

LOWER ARKANSAS RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Mule Creek Water Quality Impairment: Fecal Coliform Bacteria

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Upper Salt Fork Arkansas **Counties:** Barber, Comanche, and Kiowa

HUC 8: 11060002

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

Drainage Area: 205.6 mi²

Main Stem Segment: 7; starting at the confluence with the Salt Fork Arkansas River;
Headwaters in South-Central Kiowa County.

Tributary Segment: Ash Creek (20)
Inman Creek (21)
Spring Creek (24)

Designated Uses: Expected Aquatic Life Support on Ash, Inman, and Spring Creek

Special Aquatic Life Support; Primary Contact Recreation; Domestic Water Supply; Food Procurement; Ground Water Recharge; Industrial Water Supply Use; Irrigation Use; Livestock Watering Use for Main Stem Segment

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

Impaired Use: Primary and Secondary Contact Recreation on Main Stem and
Secondary Contact Recreation Tributaries

Water Quality Standard: Fecal Coliform Bacteria: 2000 colonies per 100 ml for
Secondary (KAR 28-16-28e(c)(7)(C)); Fecal Coliform Bacteria: 900
colonies per 100 ml for Primary (KAR 28-16-28e(c)(7)(B))

Classified streams may be excluded from applying these criteria when
streamflow exceeds flow that is surpassed 10% of the time
(KAR 28-16-28e(c)(2))

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 622 near Aetna

Period of Record Used: 1992, 1996 and 1999 (Kansas Biological Survey samples in 1999)

Flow Record: USGS Station 07148200; calculated flow based on measurements at 07148200 and data from Station 07149000 (Medicine Lodge River near Kiowa)

Long Term Flow Conditions: 10% Exceedence Flow = 29 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 Mule Creek Gaging Site. The seasonal component of the duration data could not be examined because of lack of a permanent gage on Mule 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 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 the water quality 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 noted during a warmer month of the year (June). Seven percent of the samples from water quality site 622 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.
Mule Cr nr Wilmore (622)	Annual	0	0	0	0	0	1	1/14 = 7%

Desired Endpoints of Water Quality (Implied Load Capacity) at Site 622 over 2005 - 2010:

The ultimate endpoint for this TMDL will be to continue 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, 29 cfs. Monitoring data plotting below the TMDL curve will indicate attainment of the water quality standards.

Seasonal variation in endpoints is accounted for by notation of the sample date on the annual TMDL curve and will be evaluated based on monitoring data from 2000 and 2004. 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 discharger within the watershed.

Livestock Waste Management Systems: One operation is registered, certified or permitted within the watershed. Potential animal units for the facilities totals 240. The actual number of animal units on site is variable, but typically less than potential numbers.

Land Use: Most of the watershed is grassland (76% of the area) and cropland (24% of the area). The off-season and growing season grazing density of livestock is fairly high for the lower portion of the watershed, while the upper portion of the watershed's grazing density is comparatively lower for densities in the Lower Arkansas River Basin. The cropland is mainly located along the main stem and in the upper portion of the watershed. Based on 1997 water use reports, less than 1% of the cropland in the watershed is irrigated.

On-Site Waste Systems: The watershed's population density is very low, 0.5 - 1 persons/mi². The rural population projections for Barber, 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 size of the rural population.

Contributing Runoff: The watershed's average soil permeability is 2.9 inches/hour according to NRCS STATSGO data base. About 54% 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 more than halved (21%). 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 4% 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 assessment of sources, the distribution of excursions from water quality standards and the relationship of those excursions to runoff conditions, non-point sources are seen as the cause of the occasional water quality violations. Background levels are not significant as a cause of the problem. Implementation of non-point source pollution control practices should be taken within one mile of the listed stream segments.

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% of samples, this TMDL will be a Medium Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Upper Salt Fork Arkansas River Subbasin (HUC 8: 11060004) with a priority ranking of 47 (Medium Priority for restoration work).

Priority HUC 11s and Stream Segments: Unless impairment is determined by additional monitoring between 2000- 2005, no priority HUCs or stream segments will be identified.

5. IMPLEMENTATION

Desired Implementation Activities

1. None, unless impairment is determined by additional monitoring between 2000- 2005,

Implementation Programs Guidance

Unless impairment is determined by additional monitoring between 2000- 2005, no direction is needed on implementation programs.

Time frame for Implementation: Conditions will be evaluated based additional on monitoring between 2000- 2005.

Targeted Participants: None, until 2005 evaluation.

Milestone for 2005: The year 2005 marks the midpoint of the ten-year implementation window for the watershed. At that point in time, additional monitoring data from Station 622 will be reexamined to confirm the impaired status of the streams within this watershed. Should the case of impairment develop, source assessment, allocation and implementation activities will ensue.

Delivery Agents: None at this time. Status will be re-evaluated in 2005.

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 Lower Arkansas 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 and on-site waste systems.

6. MONITORING

KDHE will continue to collect bimonthly samples during 2000 and 2004 at rotational Station 622, over each of the three defined seasons. Based on that sampling, the status of 303(d) listing will be evaluated in 2006. Should impaired status remain, the desired endpoints under this TMDL will be refined and direct 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. Following current (1998) Kansas assessment protocols, monitoring will ascertain if less than 10% of samples exceed the applicable criterion at flows under 29 cfs with no samples exceeding the criterion at flows under 18 cfs.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Lower Arkansas River Basin were held March 9, 2000 and April 26-27, in Hutchinson, Wichita, Arkansas City and Medicine Lodge. 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 Lower Arkansas River Basin.

Public Hearing: A Public Hearing on the TMDLs of the Lower Arkansas River Basin was held in Wichita on June 1, 2000.

Basin Advisory Committee: The Lower Arkansas River Basin Advisory Committee met to discuss the TMDLs in the basin on September 27, November 8, 1999; January 13, March 9, 2000.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:
Sedgwick County Technical Advisory Group: August 8, October 14, November 15, 1999 and January 20, 2000.
Agriculture: January 12, February 2 and 19, 2000.
Environmental: March 9, 2000.
Conservation Districts: November 22, 1999.
Industry: December 15, 1999, January 13, February 9 and 22, 2000.
Local Environmental Protection Groups: September 30, November 2, December 16, 1999.

Milestone Evaluation: In 2006, evaluation will be made as to the degree of any impairment which has occurred within the watershed and current condition of Mule Creek. Subsequent decisions will be made regarding implementation approach and follow up on additional

implementation in subwatersheds, if necessary.

Consideration for 303(d) Delisting: Mule Creek will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2000-2005. Therefore, the decision for delisting will come about in the preparation of the 2006 303(d) list. Should modifications be made to applicable criterion during the review period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

For this 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 2000-2005. 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 303(d) 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.

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