

KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Salt Creek Watershed Water Quality Impairment: Fecal Coliform Bacteria

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Lower Republican

Counties: Republic and Cloud

HUC 8: 10250017

HUC 11: 050

Drainage Area: 216.6 miles²

Main Stem Segments: 19, 20, 22, & 23, starting at confluence of Republican River, headwaters in Republic County near Munden

Tributary Segments: Riley Creek (24)
Coal Creek (47)
West Salt Creek (25)
Turkey Creek (51)
East Creek (21)

Designated Uses: Primary and Secondary Contact Recreation on Main Stem Segments. Secondary Contact Recreation on Riley Creek, Coal Creek, West Salt Creek, Turkey Creek, and East Creek.

1998 303d Listing: Table 1–Predominant Point and Non-point Source Impacts

Impaired Use: Primary and Secondary Contact Recreation on Main Stem Segments. Secondary Contact Recreation on Tributary Segments.

Water Quality Standard: Fecal Coliform Bacteria: 2000 colonies per 100 ml for Secondary (KAR 28-16-28e(c)(7)(C)); 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 28-16-28c(c)(2))

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 1998 303d: Not Supporting Secondary Contact Recreation

Monitoring Sites: Station 650 near Hollis

Period of Record Used: 1993 & 1997

Flow Record: Flow at Salt Creek is calculated from Mill Creek at Washington (USGS Station 06884200, Recorded daily data 1959 - 1997) by proportional flow to drainage area.

Long Term Flow Conditions: 10% Duration High Flow Exclusion = 130 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. Flow duration data were examined from the Washington Gaging Station for each of the three defined seasons: Spring (Apr-Jun), Summer-Fall (Jul-Oct) and Winter (Nov-Mar). High flows and runoff equate to lower flow durations; baseflow and point source influences generally occur in the 85-99% range. Load curves were established for both Primary Contact Recreation 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. These load curves represent 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. A high implementation need curve was added and set at double the Secondary load curve.

Excursions from WQS were seen in Spring (Apr. - Jun) and Summer-Fall (Jul.- Oct.). Twenty five percent of the Spring samples were over the primary criterion and 50% of the Summer-Fall samples were over the primary criterion. No Winter samples exceeded the secondary criterion. Overall, 27% of the samples in the two years sampled exceeded the WQS. This would represent a baseline condition of non-support of the impaired designated use.

PERCENT OF SAMPLES OVER WATER QUALITY STANDARDS BY FLOW AND SEASON

STREAM NAME	I M P A I R M E N T	S E A S O N	MAGNITUDE	0 TO	10	30	60	90	F R E Q U E N C Y	Desired Endpoint Conditions of Water Quality at Site 650 Over 2004 - 2008:
				10 %	TO 30 %	TO 60 %	TO 90 %	TO 100 %		
SALT CREEK	F C B	S	900-2000	0	0	0	25	0	1/4= 25%	3/11=27% Exceedence
			> 2000	0	0	0	0	0		
			> 2 X 2000	0	0	0	0	0		
	S F	S	900-2000	25	0	0	0	0	2/4= 50%	
			> 2000	0	0	0	0	0		
			> 2 X 2000	0	25	0	0	0		
	W	W	> 2000	0	0	0	0	0	0/3= 0%	
			> 2 X 2000	0	0	0	0	0		

Desired Endpoint Condition of Water Quality at Site 650 Over 2004 - 2008

Overall, the endpoint of this TMDL will be to reduce the percent of samples over the applicable criteria from % to less than 10% for samples taken at flows below the high flow exclusion over the monitoring period of 2004-2008. This TMDL endpoint meets water quality standards as measured and determined by 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.

Seasonal variation in endpoints is accounted for by TMDL curves established for each season and will be evaluated based on monitoring data from 2004-2008. Monitoring data plotting below the applicable seasonal TMDL curves will indicate attainment of the water quality standards. As with the overall endpoint, the manner of evaluation of the seasonal endpoints is consistent with the assessment protocols used to establish the case for impairment in these streams.

1. Less than 10% of the samples taken in Spring at flows under 130 cfs exceed the primary criterion, with no samples exceeding the criterion at flows less than 25 cfs.
2. Less than 10% of the samples taken in Summer or Fall at flows less than 130 cfs exceed the primary criterion with no samples exceeding the criterion at flows less than 6 cfs
3. Less than 10% of samples taken in Winter exceed secondary criterion at flows under 130 cfs.

These endpoints 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 endpoints 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 is one NPDES permitted municipal wastewater discharger located within the watershed. Belleville uses a rotating biological contactor to treat its waste up to design flows of 0.46 MGD (0.71 cfs). The current permit expires in the year 2001. Population projections through the year 2020 indicate a declining population for Belleville. Projections of future water use and resulting wastewater appear to be under design flows for the waste treatment system. At design flow, the contributions from this system makes up 81 % of the flow which was exceeded during the Summer-Fall season 90% of the time.

Since the excursions from the water quality standards appear to occur under flow conditions of less than 65% duration and given the magnitude of the design flows of this system, the point source impact appears to be minimal to the watershed.

Livestock Waste Management Systems: Six operations are permitted, certified or registered within the watershed accounting for a potential of up to 2,540 animal units. Only one operation of the six is in the mainstem drainage area, a 35 animal unit dairy. All permitted livestock facilities have waste management systems designed to minimize runoff entering their operations or detaining runoff emanating from their areas. Such systems are designed for the 25 year, 24 hour rainfall/runoff event, which would be indicative of flow durations well under 10 percent of the time. The actual number of animal units on site is variable, but typically less than permitted numbers.

Land Use: Most of the watershed is either cropland or grassland (95% combined), with 60% of the watershed as cropland. Total water appropriations in the watershed are about 8,660 acre-feet, of which 80% is ground water. Actual permitted water use along Salt Creek and its tributaries tends to be from surface water sources. The chief surface water use is associated with irrigation for 155 acres (1996 water use reports) along the mainstem of Salt Creek and West Salt Creek. Most of the ground or surface water use associated with listed stream segments occurs along the mainstem and West Salt Creek. There are no water rights in Salt Creek or its tributaries designated for stockwatering. Water supply for livestock is obtained through domestic water rights.

Grazing density of livestock for the watershed is about 34 animal units/square mile. In 1997, inventories of cattle and swine in Republic and Cloud counties were 64,800 and 34,000 and 9,900 and 8,700, respectively. Twenty-four percent of Republic County and 6 percent of Cloud County lie within the watershed. Assuming an even distribution, up to 17,600 cattle should be in the watershed as well as 2,900 swine. However, given the lower grazing density in the watershed, actual numbers should be smaller, on the order of 7,400 animal units. Presuming the swine estimate is accurate, that would leave approximately 6,200 cattle (7,400 animals- 2,900 swine) in the watershed.

Since there are no permitted, certified or registered swine operations in the watershed, all the estimated 2,900 swine should be associated with small family farms.

The single permitted dairy has an allowance of about 35 animal units, which translates to roughly 25 dairy cows. The other remaining permitted cattle and beef operations would have about 2,500 head of cattle. The remaining cattle (estimated 3,700 head) are likely dispersed throughout the watershed in smaller family operations (un-permitted) and on open range/grassland.

Septic Systems: A number of residents within Cloud and Republic counties are in rural settings without sewer service, relying instead on septic systems. Failing septic systems contribute bacteria loadings. The infrequent excursions from the water quality standards seem to indicate a lack of persistent loadings from such systems on any grand scale. It is likely that the contribution of high bacteria loads from septic systems is restricted to local areas. Furthermore, population projections for the two counties covering the watershed indicate a decrease in rural population to the year 2020, suggesting that proliferation of septic systems will not be occurring in the watershed. Inspections or investigations of on-site wastewater systems in the two counties number 4 for Republic and 32 for Cloud County over the last two years.

Contributing Runoff: The watershed has an average soil permeability of 1.2 inches/hour according to NRCS STATSGO data base. Runoff would be produced under storms ranging in duration from one to two hours, having a recurrence interval of five, ten or twenty five years. Longer duration, less intense precipitation events would generate little to no runoff in this watershed. Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. Generally, 13 percent of the watershed would generate runoff under drier conditions or smaller storms. Moderate or wet conditions or larger storms would see runoff contributed from between 60 and 92 percent of the watershed.

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 seasonal TMDL curves 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 up to the high flow exclusion value.

Point Sources: The single municipal wastewater system is currently designed to accommodate growth. All point sources are responsible to maintain their systems in proper working condition and appropriately handle anticipated wasteloads of their respective populations. Ongoing inspections and monitoring of the systems will be made to ensure that minimal contributions have been made by these sources. The chief goal would be to maintain fecal bacteria levels below 2000 colonies in the effluent released from these livestock lagoon systems and municipal treatment systems.

The Wasteload Allocation is defined at the flow condition where the sum of the design flows represent more than 10% of the flow, thereby exerting influence on the water quality of the stream. For Salt Creek at this location, that flow condition would be flows of 0-7 cfs. Such flows have been exceeded 71 and 87% of the time during the Winter and Spring respectively. The critical period will be the Summer-Fall season, when 7 cfs has been exceeded only 60% of the time. Future NPDES and state permits will be conditioned such that discharges from permitted facilities will not cause violations of the applicable bacteria criteria at this low flow.

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 primary cause of water quality violations. Background levels attributed to wildlife might be represented by the low loads plotting below each of the seasonal curves. The previous assessment suggests that livestock in small family operations, on pastureland or in riparian areas may contribute to the occasional excursions from the water quality standards seen in the three seasons. All six of the livestock facilities in the watershed rely on some system for wastewater detention and long holding times to minimize the release of fecal bacteria to receiving streams. Given the limited runoff characteristics of the watershed, activities would need to be in proximity to the stream for waste material to influence the stream quality.

Activities to reduce fecal pollution should be directed toward the smaller, unpermitted livestock operations and rural homesteads and farmsteads in the watershed. The Load Allocation assigns responsibility for maintaining water quality below the TMDL curve over flow conditions which are exceeded 18-87% of the time during the Spring, 8-58% of the time over the Summer and Fall and 7-71% of the time during the Winter. 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 (800 colonies for primary contact recreation; 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 this watershed has a number of impairments cited under TMDL development and because of the need to comprehensive package implementation measures to handle multiple pollutants in the agricultural setting, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Lower Republican Subbasin (HUC 8: 10250017) with a ranking of 11 (Highest Priority for restoration work).

Priority HUC 11s and Stream Segments: Because of their designated use supporting Primary Contact Recreation, focus should be made on Stream Segments 19,20 and 22 and the lower reaches of Segments 25 and 21. Further focus can be provided upon completing the local assessment of activities near the streams in this watershed.

5. IMPLEMENTATION

Desired Implementation Activities

1. Renew necessary state and federal permits and monitor permitted facilities for permit compliance
2. Install necessary proper manure and livestock waste storage
3. Install necessary grass buffer strips along streams.
4. Install necessary pasture management practices, including proper stock density on grasslands
5. Remove feeding sites in proximity to streams
6. Reduce livestock use of riparian areas
7. Insure proper on-site waste system operations in proximity to main streams.

Implementation Programs Guidance

NPDES and State Permits - KDHE

- a. Municipal permits for facilities in the watershed will be renewed after 2000 within existing operations of the lagoon systems.
- b. Livestock permitted facilities will be inspected for integrity of applied pollution prevention technologies.
- c. Registered livestock facilities with less than 300 animal units will apply pollution prevention technologies.
- d. 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 subwatersheds 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 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: Pollution reduction practices should be installed within the priority segments over the years 2000-2004, with minor follow up implementation, including other segments over 2004-2008.

Targeted Participants: Primary participants for implementation will be small scale livestock producers operating without need of permits within the priority segments. 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. Number of facilities without water quality controls
2. Number of 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. Failing on-site waste systems

Some inventory of local needs should be conducted in 2000 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 2004: The year 2004 marks the mid-point of the ten year implementation window for the watershed. At that point in time, milestones should be reached which will have at least two-thirds of the landowners responsible for the facilities and sites cited in the local assessment participating in the implementation programs provided by the state. Additionally, sampled data from Station 650 should indicate evidence of reduced bacteria levels at moderate to low flow conditions relative to the conditions seen over 1993-1997.

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. On-site waste system inspections will be performed by Local Environmental Protection Program personnel for Cloud and Republic counties.

Reasonable Assurances:

Authorities: 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 Kansas-Lower Republican 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 watershed and its TMDL is a High Priority consideration.

In State Fiscal Year 1999, the state provided to Cloud and Republic counties, \$55,976 in State Water Plan Funds for non-point source pollution reduction. The Commission will decide State Fiscal Year 2000 allocations in May 1999 and is expected to direct similar amounts of funding to the two counties for the next fiscal year.

Effectiveness: Non-point source controls for livestock waste have been shown to be effective in reducing pollution in locales such as the Herrington Lake watershed. The key to effectiveness is participation within a finite subwatershed to direct resources to the activities influencing water quality. The milestones established under this TMDL are intended to gauge the level of participation in those programs implementing this TMDL.

Should participation significantly lag below expectations over the next five years or monitoring indicates lack of progress in improving water quality conditions from those seen over 1990-1998, the state may employ more stringent conditions on agricultural producers in the watershed in order to meet the desired endpoints expressed in this TMDL. The state has the authority to impose conditions on activities with a significant potential to pollute the waters of the state under K.S.A. 65-171. If overall water quality conditions in the watershed deteriorate, a Critical Water Quality Management Area may be proposed for the watershed, in response.

6. MONITORING

KDHE should collect bimonthly samples at Station 650 in 2003, 2005 and 2007 in order to assess progress and success in implementing this TMDL. Samples should be taken primarily in Spring, Summer and Fall and at flows generally below 130 cfs.

Monitoring of bacteria levels in effluent will be a condition of NPDES and state permits for facilities using lagoons as the method of wastewater treatment. This monitoring will continually assess the functionality of the lagoon systems in reducing bacteria levels in the effluent released to the streams.

USGS should complete analysis of SSURGO soil data and 30-m resolution DEM topographic data to evaluate the relative runoff contributing areas within the watershed and provide greater

resolution on where implementation activities would be most effective. This analysis should be complete in 2000.

Local program management needs to identify its targeted participants of state assistance programs for implementing this TMDL. This information should be collected in 2000 in order to support appropriate implementation projects.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the KLR Basin were held March 10, 1999 in Topeka, April 27 in Lawrence and April 29 in Manhattan. 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 Kansas-Lower Republican Basin.

Public Hearing: A Public Hearing on the TMDLs of the Kansas-Lower Republican Basin was held in Topeka on June 3, 1999.

Basin Advisory Committee: The Kansas-Lower Republican Basin Advisory Committee met to discuss the TMDLs in the basin on December 3, 1998; January 14, 1999; February 18, 1999; March 10, 1999; May 20, 1999 and June 3, 1999.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:
Agriculture: November 10, 1998; December 18, 1998; February 10, 1999; April 10, 1999, May 4, 1999, June 8, 1999 and June 18, 1999.
Municipal: November 12, 1998, January 25, 1999; March 1, 1999; May 10, 1999 and June 16, 1999.
Environmental: November 3, 1998; December 16, 1998; February 13, 1999; March 15, 1999, April 7, 1999 and May 3, 1999.
Conservation Districts: March 16-18, 24-25, 1999

Milestone Evaluation: In 2004, evaluation will be made as to the degree of implementation which has occurred within the watershed and current condition of Salt Creek. Subsequent decisions will be made regarding implementation approach, follow up of additional implementation and implementation in the non-priority reaches.

Consideration for 303d Delisting: The streams in this watershed will be evaluated for delisting under Section 303d, based on the monitoring data over the period 2004-2008. Therefore, the decision for delisting will come about in the preparation of the 2008 303d list. Should modifications be made to the applicable water quality criteria during the ten year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

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 for Fiscal Years 2000-2004.

Approved January 26, 2000.