. Coordinate with USDA/NRCS Environmental Quality Improvement Program in providing educational, technical and financial assistance to agricultural producers.

Riparian Protection Program - SCC

a. Design winter feeding areas away from streams
b. Develop riparian restoration projects

Buffer Initiative Program - SCC

a. Install grass buffer strips near streams.
b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Extension Outreach and Technical Assistance - Kansas State University

a. Educate livestock producers on riparian and waste management techniques.
b. Provide technical assistance on livestock waste management design.
c. Continue Section 319 demonstration projects on livestock management.

Agricultural Outreach - KDA

a. Provide information on livestock management to commodity advocacy groups.
b. Support Kansas State outreach efforts.

Local Environmental Protection Program - KDHE

a. Inspect on-site waste systems within one mile of main tributary streams.

Timeframe for Implementation: Additional monitoring and source evaluation should occur over the years 2001-2005, with follow up implementation thereafter.

Targeted Participants: Primary participants for implementation will be small livestock producers operating without need of permits within the priority watershed. Implemented activities should be targeted at those areas with greatest potential to impact the stream. Nominally, this would be activities located within one mile of the streams including:

1. Facilities without water quality controls
2. Unpermitted permanent feeding/holding areas
3. Sites where drainage runs through or adjacent livestock areas
4. Sites where livestock have full access to stream and stream is primary water supply
5. Grazed acreage, overstocked acreage and acreage with poor range condition
6. Poor riparian sites
7. Near stream feeding sites
8. Failing on-site waste systems

Some inventory of local needs should be conducted in 2001 to identify such activities. Such an inventory would be done by local program managers with appropriate assistance by commodity representatives and state program staff in order to direct state assistance programs to the principal

activities influencing the quality of the streams in the watershed during the implementation period of this TMDL.

Milestone for 2005: The year 2005 marks the mid-point of the ten year implementation window for the watershed. At that point in time, source evaluation should be sufficient to plan for implementation with the landowners responsible for the facilities and sites cited in the local assessment and eligible to participate in the implementation programs provided by the state. Additionally, sampled data from the monitoring station should indicate no evidence of increased bacteria levels relative to the conditions seen over 1987-1999.

Delivery Agents: The primary delivery agents for program participation will be the conservation districts for programs of the State Conservation Commission and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State Extension and agricultural interest groups such as Kansas Farm Bureau or Kansas Livestock Association, the Kansas Pork Producers Council and the Kansas Dairy Association. On-site waste system inspections will be performed by Local Environmental Protection Program personnel for Comanche and Clark counties.

Reasonable Assurances

Authorities: If needed, the following authorities may be used to direct activities in the watershed to reduce pollution.

1. K.S.A. 65-164 and 165 empowers the Secretary of KDHE to regulate the discharge of sewage into the waters of the state.

2. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.

3. K.A.R. 28-16-69 to -71 implements water quality protection by KDHE through the establishment and administration of critical water quality management areas on a watershed basis.

4. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.

5. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control non-point source pollution.

6. K.S.A. 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.

7. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.

8. The *Kansas Water Plan* and the Cimarron Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund, annually generates $16-18 million and is the primary funding mechanism for implementing water quality protection and pollution reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This TMDL is a Medium Priority consideration and should not receive funding until after 2005.

Effectiveness: Improvements in reducing bacteria loading to streams can be accomplished through appropriate management and control systems for livestock waste.

6. MONITORING

KDHE will continue to collect bimonthly samples in 2000, 2004, and 2008 at the rotational Station 624, including fecal coliform bacteria samples. Based on that sampling, the status of 303(d) listing will be evaluated in 2010. Should impaired status develop during the monitoring period, the desired endpoints under this TMDL will be refined and more intensive sampling will need to be conducted under specified seasonal flow conditions over the period 2005-2009. The manner of evaluation will be consistent with the assessment protocols used to establish the case for impairment in these streams.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Cimarron Basin were held March 8 and April 25 in Meade. An active Internet Web site was established at http://www.kdhe.state.ks.us/tmdl/ to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Cimarron Basin.

Public Hearing: A Public Hearing on the TMDLs of the Cimarron Basin was held in Meade on May 30, 2000.

Basin Advisory Committee: The Cimarron Basin Advisory Committee met to discuss the TMDLs in the basin on October 6, 1999; January 12, 2000; March 8, 2000.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:

Agriculture: February 28, 2000

Milestone Evaluation: By 2005, evaluation will be made as to the sources of impairment which has occurred within the drainage and current condition of Cavalry Creek with subsequent decisions made regarding implementation approach and follow up assessments of source contribution and possible management techniques.

Consideration for 303(d) Delisting: Cavalry Creek will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2005-2009. Therefore, the decision for delisting will come about in the preparation of the 2010 303(d) list. Should modifications be made to the applicable nutrient criterion during the ten-year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly. Once KDHE and EPA agree to an appropriate metric to evaluate Primary Contact Recreation and establish a water quality standard using such a parameter, this TMDL will be modified to incorporate that criterion.

At this phase of the TMDL, assessment for delisting will evaluate if the percent of samples over the applicable secondary contact recreation criterion is less than 10% for samples taken at flows below the high flow exclusion over the monitoring period of 2005-2009. This assessment defines full support of the designated use under water quality standards as measured and determined by current Kansas Water Quality Assessment protocols. These assessment protocols are similar to those used to cite the stream segments in this watershed as impaired on the Kansas 1998 Section 303d list. As protocols and assessments for impairment change for future 303(d) lists, the monitoring data collected under this TMDL will use these new assessments and protocols for delisting consideration.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2002 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in Kansas Water Plan implementation decisions under the State Water Planning Process after Fiscal Year 2005.

Approved August 9, 2000.