2020 Kansas Integrated Water Quality Assessment

Ducks at Cheyenne Bottoms

Kansas
Department of Health
and Environment
Division of Environment

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EXECUTIVE SUMMARY

This report, the Kansas Integrated Water Quality Assessment (2020), was prepared by the Kansas Department of Health and Environment (KDHE) in response to water quality reporting requirements contained in sections 303(d), 305(b), and 314(a) of the federal Clean Water Act (CWA). Section 303(d) calls for the development of a list of waterbodies currently failing to meet established water quality standards, whereas sections 305(b) and 314(a) require information concerning the overall status of the state's surface waters and the programs responsible for water quality monitoring and pollution abatement.

The Kansas 2020 list of impaired waters (*i.e.*, 303(d) list) is included as an appendix to this report. This list is based primarily on data collected by the KDHE targeted surface water monitoring programs and secondarily on information obtained from outside sources. For this assessment, watersheds containing targeted stream chemistry and/or stream biological monitoring stations represented the assessment units for flowing waters. Monitored lakes and wetlands represented the assessment units for standing waterbodies. The state's 2020 303(d) list identifies 486 station/pollutant combinations of water quality impairment on lakes, wetlands, and stream systems (watersheds), encompassing 2,278 stream segment/pollutant combinations, and needing the development of Total Maximum Daily Load plans (TMDLs) to address the offending pollutants. The 2020 list also identifies 514 station/pollutant combinations of waters that were previously cited as impaired in prior lists but now meet water quality standards, with 44 of these being new in 2020.

Requirements related to Section 305(b) were addressed, in part, using data obtained through a stream monitoring program implemented in 2006. This program employs a probabilistic survey design to estimate the stream mileage supporting those uses recognized in section 101(a) of the CWA: aquatic life support, food procurement, and contact recreation. The program's target population for monitoring and assessment included all classified streams that contained water during the summer low-flow periods of 2013-2017. Owing largely to climate variation during this assessment window, only about 60% of the state's classified stream mileage is represented in the target population for assessment. Lake and wetland assessments for Section 305(b) as well as Section 314 reporting requirements were addressed using data from the targeted lake and wetland program, which uses a near-census approach in its monitoring.

Monitoring data obtained during this reporting cycle indicated that approximately 14% of the state's designated stream mileage fully supported all section 101(a) uses for which it was assessed, whereas 86% was impaired for one or more uses. Aquatic Life, Contact Recreation, and Food Procurement uses were supported, respectively, in 26%, 80%, and 59% of the stream miles designated for these uses. The two major causes or observed effects that demonstrated non-support for streams were suboptimal aquatic macroinvertebrate community metrics, an indicator of aquatic life nonsupport, and mercury in fish tissue, an indicator of food procurement nonsupport. Presence of contaminants such as bacteria, metals, and pesticides in water comprised a third category of observed causes. The most widespread discernible stressors responsible for use impairments were from agriculture (both crop and livestock production) and generalized anthropogenic influences (such as atmospheric deposition of contaminants and stream channelization). Urban stressors (both point and nonpoint sources) were less widespread, an unsurprising result given the ratio of urban to rural land use in Kansas. Natural stressors (such as drought and flood) as well as stressors of mixed natural and anthropogenic origin (such as erosion and sedimentation) were evident also.

Approximately 2.8% of the assessed lake acreage fully supported all designated uses, whereas over 96% was impaired for one or more designated uses. Approximately 82% of the assessed lake acreage exhibited no recent change in trophic condition, less than 1% exhibited some improvement in trophic state, and 12% experienced a measurable deterioration in trophic state (with 3% unknown). Of the state's nearly 56,000 acres of public wetlands, less than 5% supported both aquatic life and recreational uses. Major causes of impairment in both lakes and wetlands included nutrient enrichment, siltation and turbidity, and zebra mussel (*Dreissena polymorpha*) infestations; hydromodification and natural water chemistry also affected wetlands. Agriculture and municipal point sources were the primary sources of these impairments, along with introduction of nonnative organisms.

Kansas experienced some flooding in 2010, followed by significant and extended statewide droughts in 2011-2013; 2014 marked the beginning of drought recovery, and 2017 brought flooding in several parts of the state. Although 2019 was a record flood year, its effects are not yet realized or captured in this report. The combined effects of these dramatic weather-related events doubtless exacerbated many of the water quality impairments documented in the past decade.

PART A: INTRODUCTION

Purpose

This document fulfills specific water quality reporting requirements placed on the State of Kansas by sections 303(d), 305(b), and 314(a) of the Federal Clean Water Act. Sections 305(b) and 314(a) require a summary of the status of the state's surface waters. Section 303(d) calls for development of a list of waterbodies currently failing to meet established water quality standards, which are regarded collectively as "impaired waters." Kansas is required under the CWA to take actions that improve the condition of impaired waters. These actions may include the development and implementation of TMDLs, water quality based permit requirements, and/or nonpoint source (NPS) pollution control measures. This report presents an integrated response to the requirements of sections 303(d), 305(b), and 314(a) and contains information relevant to upcoming water quality planning, monitoring, permitting, and pollution abatement initiatives in the state.

General Assessment Approach

KDHE administers several programs that collectively satisfy the environmental monitoring and reporting requirements of the CWA (KDHE 2010). These programs also provide the technical data needed to respond to existing and emerging water pollution problems. Departmental monitoring operations currently focus on the condition of the state's surface waters (rather than groundwater) and involve two different but complementary conceptual approaches. The first involves a targeted survey design that focuses on selected lakes, wetlands, and stream reaches. The second approach involves a probabilistic survey design that assesses randomly chosen stream reaches and extrapolates the monitoring results to the entire population of classified streams in the state. Targeted monitoring operations accommodate the development and refinement of the Kansas 303(d) list, whereas both targeted and probabilistic data are used to meet section 305(b) and 314(a) Clean Lakes Program reporting requirements.

Within KDHE, activities related to sections 305(b), 314(a), and 303(d) sections of the CWA are performed by the Watershed Planning, Monitoring, and Assessment Section of the Bureau of Water (BOW). Portions of this report addressing sections 305(b) and 314(a) characterize the overall condition of the state's streams, lakes, and wetlands, including both water quality and the prevalence of bioaccumulative contaminants in fish. They also describe the major monitoring networks and regulatory programs involved in the tracking, management, and abatement of surface water pollution. The 303(d) analysis differs from the 305(b) and 314(a) assessments in terms of statistical approach and monitoring period of interest. Moreover, under the provisions of the CWA, the 303(d) list is subjected to public comment and review as well as approval by the U.S. Environmental Protection Agency (EPA).

Organization of Report

The remainder of this report is divided into several major parts. Part B contains background information on surface water resources within the state, describes the governmental programs primarily responsible for improving water quality, considers the overall costs and benefits of water pollution control, and summarizes several important water quality issues facing Kansas. Part C discusses the various water quality monitoring programs administered by KDHE, the diagnostic criteria and statistical methods employed in the 303(d) and 305(b) analyses, and the major findings stemming from these analyses. Part D summarizes the current status of groundwater quality monitoring efforts in Kansas. Finally, Part E describes the measures taken by KDHE to comply with the public participation provisions of the CWA, as related to the development of the 303(d) list. Technical appendices to this report provide additional information on KDHE's water quality monitoring programs and the results of the most recent assessments. Specifically, **Appendix A** identifies the individual water chemistry and fish tissue parameters considered in the 2018 305(b) assessment, and **Appendix B** presents the most recently completed 303(d) list for Kansas.

PART B. BACKGROUND

Total Waters

Table 1 shows a summary of the waters of the State of Kansas (KDHE 2013), along with other geographic and demographic information. The waters on the Kansas Surface Water Register have received Use Attainability Analyses (UAAs) according to standard procedures (KDHE 2012).

Table 1. Geographic information on the total waters of Kansas

Topic	Value	Data Source
State population	2,853,118	U. S. Census Bureau, 2010 Census
State surface area in square miles	81,758.72	U. S. Census Bureau, 2010 Census
Number of major river basins	12	Dec 12, 2013 KSWR +
Total classified stream miles++	30,278	Dec 12, 2013 KSWR +
Total classified stream miles designated for food procurement ++	22,235	Dec 12, 2013 KSWR +
Number of lakes, reservoirs, and ponds (publicly owned or accessible)++	322	Dec 12, 2013 KSWR +
Acres of lakes, reservoirs, and ponds (publicly owned or accessible)++	190,445	Dec 12, 2013 KSWR +
Acres of freshwater wetlands (publicly owned or accessible)++	55,969	Dec 12, 2013 KSWR +

+ The functional stream geometry of the 2013 Kansas Surface Water Register (KSWR) is derived from the 1:24,000 scale National Hydrography Dataset (NHD), projected in Lambert Conformal Conic North America (Clarke 1866) and trimmed at state boundaries. Lake and wetland acreage estimates are based on adjusted areas of NHD polygons.
++ This includes classified waterbodies as published in the 2013 KSWR.

Water Pollution Control Program

I. POINT SOURCE POLLUTION CONTROL

The Kansas point source program was initiated in 1907 (K.S.A. 65-161 *et seq*.) and continues to be modified and expanded in response to ongoing amendments to the CWA. The federal regulations implementing this law are found in Title 40 of the Code of Federal Regulations. Federal water pollution control programs are designed to protect the navigable waters of the United States, whereas the Kansas Water Pollution Control KWPC Program is designed to protect all surface water and groundwater resources in the state by controlling discharges from municipal, federal, commercial, and industrial wastewater treatment facilities (WWTFs), permitted concentrated animal feeding operations (CAFOs), and urban and industrial stormwaters.

KDHE is authorized to administer federal and state laws governing the treatment, re-use, and discharge of wastewaters in Kansas. Specifically, the department is responsible for the development, public notice, issuance, and periodic review of water pollution control permits; the approval of engineering plans and specifications for WWTFs and sewage collection systems; the development of stormwater best management practices (BMPs); the establishment of pretreatment requirements for facilities in non-pretreatment program cities (EPA Region 7 administers pretreatment program cities); and the performance of treatment plant compliance reviews. The department also oversees the development and management of operator training and certification programs in Kansas. Non-overflowing WWTFs are regulated through the Kansas Water Pollution Control permitting system (K.S.A. 65-165). National Pollutant Discharge Elimination System (NPDES) permits are required for all discharging WWTFs, Phase I and Phase II Municipal Separate Stormwater Sewer Systems (MS4s), and large agricultural facilities (**Table 2**). Agricultural facilities primarily include CAFOs but also include other animal feeding operations as well as some livestock markets and livestock truck washes. Wastewaters discharged by these treatment facilities are subject to effluent limitations, effluent guideline limits, and the Kansas surface water quality standards. Individual permits normally are issued for a period of five years, and all are reviewed by KDHE prior to re-issuance. The state's WWTF permit compliance record for calendar years 2018 and 2019 is summarized in **Table 3.**

In addition to regulating wastewaters generated by these entities, the Kansas and federal programs have expanded into the area of stormwater pollution control. KDHE issues general permits for controlling stormwater runoff from construction and industrial sites, larger cities, and urbanized counties. MS4 permits have been issued to 64 of the state's largest municipalities/counties/governmental entities and their surrounding areas to reduce the effects of stormwater runoff on receiving streams. In addition, stormwater pollution prevention plans are required for construction activities disturbing more than one acre of land and for certain classes of industries that conduct activities in which materials are exposed to rainfall. Industrial facilities with individual permits are also required to develop and implement stormwater pollution control plans as part of their individual permit requirements. Stormwater NPDES permits are normally issued for a period of five years (**Table 2**).

Table 2. Number of active KWPC and NPDES permits as of January 1, 2020

<table>
<tr><th colspan="2">Municipal and Commercial</th><th colspan="2">Industrial and Federal +</th><th colspan="2">Agricultural ++</th><th colspan="2">Stormwater</th></tr>
<tr><td>Mechanical Treatment Facilities (NPDES) +++</td><td>138</td><td rowspan="2">Industrial and Federal Discharging (NPDES) +++</td><td rowspan="2">372</td><td rowspan="2">Agricultural Federal (NPDES)</td><td rowspan="2">432</td><td rowspan="2">Municipal Separate Stormwater Sewer Systems (MS4) (NPDES)</td><td rowspan="2">64</td></tr>
<tr><td>Discharging Lagoons (NPDES) +++</td><td>349</td></tr>
<tr><td rowspan="2">Municipal and Commercial Non-discharging (KWPC)</td><td rowspan="2">416</td><td rowspan="2">Industrial and Federal Non-discharging (KWPC)</td><td rowspan="2">68</td><td>Agricultural State Permits (KWPC)</td><td>1319</td><td>Industrial Stormwater (NPDES)</td><td>845</td></tr>
<tr><td>Agricultural State Certificates (KWPC)</td><td>1562</td><td>Construction Stormwater (NPDES)</td><td>2448</td></tr>
<tr><td>Totals</td><td>903</td><td></td><td>440</td><td></td><td>3313</td><td></td><td>3293</td></tr>
</table>

KWPC = Kansas Water Pollution Control / NPDES = National Pollutant Discharge Elimination System
+ Tally does not include 59 industrial pretreatment facilities that discharge to municipal systems, the 9 Pesticide General Permitted facilities or the 173 Ready-mix General Permitted facilities.
++ All agricultural facilities are non-discharging, but large facilities have combined Federal/State permits.
+++ Subject to monitoring by Compliance Monitoring Program and represented in Table 3.

Table 3. Permit compliance for discharging wastewater treatment facilities, 2018-2019

	Municipal and Commercial Facilities	Industrial and Federal Facilities
Total number of facilities	487	372
2018 absolute compliance+	88.1%	96.5%
2019 absolute compliance+	87.6%	97.0%

+ Absolute compliance means that a facility reported on all parameters specified in its NPDES permit and met all permit limits for the monitoring period (based on records submitted by the facility).

Over the past 13 years, a significant effort has been made to decrease nutrient (nitrogen and phosphorus) loadings to surface waters. In a document dated December 29, 2004, KDHE proposed and has since initiated a program whereby new and significantly upgraded mechanical wastewater treatment plants are required to construct and operate processes to reduce the amount of nitrogen and phosphorus in effluent discharges. As of January 1, 2018, more than half of the mechanical wastewater treatment plants that generate significant amounts of nitrogen and/or phosphorus have implemented or are building such nutrient reduction processes (Rod Geisler, Pers. Comm. 3/14/2018). The department uses several contractors to assist other large and major facilities to implement operational changes, if possible, or to provide reduction by chemical addition. Also, the department has several contracts to provide on-site training assistance to existing mechanical treatment facilities to improve nutrient removal processes. Investments in such training and technology have reduced nutrient loads.

II. NONPOINT SOURCE POLLUTION CONTROL

Nonpoint source pollution refers to the transport of natural and man-made pollutants by rainfall or snowmelt moving over and through the land surface and entering lakes, rivers, streams, wetlands, or groundwater. KDHE's Watershed Management Section (WMS) is responsible for developing the Kansas Nonpoint Source Management Plan, which provides a framework to coordinate agencies and organizations involved in nonpoint source related management activities. The WMS administers funding and coordinates programs designed to eliminate or minimize NPS pollution. To accomplish this goal, the section develops and reviews strategies, management plans, local environmental protection plans, and county environmental codes intended to control NPS pollution. These efforts are coordinated but are managed under several different programs.

The Watershed Restoration and Protection Strategy (WRAPS) program is one such effort administered by the Section; it offers a framework to engage citizens and other stakeholders in a teamwork environment aimed at protecting and restoring Kansas watersheds by developing and implementing 9 element watershed plans. These projects are supported in part by the CWA 319 funds.

The Drinking Water Protection Program is another program coordinated by the Section. It is designed to provide technical assistance to Public Water Supply Systems (PWSS) interested in writing and implementing a drinking water protection plan. Many PWSS are incorporated into Kansas WRAPS plans; however, those not covered by a WRAPS project are encouraged to complete drinking water protection plans.

The Local Environmental Protection Program (LEPP) provides technical assistance and support to county sanitarians in the implementation of local sanitary codes. Guidance provided by this program is largely related to private domestic onsite wastewater disposal systems, private domestic drinking water wells, and sanitary services, such as domestic septic disposal and land application. In conjunction with the work of county sanitarians throughout the state, LEPP program services complement a variety of water quality and public health efforts implemented by other local, state and federal agencies.

Finally, stormwater and NPS abatement projects have been supported through various funding mechanisms since 2009. A partnership between KDHE Watershed Management Section and KDHE Municipal Program used funds first from the American Recovery and Reinvestment Act (ARRA) of 2009, and then in 2010-2012 used part of the Green Project Reserve from the Kansas Water Pollution Control Revolving Fund. After 2012, Green Project Reserve funding was no longer available to the Watershed Management Section for NPS pollution projects. Thus, from 2013 to 2015, members of the Watershed Management Section staff pursued development and implementation of the Local Conservation Lending Program (LCLP). The LCLP makes funds available to local banks through a linked-deposit system; the banks then use these funds to offer low-interest loans to eligible borrowers for conservation projects aimed at protecting water quality in Kansas. The pilot phase began in late 2015.

Watershed Restoration and Protection Strategy

The WRAPS program is a voluntary targeted watershed-based program for controlling NPS pollution. This program is unique because the natural resource agencies of Kansas, with support from USEPA, aggressively seek citizen and stakeholder input and participation on watershed management and protection issues. This approach involves:

- Identifying watershed protection and restoration needs
- Establishing watershed protection and restoration goals
- Developing 9 element plans to achieve established goals
- Implementing fully developed plans

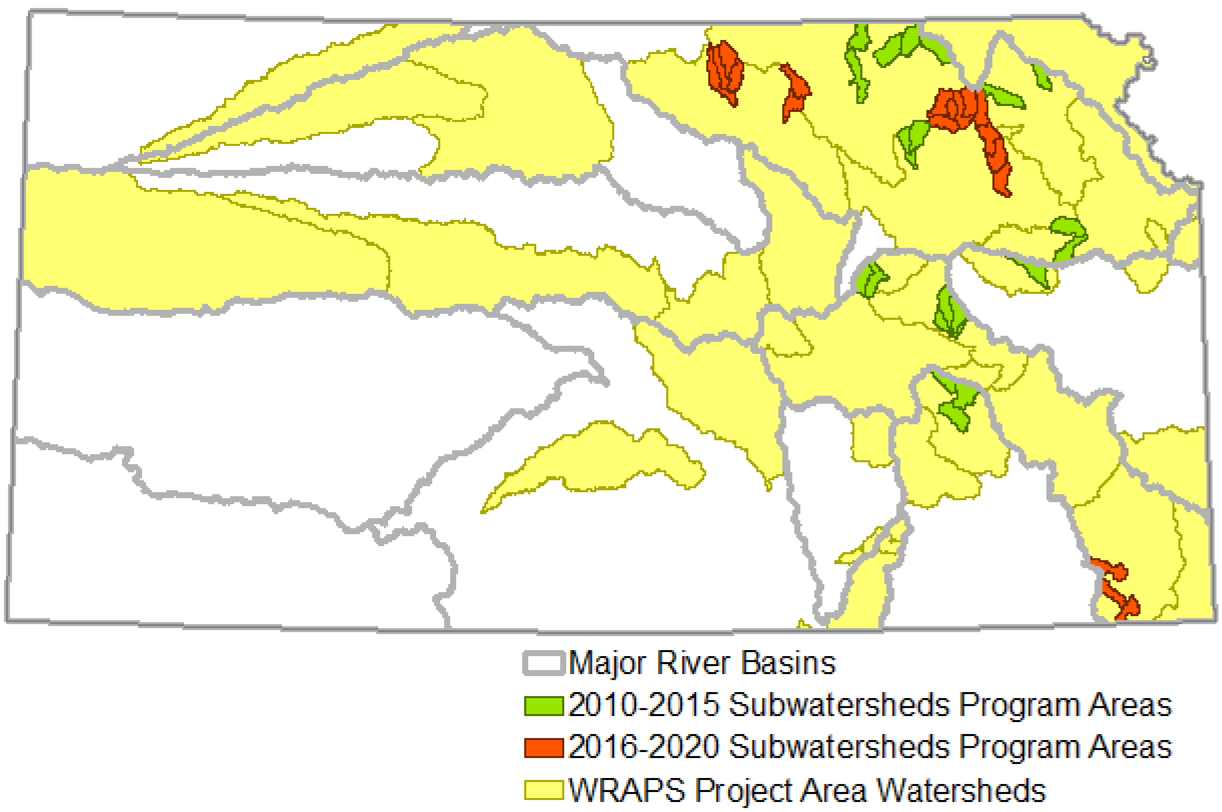
The 9 element watershed plans already implemented under WRAPS collectively serve and protect 45% of the state's total land surface (24,576,154 acres). This includes most watersheds draining into large federal reservoirs (**Figure 1**). Annual investments in WRAPS projects total approximately $3 million (M). Of this amount, about $0.6 M is derived from State Water Plan funds and $2.4 M from CWA section 319 funds. Additional funds for Best Management Practices (BMPs) come from programs administered by the Kansas Department of Agriculture's Division of Conservation as well as the Federal Farm Bill administered by the United States Department of Agriculture.

KDHE funds WRAPS projects through various sponsoring organizations to implement the 9 element watershed plans. Half of the WRAPS projects receive individual grants for high priority WRAPS projects while the other half received implementation funds through a large grant sponsoring multiple WRAPS projects.

A KDHE initiative begun in 2010, the Subwatersheds Monitoring Program, tracks water quality changes over time in a selected set of HUC-12 subwatersheds as area stakeholders implement

BMPs. It is a partnership between the Watershed Management Section and the Watershed Planning, Monitoring, and Assessment Section. Baseline data was obtained from the original 2011-2015 monitoring sites to ultimately be compared to future monitoring results after BMP implementation. In 2016, a new set of HUC-12 watersheds were identified (**Figure 1**) in three active WRAPS project areas, and monitoring in those subwatersheds are scheduled for 2016-2020.

Figure 1. Kansas WRAPS Projects as of December 2020



Drinking Water Protection Program

The Drinking Water Protection (DWP) Program is built on the principle that prevention often costs less than treatment. The program identifies drinking water source restoration and protection needs and provides technical assistance to Public Water Supply Systems (PWSS) to restore and protect water quality to meet drinking water standards. KDHE encourages PWSSs and their surrounding communities to complete voluntary DWP plans. Local stakeholders establish source water goals, corresponding action steps are created in the DWP plan, and the plan is implemented and monitored.

DWP plans are built on data from Source Water Assessments (SWA). These SWAs were completed for all active PWSSs in 2004, as required by the 1996 amendments to the Safe Drinking Water Act, and funded by USEPA. The assessments identified all potential sources of contamination for each public water supply system and evaluated the susceptibility of the PWS to contamination. The SWAs were the first step in a comprehensive plan for protecting the public drinking water supply system. PWSSs and their surrounding communities use the SWA and the accompanying Susceptibility Analysis Scores to determine the contaminants and activities that pose the greatest threats to their water supply.

The DWP plan evaluates past SWA reports and performs a drinking water source investigation that uses various water monitoring, modeling, and evaluation techniques to update knowledge of the potential for drinking water contamination. The plan describes current conditions of the drinking water protection area, including age of the PWSS, environmental assessments and investigation results, population, and land use. A completed plan describes action steps needed to protect the drinking water source. Implementation of the action steps is clearly outlined and scheduled along with a list of resources (funding, technical assistance, regulations, etc.) needed to fulfil the DWP plan objectives and goals. Milestones and a monitoring schedule allow the PWSS to track its efforts in implementation.

In 2019, KDHE began working with a western Kansas community (City of Ford) to pilot the program. A local leadership team formed to help implement the process. The assessment will begin in early 2020. Multiple communities have been contacted whose nitrates show an upward trend and are slated to begin assessment work to identify pollutant sources in Spring 2020.

In addition to the DWP program, drinking water sources benefit from BMPs through WRAPS program. There are 73 public water supply systems (serving approximately 1,277,288 Kansans) relying on surface water sources from streams and/or reservoirs that directly benefit from NPS/WRAPS watershed project implementation.

Local Environmental Protection Program

The LEPP is administered by KDHE and has had several funding sources. From SFY1990 through SFY2010, it was funded by the Kansas Water Office (KWO) under the auspices of the State Water Plan. For SFY2011 and SFY2012, grant funds were allocated through the State General Fund. The program provided financial assistance to local governmental units developing and implementing environmental protection plans on behalf of their respective jurisdictions. All such plans included a sanitary code for regulating private water wells and private onsite wastewater treatment systems, and in addition addressed subdivision drinking water and wastewater treatment, solid and hazardous waste disposal, public water supply protection, and NPS pollution abatement. The program has provided no financial assistance to local governments since SFY 2013, so local governments now provide funding for the program through county general funds and user fees.

The role for KDHE has shifted from grant administration to providing technical assistance, information, and education to support local officials in administration of their Environmental/Sanitary Code. Currently 103 of the 105 Kansas counties participate in this program. The LEPP program is in the implementation phase of a five year plan designed to improve the efficiency in which local officials receive information, technical assistance, and guidance. Elements of this five year plan include:

- Develop a Model Environmental Sanitary Code to assist counties with code updates
- Update the procedure for Environmental Sanitary Code adoption or revision

- Develop a web page for septic haulers and pumpers
- Conduct a nutrient loading study for onsite wastewater systems
- Update the Kansas Environmental Health Handbook
- Update the LEPP web page
- Develop an online training center for sanitarians

Other Nonpoint Source Pollution Control Projects

Background and History

One of the Goals in the Kansas Nonpoint Source Management Plan is to institute a revolving loan fund for NPS projects, and to that end KDHE Watershed Management Section and KDHE Municipal Programs Section have formed a partnership.

This effort was begun in 2009, when approximately $5.7 million of the American Recovery & Reinvestment Act (ARRA) funding was set aside to support NPS/green infrastructure projects administered through the Watershed Management Section (WMS). Eleven projects were awarded in the form of low-interest loans with principal forgiveness. Funded projects used innovative technologies for sustainable stormwater management and NPS pollution abatement, such as constructed wetlands, native grass plantings, pervious pavement, bioretention swales, rain gardens, and stormwater reuse systems, as well as some streambank stabilization and restoration work.

Green Project Reserve

In FFY 11 and 12 (October 2010-September 2012), the Kansas Water Pollution Control Revolving Fund (KWPCRF), which has traditionally been used for treatment plant upgrades, reserved $5.1 million of its funding over two years for Green Project loans. The fund issued a Call for Proposals that outlined submission requirements, project eligibility, and applicant qualifications for NPS projects funded through the KWPCRF. Selected projects were notified of the funding award; pre-award meetings were held to outline the loan application process and requirements; and efforts continued to complete loan applications and secure executed loan agreements. A total of 11 projects have been funded since 2011. These projects included streambank stabilization, restoration with riparian/vegetated buffers, pervious pavement with underdrain systems for stormwater storage, and bioretention swales and rain gardens.

In 2019, KDHE began work to access green project reserve funds to assist with the implementation of large scale soil health practices. Soil health principles include decreasing soil disturbance, covering the soil with living plants, increasing diversity of growing plants, and integrating livestock. These principles improve the function of soil and therefore decrease the amount of runoff occurring by increasing infiltration. The funds will be used to provide areas of the state with interseeder equipment capable of planting cover crops in unharvested cash crops to increase the growing potential of living plants prior a usually bare soil time for agricultural land.

Local Conservation Lending Program

The Local Conservation Lending Program (LCLP) was officially created during the 2014-2015 legislative session through the passage of House Substitute for Senate Bill 36 (H Sub for SB 36). The bill authorizes KDHE to implement the program throughout the state of Kansas. The purpose of the program is to make funds available through a linked-deposit system to local banks, in exchange for low-interest loans to eligible borrowers for water quality protection projects. Eligible projects fall into four main categories: General Conservation Projects, Livestock Projects, Stream Restoration Projects, and Onsite Wastewater Assistance.

Through the continued partnership between the KDHE WMS and KDHE Municipal Programs Section, approximately $1 million annually in KWPCRF set-aside funds has been made available for four years for the LCLP deposits/investments. The program can be combined with other cost-share programs for qualifying projects, providing an additional means to leverage state resources to implement high priority projects aimed NPS pollution abatement.

Since the LCLP statutes were enacted July 1, 2015, the KDHE WMS developed an Appendix to the Kansas Nonpoint Source Pollution Management Plan, to establish the criteria, requirements, and procedures for implementation of the program as directed in K.S.A. 2015 Supp. 65-3330. The Appendix includes eligibility criteria, practices eligible for funding through the program, eligibility criteria for borrowers, eligibility criteria for costs, project completion and certification requirements and process, and other program requirements.

KDHE completed a successful 'pilot phase' of the program, in which prospective lending institutions (banks) and test projects were identified. The goal of this phase was to work through several projects in close coordination with participating lenders and agency partners in order to address any comments or concerns as well as refine the program process. The state continues to promote the LCLP. Generally low interest rates provided by financial institutions since 2018 has prevented the LCLP funds from being accessed; however, did not prevent NPS projects from being implemented. Kansas landowners interested in the program decided in many cases to implement the project with a traditional loan from their banks. KDHE believes that the program will be more widely utilized as interest rates increase in the financial sector.

Cost/Benefit Assessment

The direct and indirect costs of water pollution control can be measured, or at least estimated, with some degree of confidence. In contrast, environmental benefits stemming from pollution control are less amenable to expression in monetary terms. Section 101(a) of the CWA establishes national water quality objectives and interim goals reflecting the belief that the costs of water pollution control are outweighed by the ecological and social benefits of clean water. The following paragraph and accompanying tables address some of the major costs associated with water pollution control efforts in Kansas.

Pollution control expenditures in the state are associated predominantly with administrative expenses, capital investments, and operational costs for WWTFs. Although little information is available regarding the control costs borne by industrial and agricultural facilities, some capital expenditures associated with the construction and upgrading of municipal WWTFs have been documented by KDHE. For example, the department administers the Kansas Water Pollution Control Revolving Fund (KWPCRF), which provides low interest loans to municipalities for water pollution control projects. Since 1989, the KWPCRF has provided 502 loans totaling $1.36 billion for facility improvements. KDHE also coordinates with the Community Development Block Grant (CDBG) program, which is administered by the Kansas Department of Commerce. This program typically provides grant funding up to 50% of the costs of a selected water pollution control project. During 2018 and 2019, KWPCRF and CDBG provided about $124.6 million in financial aid to communities (**Table 4**). NPS pollution abatement measures received much less funding, relying instead on predominantly voluntary measures and cost-share programs previously discussed.

Table 4. KDHE cooperative funding for construction and expansion of municipal wastewater treatment facilities.

Funding Year	KWPCRF – Basic Program +	CDBG – Federal +	TOTAL
2018	$ 27.75 M	$ 4.60 M	$ 32.35 M
2019	$ 46.67 M	$ 2.50 M	$ 49.17 M
Total	$ 74.42 M	$ 7.10 M	$ 81.52 M

Monetary values presented in millions of dollars. / + KWPCRF = Kansas Water Pollution Control Revolving Fund / CDBG = Community Development Block Grants

Special Concerns and Recommendations

The current major environmental concerns for the surface waters of Kansas can be divided into four categories: agricultural concerns, municipal/industrial concerns, nuisance aquatic species, and variations in flow regimes.

I. AGRICULTURAL CONCERNS

Given the extent of agricultural land use in Kansas, it is unsurprising that agricultural practices exert a profound influence on surface water quality conditions. Erosion of cropland soils produces elevated concentrations of silt in many streams and lakes, often to the detriment of native aquatic and semiaquatic life. The presence of nitrogen- and phosphorus-containing fertilizers in field runoff promotes nuisance growths of algae and detracts from the recreational and drinking water supply uses of surface water. Stormwater runoff from uncontrolled feedlots, livestock wintering areas, and heavily grazed pastures introduces pathogens and oxygen consuming organic wastes into nearby lakes and streams, sometimes compromising the sanitary condition of these waters. Pesticide residues in streams and drinking water supply lakes can affect aquatic biota and pose potential long-term risks to human health.

Nonpoint source pollution potential has also been increased through conversion of grassland and good riparian areas to commodity crops. Even though some areas are put into no-till, the removal of deep rooted native species and a developed soil microbe community reduces infiltration, increases the likelihood of erosion and sediment deposition from ephemeral gullying, and increases the need for fertilizers and pesticides. Cropping activity next to streams has also potentially destabilized habitat.

Another trend is that with larger equipment and no-till practices, grassed waterways are deemed as loss of valuable cropland and a deterrent to time-efficient farming. This has led to an increase in the use of underground outlets in association with terraces equipped with risers. These drainage systems often deliver agricultural runoff directly to a water body without any type of natural degradation (sunlight-air) or vegetation treatment. These practices can create a conduit for dissolved and particulate pollutants being discharged near or directly into a stream if there is not adequate containment or filter.

Some financial aid restrictions have already been implemented by KDHE and other state agencies. Additionally, the KDHE Watershed Management Section (WMS) is taking steps to reduce this practice by removing it from the list of practices eligible for the US Army Corps of Engineers (USACE) Section 404 of the Clean Water Act General Permit Ag 40 for practices designed by NRCS in its 5-year reissuance process. In April 2018, when new GP 40 Section 404 Permits were reauthorized, these underground outlets were not included in blanket approval. Instead, an applicant will need an individual Section 401 WQC, which will enable KDHE to provide more technical assistance to protect and restore water quality conditions in potentially affected water bodies.

The KDHE WMS also strives to realize the water quality benefits of improving soil health through implementation of no-till, cover crops, crop rotation, livestock management systems (*i.e.* percent of organic matter increase, increased bio-microbial activity, water holding capacity, increase availability of nutrients) through infiltration and reduced runoff. Additionally, reduction of soluble phosphorus runoff from surface application may be reduced by better infiltration and better crop utilization through increased microbial activity. Depending on the rotation and type of cover crop, quick and thick growth can help reduce weed pressure by shading them to allow more sunlight to get to the cash crop so it can out compete the weed for sunlight. There may also be some weed control through allelopathic characters of certain species of cover crops and some cover crops readily attract beneficial insects for pest control.

Improved soil health can also reduce flood frequency and magnitude. Optimum infiltration into healthy soil reduces peak runoff discharge. This in turn results in more metered flow into the adjacent water body. This can help re-establish base flow in streams cut off from the natural hydrological cycle as well as reduce the impact of runoff events. The ability for this to occur could also provide “cleaner water” to assimilate nutrients in runoff. Subsurface flow is more metered and less forceful, which can mitigate “hungry water” conditions that threaten stream bank and bed stability. The KDHE has been working with WRAPS groups to identify farmers who have started to implement soil health practices. The WMS is also working with the Kansas Department of Agriculture Flood Plain Mapping Program to identify areas where better infiltration could yield significant benefits.

Soil health improvements on producer fields are being evaluated for market based economic solutions for producers. Carbon sequestration and water quality improvements are identified as goals in many industries within the last few years. Industries such as food manufactures, agricultural companies, and retailers are developing processes to purchase carbon and water quality credits from agricultural producers. By offering producers market based economic solutions, farm profitability will no longer rely solely on commodity production. It is believed that through these types of solutions, less conversion of grassland and riparian areas will occur while still allowing the agricultural community to show economic profit. Soil health has become a solution to ecological restoration improving many natural resource issues at the same time as increasing economic sustainability in small, rural areas.

The FFY 18/SFY19 reductions in nitrogen, phosphorus and sediment were accomplished through partnerships between Kansas Department of Agriculture's Division of Conservation, Natural Resources Conservation Service, EPA (Section 319 Program), Kansas Water Office, and KDHE. Partnership activities included financial and technical assistance at the WRAPS level. Practices included both management and structural practices resulting in: 336,173 and 173,493 lbs/yr of nitrogen and phosphorus respectively and 123,464 tons/yr of sediment. However, WMS and EPA are encouraging less structural and more management based (soil health improvement practices); these are envisioned to be more cost efficient with multiple benefits as described above.

Efforts to alleviate the impacts of agriculture on the aquatic environment have focused primarily on the abatement of soil erosion and proper management of chemical fertilizers, biocides, and livestock wastes. Although the wider adoption of agricultural BMPs is underway and should lead to measurable reductions in stream contaminant levels, runoff water quality is not the only agricultural factor limiting the use attainment of surface waters. Throughout much of western Kansas, decades of irrigated crop production have exacted a heavy toll on stream life by lowering groundwater tables, reducing base stream flows, and transforming formerly perennial waterbodies into intermittent or ephemeral systems. In some areas of northeastern Kansas, stream channelization has radically simplified the original aquatic habitats and decimated a formerly diverse fish and shellfish fauna. Impoundments (large and small) throughout the state have encouraged the establishment of predominantly nonnative fish assemblages, fragmented the remaining stream habitats, and diminished the seasonal peak flows required by certain native fishes for spawning and egg development.

The complete restoration of degraded aquatic ecosystems would require large-scale habitat rehabilitation efforts and fundamental changes in the laws, policies, and practices currently dictating the use and allocation of water in Kansas. Some more readily implemented options for partially offsetting the historical effects of agriculture include: enhancing minimum stream flows through the State-mediated purchase of water rights, expanding hatchery restocking programs for native fish and shellfish; selectively removing low head dams and other barriers to fish migration; installing fish ladders and elevators on larger dams, and other related management initiatives – all in addition to concurrent improvements in agricultural practices. Most of these concepts are not new; for example, the importance of maintaining migrational corridors for fish was emphasized repeatedly by Kansas officials during the late nineteenth century but never seriously considered in the course of water resource development (Angelo, Cringan and Haslouer 2003).

Even so, there is improvement, as our scientific understanding, agency collaboration, and shared policies improve. Many efforts are being coordinated more broadly across various state and federal agencies. A Nutrient Reduction Plan was created by KDHE in 2004. In 2010 it was expanded and formalized as the Kansas Nutrient Reduction Strategy, which includes collaboration with the Kansas Water Office, Kansas Department of Agriculture, and Kansas Department of Wildlife, Parks, and Tourism. In 2013, Governor Sam Brownback asked state agencies to work together with his administration on a fifty-year water vision. As a result, the Kansas Water Vision task force and planning documents (State of Kansas January 2015) have created an even more permanent infrastructure for interagency collaboration on issues surrounding statewide water supply and, to some degree, water quality.

The coalition of agencies work with state mechanisms as well as helping to coordinate and leverage federal programs such as USDA Farm Service Agency's Conservation Reserve Enhancement Program (CREP), which provides incentives to remove environmentally sensitive land from production and implement conservation practices.

II. MUNICIPAL AND INDUSTRIAL CONCERNS

Discharging wastewater treatment facilities (WWTFs) and other point sources influence surface water quality throughout much of Kansas. Inorganic nitrogen and phosphorus released from some facilities promote blooms of filamentous or scum-forming algae in downstream waters and detract from their capacity to support primary and secondary contact recreation. Bypasses of raw or partially treated sewage occur each year, owing to treatment plant capacity limitations, malfunctions, operator error, and natural catastrophes. Such bypasses can result in fish kills and other serious water quality problems.

Stormwater runoff from lawns, golf courses, roadways, parking lots, and construction zones often contains a complex mixture of chemical pollutants (*e.g.*, herbicides and pesticides, fertilizers, oil, grease, antifreeze, de-icing salts, solvents, detergents, asbestos). These substances can prevent the development and maintenance of representative aquatic communities in receiving surface waters. Similarly, concentrations of mercury, polychlorinated biphenyls (PCBs), and other bioaccumulative contaminants in fish taken from urban streams may pose unacceptable risks to human consumers.

In addition, data related to the accumulation, transport and fate of microplastics, animal and human pharmaceuticals, hormones, personal care products, and other ubiquitous chemicals such as perfluorinated compounds (PFOS) and polybrominated diphenyl ether fire retardants (PBDEs) are needed in Kansas as well as the rest of the country.

Although the concentrations of such chemicals in the water column are most often minute, the processes of bioaccumulation and subsequent biomagnification in the food chain may concentrate these chemicals in fish tissue to levels that subject human and wildlife consumers to a risk of deleterious effects. Consumers of fish exposed to these contaminants and/or their degradation products may be exposed to concentrations in fish tissue many times greater than the concentrations occurring in the ambient environment, and some are resistant to removal by drinking water treatment plants (Glassmeyer 2017).

Although the USEPA has long acknowledged the importance of monitoring and determining safe levels of these contaminants of emerging concern (CECs) in both water (Stephen, et al. 1985) and fish tissue (USEPA 2013), analytical costs for many of these compounds remain high, and financial support for consistent implementation at the state level is not available.

Unplanned and extensive urban growth can negatively influence the physical habitats supporting aquatic life, in part because eliminating and altering permeable land surfaces, wetlands, and riparian areas diminishes urban watersheds' capacity to remove pollutants and mitigate the effects of flooding. Stormwater runoff from impervious surfaces such as paved areas and rooftops can lead to powerful flooding events, capable of scouring stream bottoms and eliminating the habitat required by some native aquatic species. The channelization of urban streams results in highly simplified aquatic habitats incapable of supporting the full range of fish, amphibians, invertebrates, plants, and wildlife indigenous to this region. In many instances, the negative effects of high-density development on streams, lakes, and wetlands could be reduced through urban planning, employing established BMPs, maintaining green corridors around water bodies, and strategically designing the placement of development. The retention of natural corridors or "greenways" along rivers and creeks, and observance of the intent of the antidegradation provisions of the surface water quality standards (KDHE 2015), would do much to preserve the natural physical and chemical attributes of the state's urban streams. Local, state, and federal authorities also could support more litter cleanup initiatives. Improving the visual and aesthetic character of urban waters would increase their perceived value and encourage protection and sustainable use.

Some streams also suffer from illegal dumping of trash and other unwanted materials. The practice of discarding grass clippings, brush, and animal carcasses into streams (and the subsequent decay of these materials) reduces dissolved oxygen levels, jeopardizes populations of fish and other aquatic life, and may introduce pathogens. Discarded appliances and electronics, paint cans, pesticide containers, and batteries may leach toxic materials, thereby posing a threat to resident aquatic biota.

On a positive note, the deliberate and systematic renovation of many wastewater treatment facilities has noticeably improved surface water quality over the past few decades, and this progress continues. As point sources contributing to water quality impairments decline, attention will shift increasingly to nonpoint sources. Watershed pollution control efforts, predicated largely on the development and implementation of TMDLs, through WRAPS, will play an increasingly important role in abatement of nonpoint source pollution.

III. NUISANCE AQUATIC SPECIES

Several exotic plant and animal species have established populations within the state, and some pose a serious risk to native aquatic life and the beneficial uses of surface waters. For example, Asian clams (*Corbicula fluminea*) have established large populations in streams and lakes throughout the state, and the zebra mussel (*Dreissena polymorpha*) has gained a foothold in recent years in several major river basins. Both of these exotic bivalves can compete with or otherwise injure native shellfish species, and the zebra mussel in particular can impair designated recreational and drinking water supply uses. At least three species of Asian carp have been reported in Kansas (bighead carp, *Hypophthalmichthys nobilis*; silver carp, *Hypophthalmichthys molitrix*, and grass carp, *Ctenopharyngodon idella*), as well as white perch *(Morone americana)* and rudd *(Scardinius erythrophthalmus)*; additional exotic fishes are expected to appear in Kansas in the near future. These animals can compete with native fish and wildlife for food and shelter, and some dramatically reduce water clarity by disturbing bottom sediments during feeding. Zebra mussels and other invasive species also create significant costs to manage and mitigate (Connelly, et al. 2007).

Several introduced plant species also have proven problematic. Thickets of salt cedar (*Tamarix* spp.) have become established along many streams in western and central Kansas, crowding out the native riparian vegetation and removing (via evapotranspiration) vast amounts of water from the adjoining streams and underlying alluvial aquifers. Purple loosestrife (*Lythrum salicaria*) has become the dominant herbaceous species in many wetlands, overwhelming many of the state's native plants and jeopardizing the animals depending on these plants for food and shelter. Eurasian watermilfoil (*Myriophyllum spicatum*), an exotic plant sold in the aquarium trade, has been documented in several streams in western Kansas and in scattered lakes throughout the state. This plant propagates via seeds and vegetative fragments and can spread rapidly between waterbodies by attaching to boat propellers, boat trailers, and fishing gear. Curly-leaf pondweed (*Potamogeton crispus*) has also been found in seven publicly accessible lakes. Once introduced into a lake or stream, these plants can form dense mats of vegetation that can interfere with recreational activities, crowd out native aquatic vegetation, disrupt the feeding behavior of native fish, and choke water intakes used for municipal water supply, power generation, and irrigation. An even more invasive and potentially damaging exotic aquatic plant. Hydrilla (*Hydrilla verticillata*) has been discovered in two discrete locations in northeast Kansas during the last few years (an urban park lake, and a restaurant's outdoor water garden). The expansion of this exotic aquatic species carries with it, based on experiences elsewhere, and even greater potential for environmental and water infrastructure damage.

Finally, although cyanobacteria are part of the natural aquatic ecosystem at low concentrations, their increased abundance in the reservoirs of Kansas over the past ten years has led to widespread Harmful Algal Blooms (HABs). In some cases, the HABs have limited normal uses of the waterbodies for recreation or even as drinking water supplies. In 2010, KDHE established a complaint based HAB response program for public waterbodies; this program has grown each year alongside the increase in the number of affected waterbodies and the duration and intensity of blooms. In 2019, the KDHE Public Water Supply Section established a voluntary raw water monitoring program for Water Supply systems that depend on surface water sources. This program provides subsidized testing for cyanobacterial toxins as well as assistance in emergency response planning.

IV. VARIATION IN FLOW REGIMES

Aquatic plants, animals, plankton, and microbes are adapted to live in particular environments. For example, some fish do best in fast-flowing riffles, whereas others thrive in deep lakes. Even within a given species, habitat requirements may change over the course of a lifetime or on a seasonal basis, to support survival, growth, and reproduction. Alteration of flow regimes from historical, natural conditions can disrupt habitat and affect individual species, relationships in food webs, and the aquatic ecosystem as a whole.

Throughout history, humans have recognized the need to manage natural resources in a way that makes them usable but also sustainable, which requires balancing priorities. For example, we construct dams to create reservoirs, help control flooding, and create stable water supply sources. At the same time, we recognize that impounded systems must also release water to support downstream uses, in a manner that supports the habitat requirements of aquatic communities as well as the water rights of human users downstream. Over time, we adjust our management policies and priorities as we gain knowledge and understanding.

Many factors, both natural and anthropogenic, can change the amount and timing of streamflow. Direct withdrawals from a stream (for example, for domestic, municipal, or industrial use) and discharges to a stream (from point sources) are easily observable impacts, but other impacts are less obvious. Changes in groundwater levels can affect baseflow conditions. A recent study on southwest Kansas streams has demonstrated a linkage between groundwater withdrawals and declining stream flows (Juracek 2015), which confirms earlier observations of the same patterns (R. T. Angelo 1994).

Flow rates can be accelerated, slowed, or stopped by changing or confining the contours of stream channels – through straightening, dredging, installing levies and revetments, and the like – or by introducing impoundments, which range from major reservoir projects and farm ponds to low-water crossings and beaver dams. Flow can also be changed by modifying the land surface, which affects how precipitation flows overland. Examples of this include installing impervious surfaces, terracing, or constructing ditches and drains. Any of these changes, by altering flow regime, can in turn propagate a cascade of changes both upstream and downstream as the stream or river redistributes sediments, changes its depth, width, and course, and returns to equilibrium.

Overlaid upon these other alterations (both anthropogenic and natural), changes in weather patterns can produce dramatic and readily observable changes in streamflow. The amount, timing, and rate of precipitation all affect streamflow, and these factors interact to determine the absolute and relative rates of runoff, evaporation, infiltration, and groundwater recharge. In the past fifteen years, Kansas has witnessed two major droughts (2000-2006 and 2010-2013) as well as numerous instances of localized flooding. If weather trends observed in Kansas over the past 30 years continue, with gradual increases in both absolute precipitation and temperature over time (National Oceanic and Atmospheric Administration 2016, National Oceanic and Atmospheric Administration 2016), this will undoubtedly shift the seasonal baselines of surface water availability.

Changes in historic, natural streamflow patterns affect not only habitats available for aquatic communities, but also transport of sediment and pollutants. The majority of pollutant loads to streams and lakes is borne by relatively large, short-duration, infrequent storm events and their associated runoff production. The magnitude of these runoff events may overwhelm most Best Management Practices, when they exceed the typical design storm (*e.g*., 25-yr recurrence interval) handled by those practices. Alterations to historic rainfall-runoff responses, such as changes in climate patterns that intensify storms, or increases in a watershed's impervious cover that reduce infiltration, increase the likelihood of damaging runoff and pollutant loads being delivered to water bodies despite investments in BMPs. Conversely, conditions that prolong or aggravate low flow situations induce flow stagnation, which extends the time that pollutants are in contact with aquatic life and prevents beneficial re-aeration that cleanses the stream systems.

Many of the factors that affect streamflow variation are difficult or impossible to manage. The Clean Water Act does not directly address flow management, so pollution resulting from flow alterations defy the typical regulatory tools provided by the Act. Even so, it in our shared best interest to understand, anticipate, mitigate, and plan our responses, given that alterations of natural flow regimes will likely present increasing challenges to managing water quality and maintaining water supplies.

V. CONCLUSIONS

Taken together, these threats can seem daunting. However, various state and federal programs are making incremental efforts to abate the impacts of those activities. For example, NPDES permits tying urban stormwater to impaired waters and directing appropriate corrective practices have been drafted. Kansas is implementing a State Nutrient Reduction Strategy to reduce phosphorus and nitrogen in surface waters. WRAPS groups direct funding to critical subwatersheds to reduce NPS pollutant loads, and the Subwatershed Monitoring Program tracks improvements.

Many of these activities have been tied together and enhanced through the Kansas Water Vision (State of Kansas January 2015). Several of the Phase I Action Items already underway deal directly with nutrient and sediment issues. Although the primary focus in many efforts is reducing sediment and nutrient transport into drinking water reservoirs, many applicable management practices limit movement of other pollutants as well. Along with interagency collaboration, a centerpiece of Water Vision initiatives is citizen engagement. This builds on the tradition of education campaigns implemented by KDHE, KDWPT, and others to create awareness of water quality issues, promote precautions that limit migration of invasive species, and encourage water conservation.

One important innovation of the Kansas Water Vision task force has been to create fourteen Regional Planning Areas (RPAs). These were created by the Kansas Water Authority in December 2014 and tailored to the resources and needs of different parts of the state. The RPAs are based on a hybridization of Groundwater Management Districts in the west (which are based on boundaries of the High Plains Aquifer and counties) and river basins in the east. Each RPA has a Regional Advisory Committee; these entities replace Basin Advisory Committees. This configuration of local representation reflects Kansas' long-standing acknowledgement that surface water, alluvial groundwater, and deep groundwater are distributed unevenly across the state and that these local variations of interconnected water resources must be understood and factored into policy deliberations.

Consideration has also been given to structural changes to state water use law that will encourage conservation; these include elimination of the "use it or lose it" rule for groundwater rights and introduction of multiyear flex accounts that allow irrigators to budget water use over five years rather than one. In 2012 the Legislature authorized Local Enhanced Management Areas (LEMAs) in western Kansas to combat groundwater declines through local management strategies (K.S.A. 82a-1036).

Broad-based conservation and restoration collaborations proceed as partnerships, mechanisms, and funding become available. For example, KDWPT, in partnership with the US Fish and Wildlife Service and the City of Wichita, is installing a fish passage structure in the Arkansas River, which is Designated Critical Habitat for several state-listed fish species.

In a February 2015 settlement with Nebraska over the Republican River Compact, Kansas recently received $5.5 million; of this, $3.5 million will be used for conservation projects in the Lower Republican River Basin, with oversight from the Kansas Water Office; much of the funding will be used for irrigation efficiency infrastructure in the northcentral part of the state. In the southeastern corner of Kansas, which has a long mining history, KDHE is working with Pittsburg State University's Monahan Research Center and the federal Office of Surface Mining to design a remediation wetland to treat acid mine drainage.

Another restoration project underway in southeast Kansas is aimed at restoring native aquatic communities. In March 2014, KDHE and KDWPT signed a Memorandum of Agreement to implement Natural Resource Damage Assessment (NRDA) activities at the Farlington State Fish Hatchery. This Memorandum included a provision for some funding by KDHE to KDWPT for the implementation, construction, operation, management, and maintenance of a native species facility, called the Kansas Aquatic Biodiversity Center (KABC). This facility, which opened in 2018, will serve as a hatchery for native freshwater mollusks as well as fish. These native species will be used in a variety of restocking and restoration efforts. Many species are imperiled or in need of population augmentation, while other species need re-establishment due to natural resource damage.

Over time, these programs can improve the health and intrinsic value of our aquatic ecosystems, thereby increasing their economic and cultural value to the citizens of Kansas. Effective program implementation requires investment in continued systematic, thorough, high quality monitoring of water resources and aquatic communities. This will direct limited resources to the highest priority waters while building a foundation of sound scientific evidence to evaluate and improve restoration strategies and measure their success.

PART C. SURFACE WATER MONITORING AND ASSESSMENT

Monitoring Programs

In Kansas, the Kansas Department of Health and Environment (KDHE) is the agency that bears primary responsibility for surface water quality monitoring and assessment of the state's surface water resources. This work is accomplished through six long term monitoring programs housed in the Watershed Planning, Monitoring, and Assessment Section of the Bureau of Water. The six Monitoring Programs are: Lake and Wetland, Targeted Stream Chemistry, Targeted Stream Biology, Probabilistic Stream, Fish Tissue Contaminant, and Compliance. The Subwatershed Water Quality Monitoring Program and several other cross-program initiatives and special projects are operated by the same program staff. The Surface Water Use Designation Program does not currently have a dedicated staff, but still maintains a methodology that is implemented by section personnel.

Water quality grab samples collected by these programs are analyzed at the Kansas Health Environmental Laboratories (KHEL) for a suite of physical, organic, inorganic, and bacteriological parameters. As of 2016, KHEL contracts with the State Hygienic Laboratory at the University of Iowa (Coralville, Iowa) to analyze the agency's ambient radiological water quality samples. Fish tissue mercury samples are analyzed at EPA Region 7 laboratories. Other types of samples are processed and analyzed in house or sometimes outsourced to contractors, all under the aegis of KDHE and its approved Quality Assurance Management Plans.

For detailed information on methods as well as the developmental history and current status of KDHE's environmental monitoring programs, the reader is referred to the applicable quality assurance management plans (QMPs) and standard operating procedures (SOPs) posted on the departmental website (http://www.kdheks.gov/environment/qmp/qmp.htm#BOW). For a view that places programs in context and identifies known gaps and goals, refer to the current ten-year (2019-2028) Kansas Water Quality Monitoring and Assessment Strategy (KDHE 2019).

I. TARGETED LAKE AND WETLAND MONITORING PROGRAM

This program surveys water quality conditions in publicly owned and/or publicly accessible lakes and wetlands throughout Kansas. Program personnel visit individual waterbodies on a three- to six-year rotational schedule, and field measurements and subsequent laboratory analyses provide data on a large suite of physical, chemical (inorganic and organic), and biological (phytoplankton and macrophyte community) parameters (**Appendix A**). Macrophyte community composition and areal coverage are evaluated in selected waterbodies smaller than 200 acres. The Lake and Wetland Monitoring Program performs rotational surveys that comprises 88% of Public Lake Acreage and the program's primary database now contains over 400,000 analytical records representing more than 350 waterbodies (KDHE 2020b). Watersheds associated with many of these lakes and wetlands are surveyed periodically with respect to prevailing land use/land cover and the location and size of discrete pollutant sources (WWTFs, CAFOs, *etc.*).

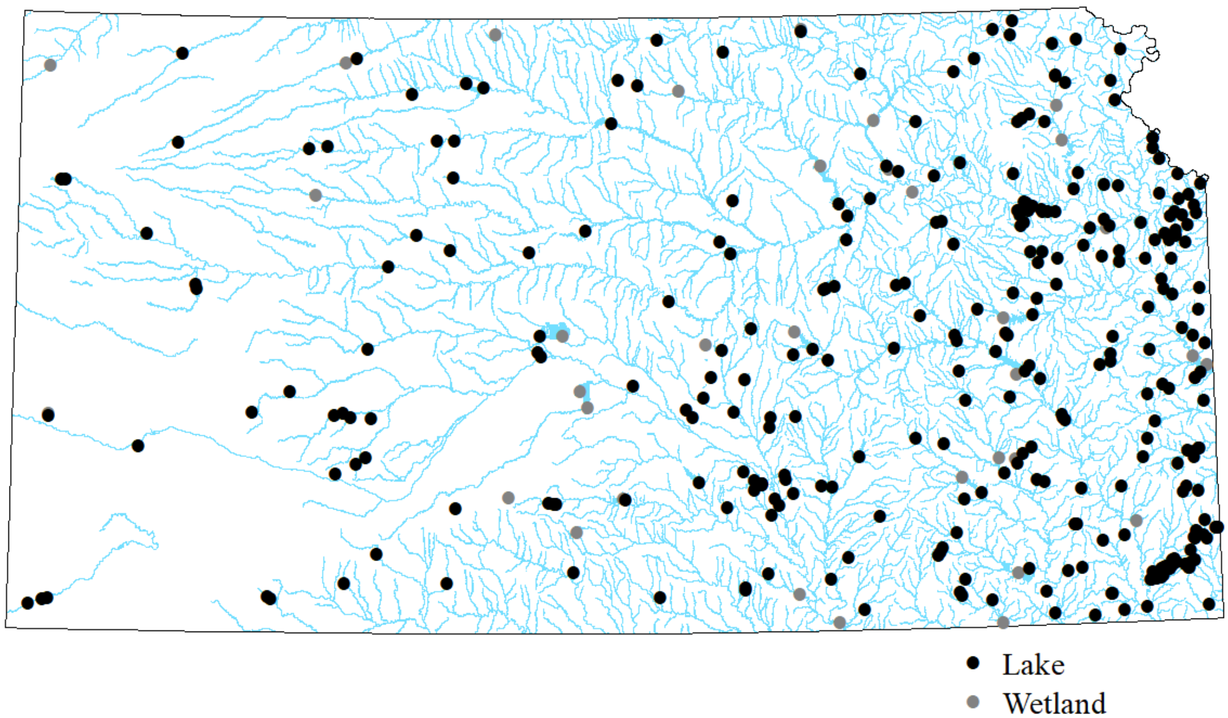


Figure 2. Targeted Lake and Wetland Monitoring Sites

As of December 2019, baseline water quality information is obtained from a dynamic ambient sampling network of 227 selected lakes and wetlands distributed throughout the state (**Figure 2**). These include all 24 federal lakes, most state-administered fishing lakes (those with open water in the majority of years), various other state, county, or locally owned lakes, several privately owned but publicly accessible lakes (primarily for water supply), and six state or federally owned wetlands. In addition to the lakes and wetlands routinely monitored in this program, other standing waterbodies have been subjected to less intensive investigation throughout the program's tenure. A number of waterbodies were evaluated from a single survey for basic water chemistry, nutrient and trophic status, and water clarity. In other cases, physicochemical and biological data were collected from surveys occurring prior to the most recent six-year rotating sampling period. Inclusion of these sites in the current assessment is limited to results tied to the trophic status of the waterbody at the time of evaluation.

Because only a small number of Kansas lakes are natural in origin, an effort has been made to identify artificial lakes in minimally disturbed/developed watersheds to serve the function of reference systems. This program routinely shares a large amount of data and expertise with other agencies and organizations involved with lake and wetland management, environmental restoration, water quality monitoring, and environmental education. Additional collaborative efforts have addressed the abatement of toxic algae blooms and taste/odor problems in public water supplies.

II. TARGETED STREAM CHEMISTRY MONITORING PROGRAM

The department's stream chemistry monitoring program, specifically the stream chemistry sampling network, comprises over three hundred monitoring sites that survey water quality conditions in all the major river basins and physiographic regions throughout Kansas (**Figure 3**). This program's monitoring operations provide critical information for environmental protection, overall quality assessment, and evaluation relative to deviation from historical hydrological conditions. They play an important role in the development and refinement of TMDLs for 303(d)-listed streams. **Appendix A** provides a list of the routine and supplemental water quality parameters analyzed by the targeted stream chemistry program.

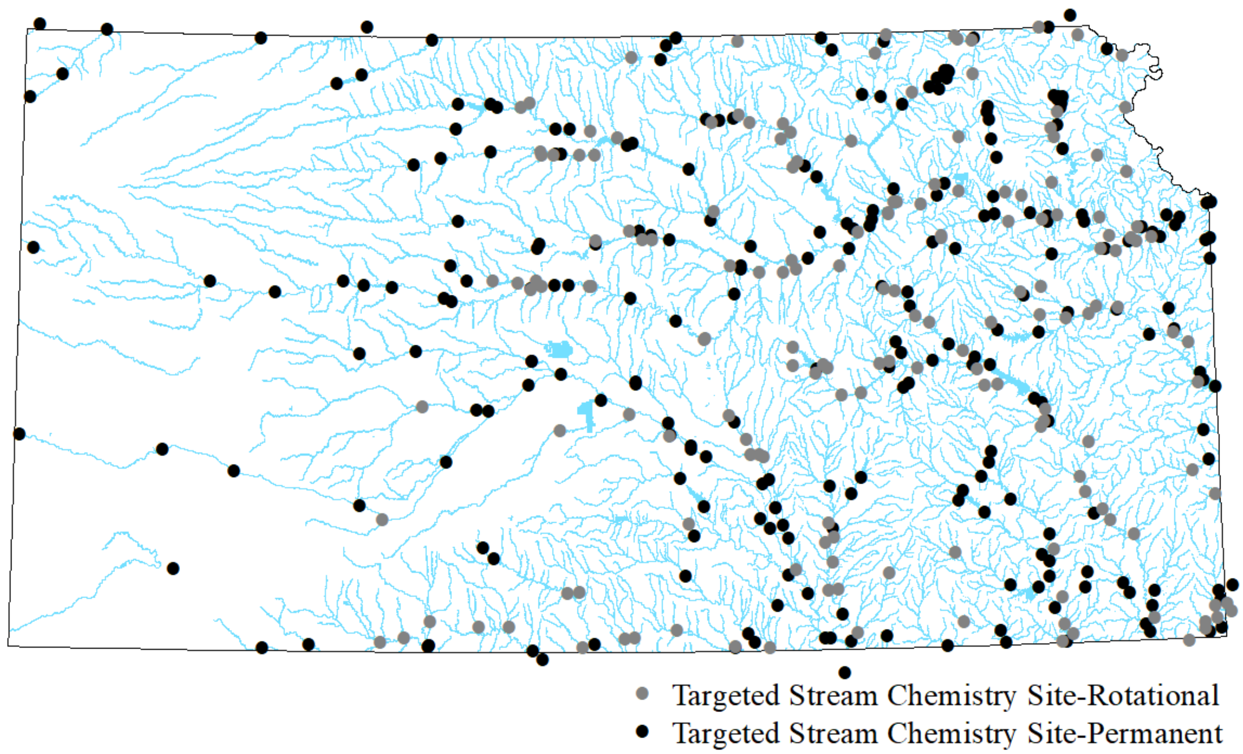


Figure 3. Targeted Stream Chemistry Monitoring Program Sites

On a quarterly basis, data on stream chemistry are obtained from over 200 monitoring stations. In a given year, staff of the BOW Watershed Planning, Monitoring and Assessment Section visit 162 permanent sites (monitored every year) and approximately 42 rotational sites (monitored every fourth year). These sites represent water quality conditions in targeted watersheds or specific stream reaches that are typically located near the lower terminus of eight-digit hydrologic unit code (HUC) watersheds. For example, some sites reflect water quality conditions in streams as they enter or exit Kansas, others represent conditions above or below major WWTFs, urban areas or reservoirs, and still others reflect water quality conditions in predominantly rural watersheds. A few "minimally altered" and several "least impacted" reference streams are included in the network to gain a better understanding of baseline water quality conditions in various ecoregions (Chapman, et al. 2001). As currently configured, the network provides water quality information useful to characterizing pollutant loadings from more than 97 percent of the state's contributing drainage area.

The program database comprises over two million records representing nearly 400 active and inactive monitoring locations and approximately 100 different analytical parameters. The Stream Chemistry Monitoring Program is the longest running environmental monitoring operation administered by KDHE; some records in the database date to the late 1960s, and several monitoring sites have a continuous period of record extending from that time to the present **(KDHE 2020d)**.

III. TARGETED STREAM BIOLOGICAL MONITORING PROGRAM

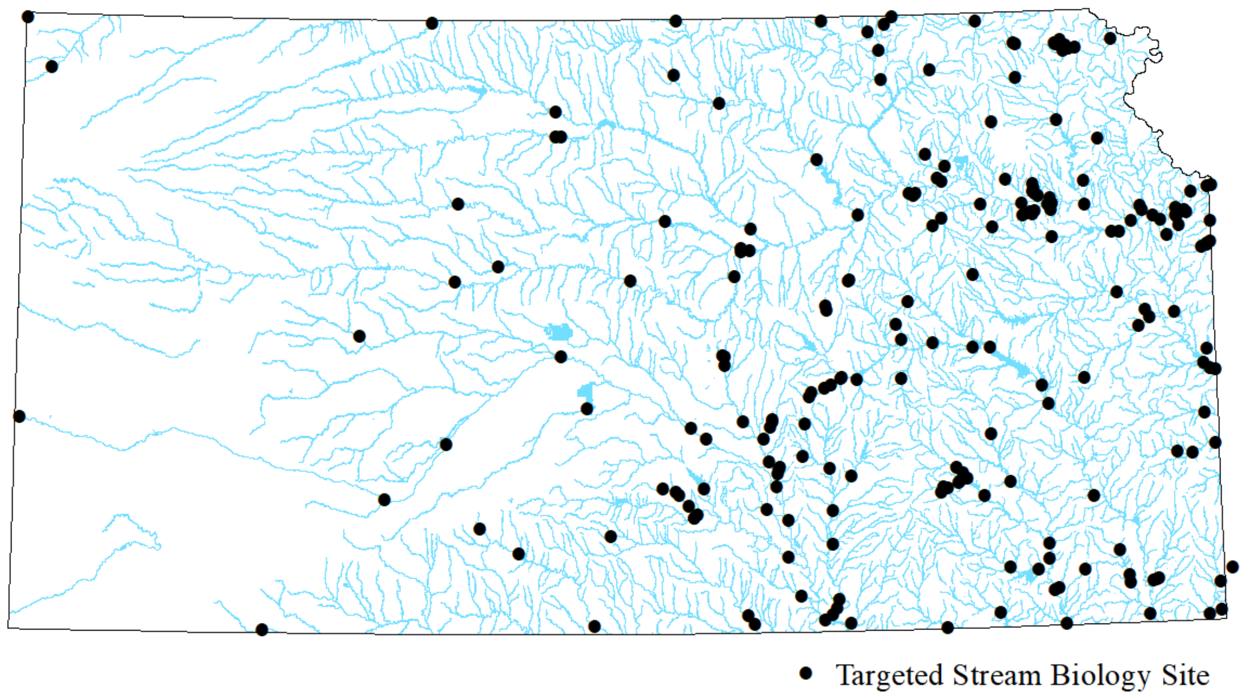


Figure 4. Targeted Stream Biological Monitoring Program Sites

To assess biological condition (health), the Stream Biological Monitoring Program examines the structural attributes of aquatic macroinvertebrate assemblages to provide a more refined picture of the ecological status of streams (KDHE 2020c). Unlike water chemistry measurements alone, which reflect conditions occurring at the moment of sample collection, biological monitoring provides an integrated measure of environmental condition over time frames ranging from weeks to years, depending on the biological assemblage of interest. The majority of the program's monitoring sites are also Stream Chemistry Monitoring Program sites. Fewer biological monitoring stations can be visited throughout the year than chemistry stations; however, combining biological and chemical sampling at selected key sites provide a more complete picture of ecological status than either method alone. Samples normally are obtained from 45-65 network sites each year as dictated by TMDL development needs, special projects, or other regulatory considerations.

Over the course of 40 years, the program has developed a sampling network that includes 222 current and historical monitoring sites distributed throughout the state (**Figure 4**). Some stations have been sampled annually for the entire period of record. The program's database currently contains over 80,000 predominantly genus/species level records (over 501,000 individual organisms), and a separate freshwater mussel database contains approximately 15,000 high resolution records. Data from this program are used primarily in the development and refinement of TMDLs for 303(d)-listed streams and special studies.

IV. PROBABILISTIC STREAM MONITORING PROGRAM

Probabilistic sampling is a method of environmental monitoring that yields statistically valid representative information on the physical, chemical, and/or biological condition of natural resources. It differs from conventional targeted sampling in that probabilistic monitoring stations are a randomly selected subset of the resource as a whole. In Kansas, stream chemistry and stream biological monitoring programs traditionally have employed a targeted monitoring design that positions stations in a deliberate and strategic manner (*e.g.*, near the terminus of a specific watershed or above and below a discrete pollution source). Although these programs are of critical importance in determining site- and watershed-specific water quality conditions, funding and logistical constraints limit the number of targeted sites that can be sampled on an ongoing basis. In contrast, probabilistic monitoring focuses on the total resource rather than the individual monitoring locations. Results generated from this approach can be extrapolated with known confidence to the state's entire population of streams, including hundreds of smaller waterbodies (*e.g.*, headwater streams) largely outside the purview of the targeted monitoring programs.

In 2004, KDHE participated in USEPA's National Wadeable Streams Assessment and gained a familiarity with the application of probabilistic sampling designs and associated field methods (USEPA, 2006 and http://water.epa.gov/type/rsl/monitoring/streamsurvey/index.cfm). In 2005, availability of supplemental monitoring funds under section 106(b) of the CWA allowed KDHE to establish a probabilistic monitoring program. This effort was formally implemented in June 2006 under the auspices of the newly created Kansas Stream Probabilistic Monitoring Program (SPMP).

Probabilistic stream monitoring addresses 305(b) data needs, whereas targeted monitoring serves as the primary basis for 303(d) list development, TMDL formulation, and NPDES permit review and certification. Although site selection procedures for the probabilistic and targeted monitoring programs differ substantially, many field methodologies developed for the targeted programs have been integrated with little alteration into the probabilistic program. This decision has maintained methodological continuity across programs and facilitates inter-program data comparisons.

The SPMP sampling network is predicated on a random, but spatially balanced, site selection process (Kaufmann, et al. 1991, Messer, Linthurst and Overton 1991, Larsen, et al. 1994, Urquhart, Paulsen and Larsen 1998, Herlihy, Larsen, et al. 2000, Herlihy, Stoddard and Burch-

Johnson, The relationship between stream chemistry and watershed lend cover data in the mid-Atlantic region, U.S. 1998). Site coordinates are based on the random selection of points from the universe of classified stream segments identified in the most recently approved version of the Kansas Surface Water Register (KSWR) (KDHE, 2010a). This register represents all potential sampling locations or "the sampling frame." It is subject to incremental change over time owing to the deletion or addition of classified stream segments (KAR, 2004; KDHE, 2012c). In effect, an infinite number of potential sampling sites can be selected from the KSWR, allowing a manageable subset of about 30–50 newly selected sites to be sampled each year. Additional details are given in the SPMP quality assurance management plan (KDHE 2017).

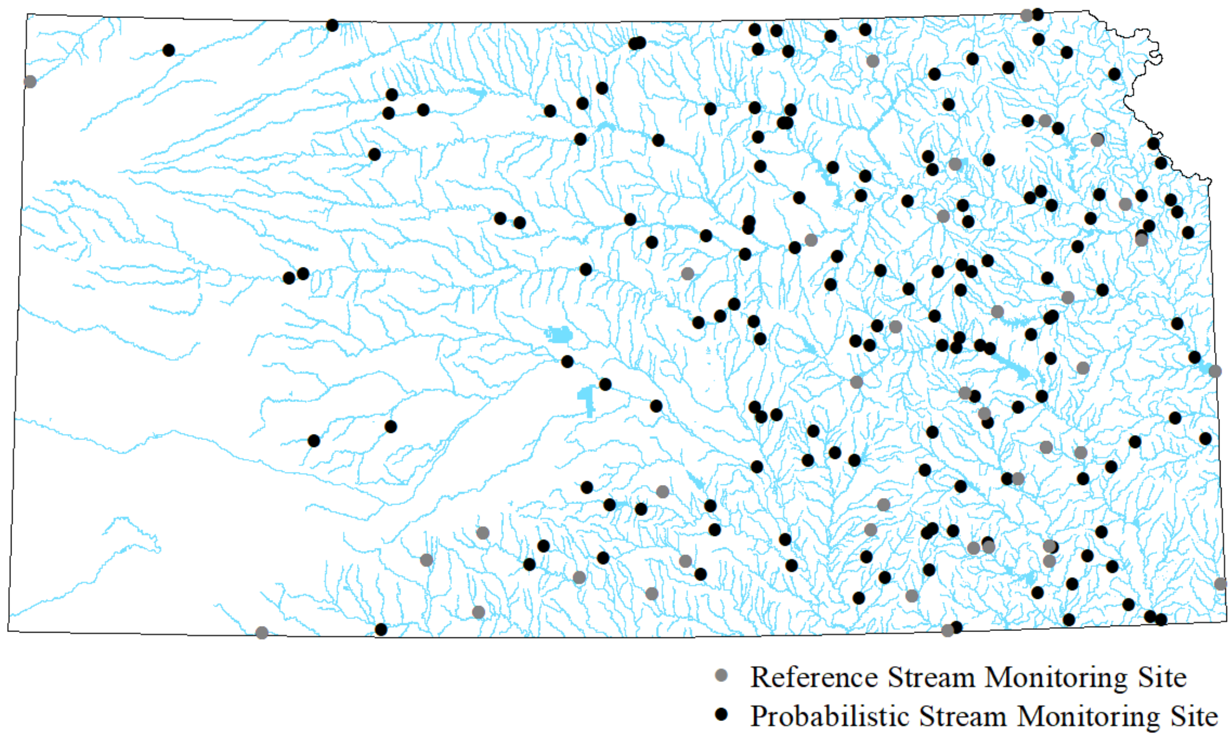


Figure 5. Probabilistic Stream Monitoring Sites, 2013-2017

In addition to the 30-50 probabilistically selected monitoring sites sampled each year, the SPMP maintains a network of 25-35 reference-quality stations, which are chosen to reflect least disturbed waterbody types across the full range of stream sizes, ecoregions (Chapman *et al*, 2001) and major river basins (**Figure 5**). These sites are sampled on an approximately biennial basis using the same methodologies as those used on probabilistic sites. Data from these sites are used to derive thresholds for macroinvertebrate assemblage metrics, which are then used to assess the general population.

Water chemistry samples are collected on a quarterly basis at each monitoring site; see **Appendix A** for parameters. During summer low flow of the same year, SPMP staff visit each site to sample the macroinvertebrate and phytoplankton communities. Physical habitat data also are collected to help discriminate between chemistry- and habitat-mediated constrains on the biotic community. The SPMP staff also obtains permissions to access a subset 12-20 of each year's sites that are on segments designated for food procurement. In cooperation with the Fish

Tissue Contaminant Monitoring Program staff, harvestable-sized edible fish are collected at these sites, and their tissue plugs are screened for mercury metals. (Note: the USEPA Regional Laboratory has discontinued analysis of other heavy metals and organic contaminants, so these are no longer assessed.)

As mentioned previously, SPMP personnel employ many field protocols developed originally for the targeted monitoring programs and continue to work closely with staff from those programs, sharing in training, sample collection, and quality control and quality assurance methods. These established protocols are robust, and their utility has been demonstrated over the course of several decades. Moreover, data comparability and consistency among monitoring programs may prove important to future statewide water quality assessments. The SPMP database currently contains over 26,000 high resolution (predominantly genus/species level) macroinvertebrate records for 2006-2017 and over 2,700 water chemistry records for the same time period. Separate databases house additional information on physical habitat, freshwater mussels, phytoplankton, and fish tissue.

V. FISH TISSUE CONTAMINANT MONITORING PROGRAM

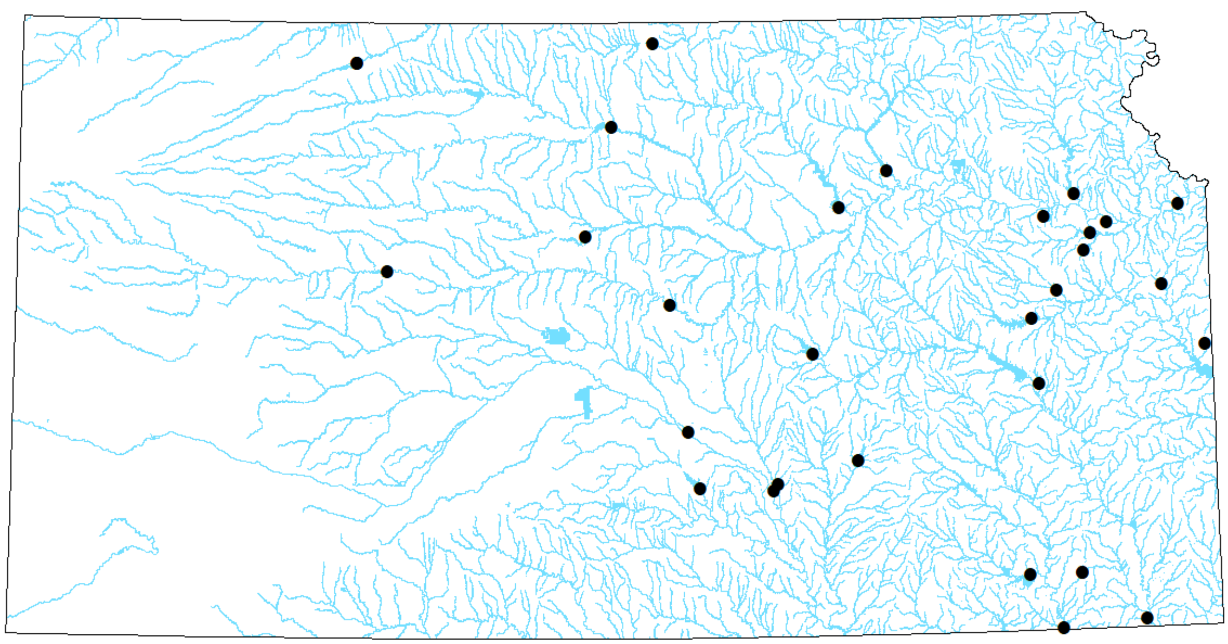


Figure 6. Targeted Fish Tissue Contaminant Monitoring Program Sites

The Fish Tissue Contaminant Monitoring Program obtains information on chemical contaminant levels in fish collected from streams and lakes in Kansas to inform the public of the potential health risks associated with consuming wild-caught fish in Kansas and to identify impaired fishable waters (KDHE 2020a). KDHE field staff collect the majority of samples used for reporting and advisories. Additional field support is sometimes provided by the Kansas Department of Wildlife and Parks and Tourism (KDWPT) and USEPA Region 7 staff. All methyl mercury samples are analyzed by the USEPA Region 7 Laboratory. Organic contaminant samples (**Appendix A**) were analyzed by the USEPA Region 7 Laboratory through the year 2014. Owing to safety concerns related to the preparation and homogenization process of whole-body composite samples, USEPA Region 7 Laboratory terminated the organic contaminant analysis. Thereafter, all organic contaminant samples supporting fish consumption advisories have been analyzed by private contract laboratory services for chlordane, DDT, and PCBs only due to budgetary constraints. The fish tissue database, which includes data from both the targeted Fish Tissue Contaminant Monitoring Program and the Stream Probabilistic Monitoring Program, currently comprises over 25,000 records from more than 360 lake, stream, and river sites.

Fish tissue samples are usually obtained from 30-50 waterbodies each year, utilizing both targeted and probabilistic sampling designs. Targeted sampling efforts focus on tracking long term contaminant trends among legacy contaminants such as PCBs and chlordane, waterbodies with known or suspected contamination, existing advisory sites, and waterbodies where fish are heavily harvested by the fishing public. Probabilistic samples from streams, selected by and collected in collaboration with the Stream Probabilistic Monitoring Program, provide unbiased data in fulfillment of 305(b) reporting requirements and serve a screening function for ascertaining contaminant patterns that may potentially affect human and wildlife consumers.

KDHE utilizes data consisting of whole body composite organic contaminant samples, fillet composite organic contaminant fillet samples, and mercury fillet plug (biopsy) samples to evaluate potential human health concerns related to mercury, organochlorine pesticides, and PCBs, in part to track long term trends as well as areas with known problems (Arruda, Cringan, et al., Correspondence between urban areas and the concentrations of chlordane in fish from the Kansas River 1987, Arruda, Cringan, et al., Results of follow-up chlordane fish tissue analysis from the Kansas River 1987, KDHE 1988, KDHE 1988). Risk is calculated using standard USEPA methods (USEPA 2000, USEPA 2000). The data are utilized for issuing, rescinding, modifying, or supporting local and state-wide fish consumption advisories. The consumption advisories are published at the beginning of each year jointly with KDWPT (KDHE 2020d, KDWPT 2020).

VI. COMPLIANCE MONITORING PROGRAM

As a National Pollutant Discharge Elimination System (NPDES) delegated state, Kansas has been issuing NPDES permits and conducting compliance sampling inspections since the mid-1970s. As of December 31, 2019, there were 903 NPDES permitted facilities in the state subject to monitoring by this program; see **Table 2.** NPDES permits contain specific and legally enforceable effluent limitations and self-monitoring requirements for flow measurement and sampling. The sampling frequency, the sample type (grab or composite), the parameter limitations, the analytical methods, and the reporting frequency are determined by the permitting agency (KDHE).

Self-monitoring data, provided by dischargers of pollutants, are submitted to KDHE by the permit holder at specified intervals and analyzed for parameters specified in the individual facility's NPDES permit. Additional parameters such as metals, nutrients, and organic compounds are frequently sampled to obtain additional information regarding effluent characteristics. Whole effluent toxicity samples have also been collected during compliance sampling. Compliance monitoring includes all field activities conducted to determine the status of compliance with permit requirements. A compliance sampling inspection will accomplish one or more of the following objectives:

- Verify compliance with effluent limitations;
- Verify self-monitoring data;
- Verify that parameters specified in the permit are consistent with wastewater characteristics;
- Support permit re-issuance and revision; and,
- Support enforcement action.

The scope of the Compliance Monitoring program is statewide. Any discharging NPDES permit holder may be subject to compliance monitoring. Facilities are selected by KDHE Bureau of Water regulatory personnel. Program staff currently monitor 20 to 30 facilities per year. During 2018-2019, 46 facilities were visited. From the discharging municipal and industrial mechanical and treatment systems, 384 analytes were sampled and evaluated against NPDES permit limits. A total of nine analytes in the discrete sampling were found to be in exceedance of permit limits at the time of sampling. Of those, four analytes were in violation of complying with applicable permit requirements at one facility during a compliance assurance follow-up. This facility has hired a private consultant to identify the causes of noncompliance and implement immediate and long-term remedies that will help achieve permit compliance. Compliance monitoring data are stored in a stand-alone database on a secure agency data server and shared with the BOW Industrial Program Section.

These observed exceedances in addition to self-monitoring data are also used to investigate actual instream violations of Kansas Surface Water Quality Standards, the vigilance of the Compliance Monitoring Program safeguards the surface waters of the state by ensuring accountability of permitted dischargers.

VII. SUBWATERSHED MONITORING PROGRAM

The Kansas Subwatershed Water Quality Monitoring Program (SWMP) was established in 2010 as a cooperative effort between KDHE's Watershed Management Section and stream monitoring programs of the Watershed Planning, Monitoring and Assessment Section (KDHE 2014). It is a cross-program initiative staffed by personnel from pre-existing long-term monitoring programs. The SWMP employs a water quality monitoring strategy that assesses nonpoint pollution on a subwatershed scale and was designed to track water quality improvement in selected HUC-12 subwatersheds over time (**Figure 7**).

Monitoring efforts target specific Kansas watersheds that have active Watershed Restoration and Protection Strategy (WRAPS) project areas. All the WRAPS projects have detailed plans to address water quality impairments associated with nonpoint source pollutants identified in Total Maximum Daily Load (TMDL) evaluations. The WRAPS plans strategically target particular geographic areas for implementation of agricultural BMPs, which are designed specifically to address nonpoint source pollutants related to TMDLs.

From 2010 to 2015, the SWMP completed five years of monitoring to establish a water quality baseline for the first set of fifteen subwatersheds. The next set of nine subwatersheds has been selected, and monitoring on those sites began in 2016 and is scheduled through 2020. The baseline water quality data obtained from these subwatersheds will be compared to future monitoring data, in order to document load reductions attributable to the implementation of Best Management Practices.

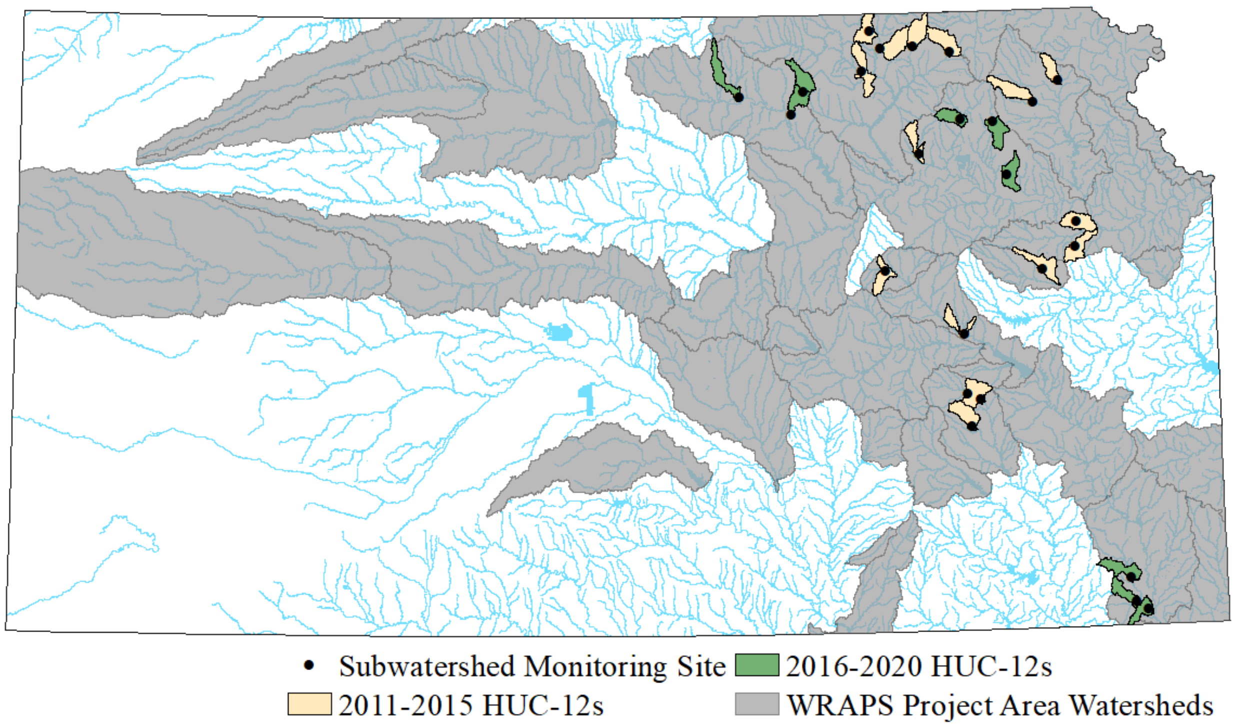


Figure 7. Subwatershed Monitoring Program Sites

VIII. SPECIAL PROJECTS

Coupled with ongoing efforts to protect the physical, chemical, and biological integrity of the waters of the state, KDHE performs special water quality investigations in support of TMDL studies to strengthen mitigative and enforcement decisions implemented by the department. KDHE is actively working on two projects directly related to wastewater treatment facilities and two other special projects:

1. As construction is planned for new wastewater treatment plants, KDHE collects chemical and biological data above and below the planned outfall. This establishes a baseline to evaluate the impacts of the new plant discharges into the receiving stream once operations commence.

2. KDHE added new biological monitoring sites on streams to evaluate improvements in wastewater nutrient removal and non-point source abatement efforts triggered by newly developed TMDLs. The biological data are used to support evaluation of TMDL endpoints and inform the next iteration of TMDL implementation efforts by the point and

non-point sources discharging nutrients to the streams.

3. The Stream Probabilistic Program staff are working in cooperation with USEPA Region 7 staff to collect baseline biological, thermal, and hydrologic data from four sites in Kansas as part of the Regional Monitoring Network (RMN) initiative. The scientific information gathered from the Kansas sites will augment data collected across other regions of the country to help to quantify and detect changes in conditions in higher quality stream systems. Macroinvertebrate and algae samples were collected at two sites (RMN03 and RMN04) in 2018. In 2019, no macroinvertebrate samples or habitat evaluations were completed on RMN sites, but discharge and HOBO data logger information (continuous record of both temperature and pressure for both air and water) were collected twice from every RMN site.

4. During the summer and fall periods in 2019, the Fish Tissue Contaminant Monitoring Program staff, in cooperation and coordination with KDWPT, participated in environmental sampling activities to determine the level of mercury present in harvestable-size blue catfish and what consumption levels of the contaminant are safe for our most sensitive population. The blue catfish tissue sampling was stratified by water body based on the presence and absence of zebra mussels. Three water bodies (zebra mussel absence) were targeted for sampling; and, four water bodies (zebra mussel presence) were targeted. An additional site on the Kansas River was sampled to evaluate the mercury levels in harvestable sizes of blue catfish in a river setting.

Assessment Methodology

I. 305(B) ASSESSMENT METHODOLOGY FOR STREAMS

Overview

The target population for the 2020 probabilistic stream assessment comprised that portion of the Kansas Surface Water Register (KSWR) stream extent that contained water during the summer low-flow periods of 2013-2017. The sampling frame used to select sites was drawn from a survey design based on the December 12, 2013, version of the KSWR (KDHE 2013), which represents an extent of approximately 30,278 stream miles, based on a 1:24K resolution. This includes perennial rivers and streams as well as intermittent streams that provide important refugia for aquatic life.

The survey design was generated by the USEPA design team in Corvallis, Oregon (Olsen, Kansas statewide stream survey design. March 11, 2009. 2009), using the methods and assumptions of Stevens and Olsen (Stevens and Olsen, Spatially balanced sampling of natural resources 2004). All desk and field reconnaissance was performed by SPMP personnel, along with securing landowner permissions. The target population was determined to comprise 18,031 stream miles, or about 60% of the KSWR. The target population for assessment of the Food Procurement use was 15,115 miles, or about 68% of the mileage so designated. Data collected during 2013-2017 were used to assess the prevailing level of support for CWA section 101(a) uses (**Table 5**). A few probabilistic sites from the 2013-2014 National Rivers and Streams Assessment were also included; these are based on the same target population and compatible with the state survey design.

The likely capacity of a given stream reach to provide for recreation, food procurement, and aquatic life support was determined by considering the local water chemistry, fish tissue chemistry, suspended bacterial concentrations, and condition of the benthic macroinvertebrate community. Monitoring sites meeting the applicable water quality criteria or diagnostic thresholds for a given use were deemed "fully supportive" of that use. Any site failing to meet these criteria or thresholds was deemed "non-supportive" of the use. Note that the quantity of data and assessment methodologies used here are sufficient for a screening-level assessment for 305(b) purposes but are not sufficient to support a 303(d) impairment listing or to issue state advisories or warnings.

Table 5. Types of data applied to assessment of designated use support for streams and rivers, 2013-2017

Designated Use	Macroinvertebrate Community Structure	Water Chemistry	*E. coli* Concentrations in Water Samples	Mercury in Fish Tissue
Aquatic Life	X	X		
Recreation			X	
Food Procurement				X
Overall	*X*	*X*	*X*	*X*

Causes and sources of nonsupport are rarely known definitively, but in most cases were inferred and assigned conservatively using best professional judgment and a variety of data sources. Data sources and considerations included: prevalence and proximity of upstream point sources, nonpoint sources, spills, construction, and any other relevant anthropogenic activities or influences, point source performance during the reporting period (if known), dominant land uses within the watershed and near the sampling location, chemical profiles of water samples, and any instream manifestations reflecting degraded water quality (substrate characteristics, bank instability, algal overgrowth, presence or recent evidence of livestock in the stream channel, effluent odors, *etc.*), along with considerations of any known recent extreme weather events, such as drought or flood.

Causes have been assigned at the most proximal identifiable level (*i.e.*, the most directly observable parameter or condition), and sources are the anthropogenic and environmental stressors to which the conditions may be most logically attributed. Sources, too, were assigned at the lowest causal level possible, to minimize the degree of uncertainty in conclusions.

Aquatic Life Use

The aquatic life use assessment considered stream macroinvertebrate data and water chemistry data from 162 randomly chosen sites (**Figure 5**). A site was deemed fully supportive for aquatic life only if both the macroinvertebrate community structure and the water chemistry indicated support.

In assessment of the macroinvertebrate community, primary use support was determined using the raw site scores for four of the biological metrics used by the Stream Biological Monitoring Program. These metrics are: macroinvertebrate biotic index (MBI), nutrient-organic Kansas biotic index (KBI), Ephemeroptera-Plecoptera-Trichoptera index (EPT), and percent EPT specimens with respect to total macroinvertebrate abundance (%EPTCNT). (Huggins and Moffett, 1988). A fifth metric, Total Taxa (TOTTAX), was used as a tiebreaker when other metrics were equivocal.

Support thresholds for these metrics were derived from an analysis of 56 samples from 37 reference streams, all sampled during the 2013-2017 assessment period (**Figure 4**). Reference were partitioned into three streamflow categories (<10 cfs, n=16; 10 to 99 cfs, n=15; and ≥100 cfs, n = 6) using 10-year median discharge estimates for the KSWR segment on which each site falls (Perry *et al.*, 2004). Probabilistic sites were assigned to these same categories using the same criteria. Within each flow category, support thresholds for the biological metrics were set at the mean values for reference populations which is a standard method for threshold setting (USEPA October 2011). This procedure effectively adjusted the expected performance of each monitored stream reach on the basis of stream size, *e.g.*, a small stream would not be expected to support the same number of EPT taxa as a large river, but it would be expected to perform as well as a similarly sized stream in the absence of environmental stressors. Support thresholds derived from this process are presented in **Table 6.** For some metrics (MBI and KBI), a higher number indicates a more degraded site; for others (EPT, %EPTCNT, TOTTAX), a lower number typically indicates a more degraded site.

Table 6. Aquatic life use non-support thresholds for biological metrics across three stream classes

Flow Group	MBI	KBI	EPT	%EPTCNT	TOTTAX +
< 10 cfs	> 4.60	> 2.81	< 7	< 33	< 37
10-99cfs	> 4.68	> 2.77	< 10	< 38	< 42
≥ 100 cfs	> 4.29	> 2.62	< 14	< 61	< 33

+ Secondary metric, used as a tiebreaker

Scores for probabilistic sites were compared to the flow-adjusted thresholds and assigned a value of 0 (non-support) or 1 (full support). These values were averaged across the four primary metrics to obtain a final average value for each site. If an average support value exceeded 0.5, the site in question was deemed fully supportive of the aquatic life use. If an average value was less than 0.5, the site was considered non-supportive of the aquatic life use. If an average value was exactly 0.5, the “total taxa” metric was used as a tiebreaker to determine support.

Water quality was also used to determine aquatic life support. Kansas has separate numeric water quality criteria for chronic versus acute water quality conditions as they relate to aquatic life (KDHE 2015). Data were scored against both sets of criteria. Exceedances of chronic water quality criteria for inorganic parameters were excluded if they were determined to have occurred during unstable-flow periods. Natural background concentrations of certain parameters, *e.g.*, chloride or sulfate, for individual stream segments, if applicable, were also taken into account during scoring of exceedances. (These are the same values used in approved TMDLs). If pollutant or parameter concentrations were found to exceed a given acute or chronic aquatic life criterion in greater than 25% of samples, the site in question was deemed non-supportive of the aquatic life use.

Contact Recreation Use

All probabilistic sites were assessed for recreational use support based on measured suspended concentrations of *Escherichia coli*. This bacterium is part of the normal intestinal fauna of humans and many other warm blooded animals. It is utilized in many water quality studies as a general indicator of fecal contamination. For formal (*e.g.*, 303(d)) regulatory purposes, bacteriological criteria generally are applied as geometric mean concentrations, calculated using data from at least five different samples collected in separate 24-hour periods during a 30-day assessment window (K.A.R. 28-16-28d-e). The frequency and timing of the SPMP sample collections did not meet these rigid requirements. Therefore, the results reported below for the state as a whole (*i.e.*, pursuant to section 305(b) of the CWA) were based on seasonal samples collected from each probabilistic site over the course of a single year.

Based on studies use assessment studies performed by KDHE (mostly from 2001 to 2009), each stream segment listed in the KSWR has been assigned to one of four recreational use categories, two primary and two secondary, depending on stream size, extent of public access, and other use attainability considerations (KDHE, 2012c). *Escherichia coli* data from each probabilistic site were compared to the applicable criterion concentration. Many of these sites were designated for secondary contact recreation only, in which case all available data were combined and the geometric mean was compared directly to the appropriate criterion concentration. Sites designated for primary contact recreation were evaluated with respect to recreational season (primary contact, April 1 – October 31; secondary contact, November 1 – March 31), and the geometric mean for each season was compared to the appropriate criterion concentration (**Table 7**). If the geometric mean exceeded the applicable criterion concentration during the recreation season, it was considered a "fail," and the monitoring site in question was deemed non-supportive of the recreational use.

Table 7. *Escherichia coli* criteria used in recreational use assessments

Use	Colony Forming Units (CFUs)/100mL	
Primary Contact Recreation	Geometric Mean April 1 – Oct. 31	Geometric Mean Nov. 1 – March 31
Class B	262	2,358
Class C	427	3,843
Secondary Contact Recreation	Geometric Mean Jan. 1 – Dec. 31	
Class a	2,358	
Class b	3,843	

Food Procurement Use

Of the 165 probabilistic stream sites sampled during 2013-2017, 152 fell on segments designated or proposed for food procurement and thus were regarded as viable candidates for collection of harvestable size and species of fish. At each site, personnel endeavored to collect three to five bottom-feeding fish species (*e.g.*, channel catfish, common carp), preferably the same species and size class, and another sample of an open-water predatory species (*e.g.*, largemouth bass), with the same species/size constraints.

Through 2015, USEPA Region 7 laboratory analysis capacities limited sampling to about 15 sites per year. Additionally, some sites on segments designated for food procurement do not yield adequate samples, due to weather, safe access, or other conditions. Thus, fish tissue samples were obtained from 99 of the 152 candidate sites (**Figure 4**). The sites that did yield samples are assumed to be an unbiased subset of the total, so the proportions of support and nonsupport in the sampled population are used to represent the extent designated for food procurement.

Beginning in 2012, the USEPA Region 7 laboratory began accepting only tissue plugs for mercury; thus, this assessment is based solely on plug data. Non-carcinogens such as mercury are evaluated using USEPA health endpoints for chronic systemic effects. Assumptions for risk calculation included consumption of fish tissue over the duration of an average human lifetime, average adult body weight, and eight-ounce meal portions. For measurements based on individual plugs, the following rule was used: Both an average and a median were calculated for top predators from a given site, and these values were also calculated for bottom feeders. If any of these four values (*i.e.*, the mean or median concentration in either sample) was found to surpass the applicable threshold concentration, the site in question was deemed non-supportive of the food procurement use.

Population Extent Estimation

Data from the 165 sites assessed for aquatic life and contact recreation, along with data from the 99 site subset assessed for food procurement, were used to derive extent (i.e., mileage) estimates for the target population as a whole. If a site failed to support any single designated use, it was considered non-supportive overall. The design team at the USEPA Western Ecology Division provided the population extent and variance estimates given in this report (personal communication, Tom Kincaid and Tony Olsen), using the "R" programming environment (http://www.r-project.org), the most current "sp" and "spsurvey" custom software modules (http://www.epa.gov/nheerl/arm), and the methods and assumptions of Diaz-Ramos, Stevens, and Olsen (Diaz-Ramos, Stevens and Olsen 1996, Stevens and Olsen, Variance estimation for spatially balanced samples of environmental resources 2003).

II. 305(B) AND 314 ASSESSMENT METHODOLOGY FOR LAKES AND WETLANDS

Assessment of use support for public lakes and wetlands includes physical, chemical, and biological data. Wetlands are assessed for their support of Aquatic Life, Fish Consumption, and Secondary Contact Recreation. Lakes are assessed for these same uses as well as Primary Contact Recreation, Domestic Water Supply, Irrigation, and Livestock Water Supply. Both lakes and wetlands are characterized in terms of trophic status and subject to evaluation of trends over time. Details of the assessment methodologies are presented alongside the findings in the Results section of this document.

III. 303(D) ASSESSMENT METHODOLOGY

Overview

The 2020 list of impaired (Category 5) waters builds upon listings developed in 2018. A complete description of the procedures and assumptions applied during the preparation of this list is provided by the report, "Methodology for the Evaluation and Development of the 2020 Section 303(d) List of Impaired Water Bodies for Kansas," which reflects the state's submissions effective as of March 30, 2020, is published at http://www.kdheks.gov/tmdl/methodology.htm.

Development of the 2020 list relied primarily on data from targeted water quality monitoring programs administered by BOW and described elsewhere in this report. The statewide water quality assessment prepared by BOW pursuant to section 305(b) of the CWA also provided initial waters for listing lakes and wetlands, and long-term routine targeted monitoring of stream chemistry and stream biology provided initial data for listing streams. BOW then performed more extensive follow-up analyses, particularly on stream chemistry and stream biology, as the final basis for identifying and listing impaired waters in Kansas.

Stream chemistry data were obtained from the statewide network of targeted permanent monitoring stations (assessment period January 1, 2000 through September 30, 2019) and rotational stations (assessment period January 1, 1990 through September 30, 2017). To assess the chronic category of aquatic life, analysis for conventional pollutants generally used binomial techniques, calculated to estimate no more than 10% excursions, and adjusted to minimize Type II errors. Analysis for the aquatic life acute category or for toxics (acute or chronic), impairment is indicated by the frequency of digressions greater than once every three years. Streams suspected of being impaired by excessive total phosphorus or total suspended solids were identified by median concentrations exceeding screening values. *Table 5* in the 303(d) assessment methodology document details the methodologies used for specific pollutants based on their designated use.

Watersheds monitored by the individual stream chemistry stations comprise multiple stream segments as an assessment unit for the purposes of the 303(d) program. Waters flowing directly into some large reservoirs were not surveyed as part of the stream chemistry monitoring network, instead being assigned to the assessment unit associated with that reservoir.

The public notice for the 2020 draft 303(d) list provides a mechanism for soliciting all readily available and existing water quality data from other agencies. In most cases, any submitted data corroborated the conclusions reached from the corresponding KDHE data. The public comment period ended March 27, 2020. No comments were received from the public which required modification of the list. The final 303(d) list, submitted to USEPA, effective March 30, 2020, identifies 486 station/pollutant Category 5 water quality impairments encompassing approximately 2,278 stream segment/pollutant combinations

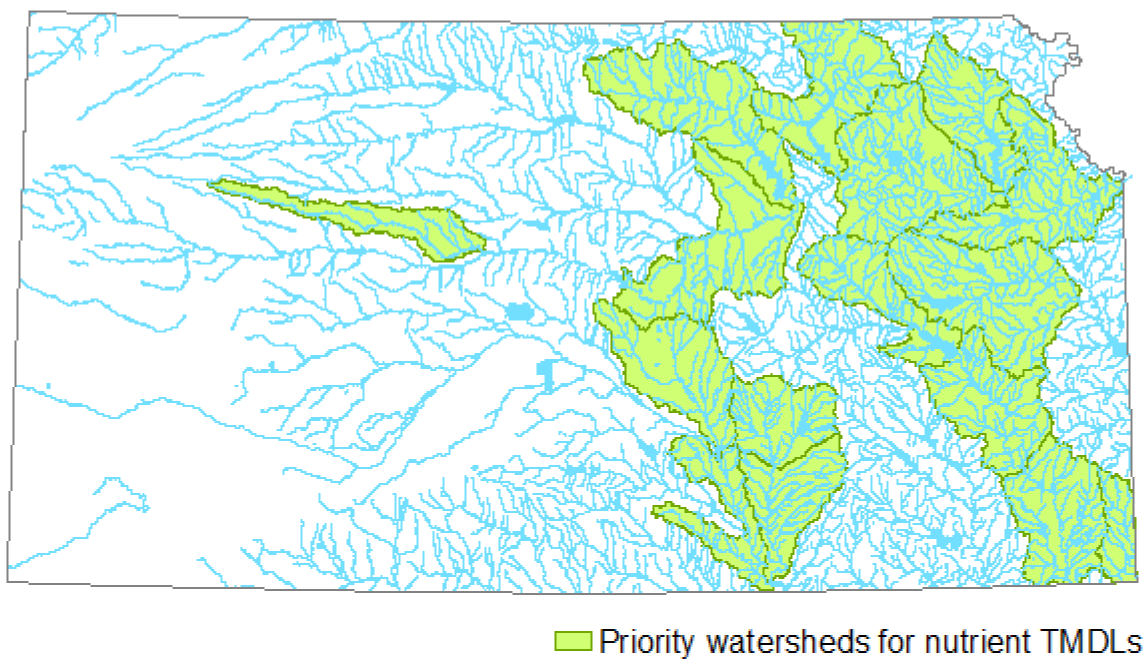
Priorities and Schedules; Introduction of the Kansas TMDL Vision

From 1999 to 2013, TMDL development efforts in each of the state's 12 major river basins adhered mostly to a five year rotational schedule. With the emergence of a Kansas TMDL Vision, however, significant alteration in scheduling was made for the years 2014-2022, to harmonize with the approach supported by USEPA's national TMDL Program. Kansas' TMDL Vision is tied to KDHE's Nutrient Reduction Framework and places focus on streams with phosphorus or nitrate impairments within 16 HUC8s deemed as high priority, see **Figure 6.**

The targeted HUC 8s and impaired streams intended for TMDLs in 2020-2021 are the Little Arkansas (11030012), Middle Arkansas-Slate (11030013), Lower Republican (10250017), Lower Smoky Hill (10260008), Delaware (10270103), Lower Big Blue (10270205), and Lower Little Blue (10270207).

As time permits, secondary impairments caused by excessive nutrients including pH, deficient dissolved oxygen, or lake eutrophication may also have TMDLs developed within the priority 16 HUC8 sub-basins. This priority schedule means that no TMDL development will be conducted in other basins of the State in the near future. Additionally, current plans are that impairments other than nutrients will be deferred until the 2014- 2022 nutrient reduction TMDL work is completed. The framework for Kansas' 303(d) prioritization under the national TMDL Vision is available at: http://www.kdheks.gov/tmdl.

Figure 6. Sixteen priority watersheds for nutrient TMDL development 2014-2022



Tracking Previously Listed Waters

The 2020 303(d) list also identifies waters from previous lists that were once impaired by a pollutant (Category 5) but that are now placed in other listing categories established by USEPA. Waters with approved, established TMDLs are placed in Category 4a. Waters in Kansas that were cited as impaired on the 1998-2018 303(d) lists (http://www.kdheks.gov/tmdl/planning_mgmt.htm) that remain impaired but now have a TMDL established for them have been removed from Category 5 and placed into Category 4a.

A small number of water bodies have been designated as Category 4b, meaning their particular impairments have been addressed by some means other than development of a TMDL. Previous Category 4b waters addressed through the appropriate limits, schedules of compliance, and other conditions placed on NPDES permits and are now achieving the respective water quality criteria have been placed in Category 2, which is reserved for those Kansas waters that were once impaired, but whose water quality has subsequently been restored to meet standards. Effluent quality data from individual facility discharge monitoring records, corresponding water quality data at downstream monitoring stations, and special monitoring efforts upstream and downstream of selected facility outfalls support the transfer of those waters to Category 2.

Atrazine impairments in a limited number of water bodies in the Little Arkansas River watershed have been addressed through implementation of a WRAPS watershed plan. Continuation of Category 4b status is contingent upon ongoing efforts and results to abate atrazine loads in the selected subwatersheds of the Little Arkansas River. Because of the burden of proof placed on designated waters into Category 4b, it is unlikely that additional such entries will be made into that category. Other WRAPS groups may address impairments through implementation of their watershed plans, but the impaired waters will remain in Category 5 until those impairments are remedied or a TMDL has been established.

A few stream systems in Kansas have been designated as Category 4c, which is used for waters impaired by factors other than pollutants (such as slurry spills, habitat limitations, or flow alterations). Biological impairment as defined by macroinvertebrate monitoring appears to be linked to pervasive low flows during drought, perhaps exacerbated by water diversions. The impairment is better suited for management through water allocation and water rights administration.

Category 3 is used by Kansas when there is uncertainty as to the impaired status of a given water body. Insufficient data exist to determine if the water is newly impaired, now restored, or continues to be impaired. Relatively new stations with small sample sizes would be placed in this category as would previously impaired waters that now are just barely compliant under the applicable analysis using recent data. Additional monitoring and subsequent analysis in coming listing cycles will move waters from Category 3 into Categories 2, 4a or 5.

Waters are placed in Category 2 as a result of successful restorative implementation, updated data, changes in water quality criteria, or the removal of certain designated uses through the Use Attainability Analysis process. In some cases, corrective actions on point and non-point sources of the pollutant have improved conditions to restore the applicable water quality standard. Ammonia and chlordane are two pollutants that reflect cases in which point source improvements (lowered ammonia) or an outright ban (chlordane in 1988) have resulted in measurable improvements in ambient stream concentrations, fish tissue concentrations, and biological monitoring results.

Any surface water that has not been cited as impaired in the past or present is designated as Category 1, signifying that all its designated uses are being fully supported. All category assignments are recorded by KDHE in electronic databases, with the most recent revision tied to the 2020 listing process and submitted to KDHE as part of the 2020 integrated report and 303(d) listings package.

Assessment Results

I. 305(B) ASSESSMENT RESULTS FOR STREAMS AND RIVERS (PROBABILISTIC DATA)

The 2013 Kansas Surface Water Register identifies all currently classified stream segments in Kansas (KDHE, 2013c). Represented at 1:24,000 resolution, these collectively represent about 30,278 stream miles and include both perennial and intermittent waters. During prolonged droughts, some of this mileage is expected to be nonviable for sampling purposes. In addition, any given intermittent segment may not contain sampleable water at a randomly chosen point along its length, especially during summer low-flow. Thus, the target sampling population is restricted to those reaches on classified stream segments that contain substantive aquatic habitats during the assessment period of interest. These habitats may include continuously flowing reaches, continuously wetted but non-flowing reaches, or isolated pools deemed capable of providing refugia for aquatic life.

Table 8. Probabilistic stream assessment fact sheet

Project Name	Kansas stream probabilistic monitoring program
Type of Waterbody	Stream or river
Units of Measurement	Miles
EPA Survey Design Project IDs	KS2010 and NRSA 2012-2013
Sample frame for assessment	Dec 12, 2013 edition of Kansas Surface Water Register
Designated Uses	Aquatic life, contact recreation, and food procurement +
Size of sample frame	30,278 miles for Aquatic Life 30,278 miles for Contact Recreation 22,235 miles for Food Procurement
Size of Target Population	18,031 miles for Aquatic Life 18,031 miles for Contact Recreation 15,115 miles for Food Procurement +
Percent nonresponse	0% for Aquatic Life and Contact Recreation 29% for Food Procurement
Indicators	Macroinvertebrate community assessments, water chemistry analyses, fish tissue mercury analyses, *E. coli* measurements
Assessment Date	March 28, 2020
Precision	95%

+ Food Procurement Use applies to only 73% of the Kansas Surface Water Register. For this assessment period, however, it applied to 84% of the target population. This is due to the underrepresentation of headwater & intermittent streams during drought periods.

Based on combined desk and field reconnaissance, the target sampling population during the summers of 2013-2017 was estimated at 18,031 stream miles or approximately 60% of the total classified stream mileage on the KSWR. This extent was assessed for support of Aquatic Life and Contact Recreation uses with chemical and biological data from 165 monitoring sites. As discussed previously, the food procurement use was assessed using fish tissue contaminant data from 99 sites. There were 53 sites that fell on segments designated for food procurement but for which samples were not obtained, due to laboratory capacity and/or fieldwork constraints; these are assumed to be an unbiased subset of food procurement sites in the FP population extent estimation. Similarly, the 120 sites that had water but were not sampled due to landowner denial were assumed to be an unbiased subset of the population as a whole. In addition, 186 nontarget sites were used in calculation of the final target population extent. In summary, the 165 sampled sites were drawn from a spatially balanced list of 471 prospective sites (165 sampled + 186 nontarget + 120 landowner denial). **Table 8** highlights some of the major features of the probabilistic sampling effort.

STREAM USE SUPPORT IN RELATION TO INDIVIDUAL DESIGNATED USES

The uses of surface water recognized in section 101(a) of the CWA correspond to the following three designated uses in Kansas: aquatic life support, recreation, and (human) food procurement (K.A.R. 28-16-28b *et seq.*). The first two uses apply in some form to all classified streams in the state. The food procurement use, on the other hand, is assigned only to a portion (73%) of the state's classified stream mileage – those rivers and streams that have been determined likely to contain edible fish of harvestable size. The Kansas surface water quality standards recognize additional uses for surface waters (**Table 9**), but support for those uses is not evaluated explicitly in this probabilistic assessment.

Table 9. Allocation of designated uses among classified streams

Designated Use	Proportion of Mileage Designated for Use +
Aquatic life support (any category)	100%
Contact recreation (any category)	~100% ++
Food procurement	73%
Livestock watering	96%
Irrigation	92%
Groundwater recharge	92%
Industrial water supply	74%
Domestic water supply	72%

+ Mileage given relative to the entire December 12, 2013 KSWR extent of 30,278 miles
++ The few streams with no formal use designation for contact recreation (<0.5% of total mileage) were assessed here using the least restrictive (Class b) criteria.

Table 10 presents use support findings for individual section 101(a) uses Aquatic Life (AL), Contact Recreation (CR), and Food Procurement (FP). The indicated 95% confidence intervals were derived using a local variance estimator approach (Stevens and Olsen, 2003).

Table 10. Support of individual designated uses in streams (in miles)

Designated §101(a) Use	Total Sample Frame Extent	Total Targeted & Assessed Extent	Extent Supporting Indicated Use*	Extent Not supporting Indicated Use*	Extent with Insufficient Data
Aquatic Life	30,278	18,031	4,699 ± 983 (26%)	13,331 ± 1,285 (74%)	0
Contact Recreation	30,278	18,031	13,803 ± 1,163 (77%)	4,277 ± 960 (23%)	0
Food Procurement	22,215	15,115	8,856 ± 1,146 (59%)	6,260 ±1,146 (41%)	0 **+**

+ Nonresponse sites, i.e., those where fish tissue samples were not collected, were assumed to represent an unbiased subset of the population for the purposes of Food Procurement Assessment.
Note: Plus or minus values represent the upper and lower limits of the 95% confidence interval. Where estimated bound exceeds the estimated value, the lower 95% confidence bound is zero. 95% confidence intervals were derived using local variance estimator approach (Stevens and Olsen, 2003)

Table 11 illustrates overall support as well as the overlap among support and non-support for all three uses, but for this detailed assessment, food procurement sites where no samples were obtained are presented separately. Although only about 15% of mileage supported all uses for which it was assessed, only 9% of mileage failed all applicable uses. Most stream mileage in Kansas (~76%) supported one or two of the uses for which it was assessed.

Table 11. Detailed account of use support for streams (in miles)

		Food Procurement Support	Food Procurement No Sample	Food Procurement Non-support
Aquatic Life Support	Contact Recreation Support	1,915 ± 769 (11%)	696 ± 442 (4%)	1,193 ± 557 (7%)
	Contact Recreation Non-support	398 ± 339 (2%)	199 ± 239 (1%)	298 + 282 (2%)
Aquatic Life Non-support	Contact Recreation Support	4,828 ± 1,320 (27%)	3,282 ± 809 (18%)	1,889 ± 683 (10%)
	Contact Recreation Non-support	696 ± 421 (4%)	1,094 ± 551 (6%)	1,542 ± 696 (9%)

Note: if estimated variance exceeds the estimated value, the lower 95% confidence bound is zero.

Although this document reports confidence interval estimates only for 101(a) uses of the CWA, the stream water quality data do provide an opportunity to assess basic support for other uses. In particular, the two agricultural uses, Livestock Watering and Irrigation, are important to Kansas. Of the 165 sites sampled for water quality, 161 (98%) supported the Livestock Watering use, and 163 (99%) supported the Irrigation use. Excursions from those criteria involved presence of elevated fluoride, sulfate, and selenium.

Causes and Sources of Stream Impairment

Causes (measured parameters) and probable sources (contributing stressors) of non-support were determined for each probabilistic monitoring site exhibiting water quality impairments. Identification of stressors was based on a broad assemblage of available data, including habitat data collected on-site, water chemistry profiles, and aerial photographs, along with geographical map coverages identifying watershed boundaries and water resources, point and nonpoint sources of pollution, general land use and land cover. Findings were extrapolated to the overall population of streams targeted during the 2013-2017 assessment period. Because some individual monitoring sites were subject to multiple causes and sources of impairment, there is overlap among their extents, and thus the stream mileage affected by all causes and sources is not amenable to straightforward summation.

The major cause of non-support for streams was aquatic macroinvertebrate assemblage condition, an indicator of aquatic life support. Two other major causes are mercury in fish tissue, an indicator for food procurement, and bacterial pathogens, an indicator for contact recreation. Directly measured water chemistry parameters (metals, herbicides, physiochemical measurements) combine to form an additional functional category; see **Table 12.**

Table 12. Major causes of water quality impairments in streams (in miles)

Cause category	Cause	Impaired Mileage	Percent
Water chemistry	pH (too high or too low)	199 ± 242	1%
	Dissolved oxygen (too low)	946 ± 585	3%
	Atrazine	2,761 ± 893	5%
	Chloride	199 ± 229	1%
	Lead	423 ± 417	2%
	Selenium	1,318 ± 506	3%
Waterborne pathogens	*Escherichia coli* contamination	4,227 ± 960	5%
Biological assessment	Benthic macroinvertebrate bioassessment	12,436 ± 1,342	7%
Fish tissue chemistry	Mercury in fish tissue	6,260 ± 1,146	41% **+**

+ *as percentage of Food Procurement mileage represented in the target population (15,115 mi)*
Note: if estimated variance exceeds the estimated value, the lower 95% confidence bound is zero.

Stressors, or the sources responsible for pollutant loadings and/or use impairments, can be separated into five general categories. The most prevalent of these was agriculture, represented by both crop and livestock production. General anthropogenic influence (*e.g.*, stream channelization, atmospheric deposition of contaminants) and urban influences (from both point and nonpoint sources) occurred in some areas, as did natural sources and stressors (such as drought and flood). One stressor, erosion and sedimentation, was widespread but cannot be attributed exclusively to anthropogenic sources, because it can result from both natural and anthropogenic factors, so it is placed in a more general category along with unknown stressors; see **Table 13.**

Table 13. Major stressors/sources of water quality impairments in streams

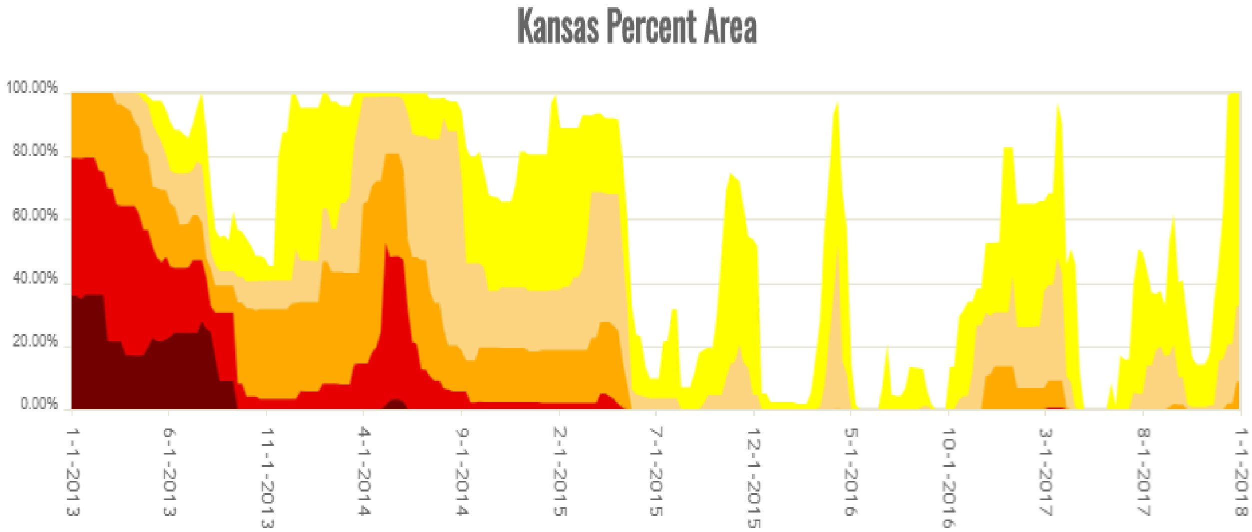
Source Type	Source	Impaired mileage	Percent
Agricultural	Aquaculture	99 ± 175	1%
	Animal feeding operations	3,208 ± 839	5%
	Grazing in riparian or shoreline areas	1,145 ± 641	4%
	Crop production	3,159 ± 926	5%
	Agricultural return flows	523 ± 406	2%
	Agriculture – general or mixed sources	497 ± 374	2%
Urban	Municipal point source discharges	1,293 ± 580	3%
	Residential districts	298 ± 295	2%
	Unspecified urban stormwater	597 ± 384	2%
General anthropogenic	Atmospheric deposition **+**	6,260 ± 1,146	41%
	Channelization	1,045 ± 667	4%
	Dam or impoundment	796 ± 470	3%
	Eutrophication	99 ± 166	1%
	Mining	99 ± 161	1%
	Petroleum or natural gas activities	199 ± 234	1%
	Releases from waste sites or dumps	224 ± 350	2%
Natural	Drought	224 ± 351	2%
	Flooding	199 ± 233	1%
	Natural sources	1,418 ± 578	3%
Mixture of natural and anthropogenic (or unknown)	Erosion and sedimentation	3,582 ± 964	5%
	Insufficient instream habitat	1,591 ± 643	4%
	Reduced stream flow	324 ± 410	2%
	Source Unknown	4,502 ± 1,128	6%

+ *as percentage of Food Procurement mileage represented in the target population (15,115 mi)*
Note: if estimated variance exceeds the estimated value, the lower 95% confidence bound is zero.

Kansas suffered from significant drought in 2012-2013. For several months during that period, 100% of the land area of Kansas was under severe to exceptional drought (National Oceanic and Atmospheric Administration 2016). In 2014, statewide precipitation was 95% of normal, but stream flows were still below normal for all but the eastern part of the state; in 2015, USGS characterized streamflow as essentially normal for the year, with higher than usual spring flows compensating for lower than usual winter flows (Kansas Water Office 2010-2014); see

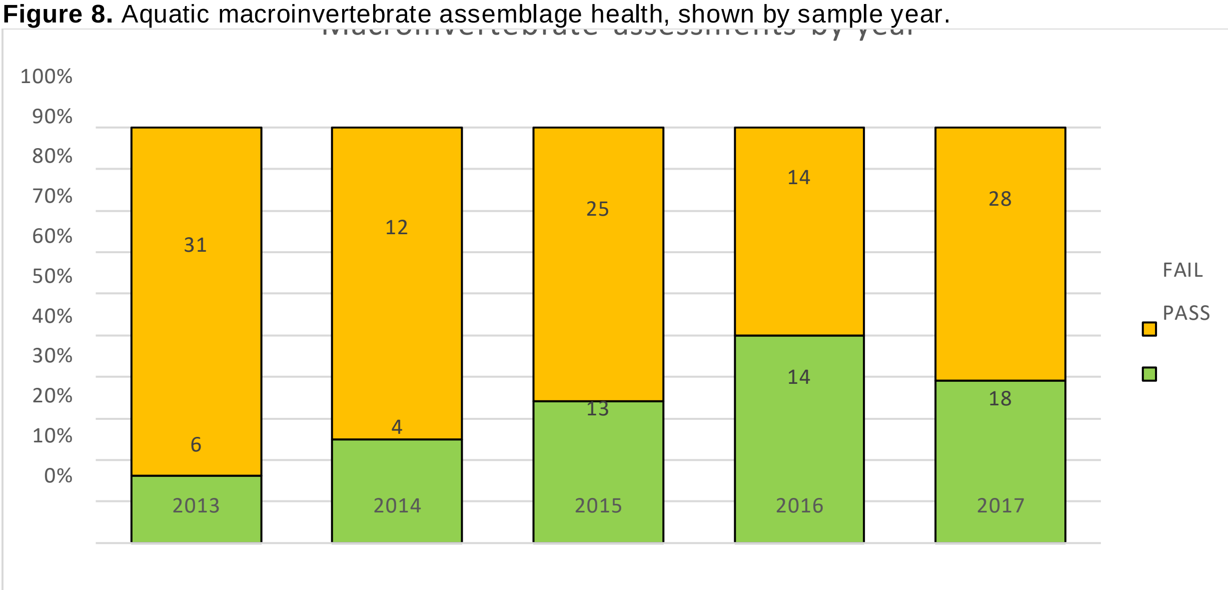
Figure 7**.**

Figure 7. Percent land area of Kansas affected by drought, 2013-2017
Data extracted from the United States Drought Monitor website, droughtmonitor.unl.edu. Author: Brian Fuchs, National Drought Mitigation Center. Color coded for severity: Yellow: D0 (Abnormally Dry) / Peach: D1 (Moderate Drought) / Orange: D2 (Severe Drought) / Red: D3 (Extreme Drought) / Maroon: D4 (Exceptional Drought).



Streamflow is affected by both surface runoff and subsurface/groundwater flow, and these lag precipitation events by varying time frames. If a stream has been scoured by flooding or dried by drought, recolonization by aquatic communities also requires time. The proportion of macroinvertebrate communities scored as healthy rose from 2013 to 2016; see **Figure 8**. It is surmised that the drought and other weather-related events contributed to many of the stream impairments documented during this period.

Figure 8. Aquatic macroinvertebrate assemblage health, shown by sample year.



Site count is shown in bars; Y axis shows relative proportions of sites passing or failing the screening-level assessment.

Although this assessment indicates that many stream systems may be in suboptimal or impacted condition, it also suggests that they have capacity for recovery when streamflow conditions return to normal. Mitigation of major identifiable stressors could also result in restored stream health and greater resilience.

II. 305(B) AND 314 ASSESSMENT RESULTS FOR LAKES AND WETLANDS

Lakes Assessment

BACKGROUND

A total of 322 publicly owned or publicly accessible lakes are included in this reporting cycle. This represents all registered lakes known to KDHE through monitoring activities, as well as from sources published by other agencies, most notably Kansas Department of Wildlife, Parks and Tourism (KDWPT) and the US Army Corps of Engineers (USACE). These lakes comprise an estimated total of 190,445 acres of surface area at normal conservation pool levels. Lakes with their shorelines under common private ownership are considered private lakes in Kansas, but they may still be public waterbodies under state water quality standards if they supply public drinking water or are open to the general public, by invitation or fee, for recreational use.

For the purposes of this report, all publicly owned/accessible lakes, reservoirs, and ponds are referred to as "significant" public waterbodies. This is based on the assumption that any lentic waterbody that is owned by, or accessible to, the general public will provide benefits to the general population. These benefits may include recreation and water supply but will also certainly include habitat for the support of indigenous aquatic and semi-aquatic organisms, including fish and migratory waterfowl.

Unless specifically identified as a wetland, all lentic waterbodies are referred to as "lakes" within this report, regardless of size or origin. This is done in order to avoid the arbitrary thresholds separating ponds from other waterbodies, and to recognize the fact that we assign and expect the same benefits from constructed lakes as we do from naturally formed ones.

Impaired and Threatened Lakes

Table 14 presents a comparison of lake acreage assessed for this 305(b) reporting cycle versus the means by which Aquatic Life Use Support (ALUS) assessments were determined. Assessments utilize a period of record of six years for physical/chemical data and the entire period of record for trophic state data for trends. At all monitored lakes, surveys include biological, chemical, and physical data components, which also factor into metrics related to habitat. Monitored sites are those that have sampling events in multiple years with at least one event occurring within the most recent six-year time period. Evaluated sites are those with all chemical sampling occasions occurring prior to the most recent six-year sampling. An additional 10 classified lakes comprising 1,363 acres are included in this assessment but have no trophic state data and no recent (6-year) physical/chemical assessment. The majority of lake acreage is monitored, as can be seen in **Table 14.**

Table 14. Categories of data used in ALUS assessments for lakes (in acres)

Degree of Aquatic Life Use support (acute criteria)	Acres assessed using only biological data	Acres assessed using only chemical data	Acres assessed using biological and chemical data	Acres assessed
Insufficient Data				1,363
Fully Supported	3,526	0	141,282	144,808
Fully Supported but Threatened	176	0	6,050	6,226
Partially Supported	656	0	27,428	28,551
Not Supported	838	0	9,126	9,497
Total acres	5,196	0	183,886	190,445

Table 15 summarizes overall use support ratings for lakes assessed during this 305(b) cycle.

Table 15. Summary of Fully Supporting, Threatened, and Impaired Lakes

DEGREE OF USE SUPPORT	Assessment Category		Total acres
	Evaluated	Monitored	
Insufficient Data	n/a	n/a	1,363
Fully Supporting of All Uses	1,431	2,737	4,168
Threatened for One or More Uses (But Not Impaired for Any Uses)	1,048	53	1,101
Impaired for One or More Uses	2,717	181,096	183,813
Total Size Assessed	5,196	183,886	190,445

Table 16 divides assessments into specific beneficial uses. Fully 96 percent of reported lake acres are considered to be monitored and, thus, are monitored for "toxics" such as heavy metals and pesticides as well as the other inorganic and biological parameters common to KDHE lake surveys. Of the 183,813 monitored lake acres, 6,357 acres (3.5%) show some level of impairment from heavy metals and/or pesticides.

Table 16. Individual use summary for lakes (in acres)

Goals	Use	Size Assessed	Fully Supporting	Fully supporting but threatened	Partially Supporting	Non Supporting	Insufficient Data
Protect and Enhance Ecosystems	Aquatic Life (acute criteria)	190,445	145,089	6,226	28,084	9,964	1,082
Protect and Enhance Public Health +	Fish Consumption++	190,445	188,314	0	530	33	1,568
	Primary Contact	190,418	27,615	1,101	122,586	38,034	1,082
	Secondary Contact	190,436	145,089	6,226	28,084	9,955	1,082
	Domestic Water Supply	189,072	68,049	1,039	7,415	111,487	1,082
Social and Economic Enhancement +	Irrigation	190,225	144,997	6,223	28,084	9,839	1,082
	Livestock Water Supply	190,240	144,893	6,226	35,975	2,064	1,082

+ = Shellfishing and Cultural Use categories not applicable
++ = Based on food procurement criteria for water

Table 17 presents information related to direct and indirect causes of water quality impairments for this reporting cycle, and **Table 18** presents similar information regarding stressors. Parameters and stressors may not match ATTAINS categories but were matched to ATTAINS values as closely as possible. In some cases, several factors appear with a category. The tabular data should be viewed as applicable to a combination of two, or more, of the parameter or stressor listed.

For the most part, the results for this reporting cycle are very similar to the results reported in past 305(b) cycles. Nutrient and eutrophication related impacts dominate the list of water quality problems, along with secondary effects of eutrophication, with agriculture, urban runoff, natural sources, and point source nutrient loads being the most dominant sources.

Invasive zebra mussels (*Dreissena polymorpha*) have continued to expand into additional lakes in Kansas over the last two years. Thirty-two lakes (as of December 7, 2019) now have documented populations, totaling 145,343 acres or 76% of reported lake acreage. This is roughly double the infested lake area reported in the 2010 305(b) report, and 3.5 times that reported in the 2008 305(b) report, which was the first 305(b) to document zebra mussels in the state.

Table 17. Total lake area impacted by various cause categories (in acres)

CAUSE CATEGORY AND CODES	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
Pesticides - atrazine	621	0
Heavy Metals – arsenic	66	1,102
Heavy Metals – copper	130	0
Heavy Metals – lead	1	2,875
Heavy Metals – selenium	0	6,800
Heavy Metals – mercury	0	530
Fluoride	450	205
Nutrients and Eutrophication	37,583	104,519
High pH	158	26,207
Low pH	0	10
Siltation and Turbidity	33,807	18,067
Low Dissolved Oxygen	100	573
Chloride	0	12,593
Sulfate	257	36,875
Flow Alterations	0	17,860
Aquatic Plants	2	263
Zebra Mussels	12,964	132,379

Natural sources refer primarily to climate and weather driven impacts (such as water depletion from drought, wind resuspension of sediments, and shallow thermal stratification) or naturally high salinity in some locales. Natural sources account for virtually none of the nutrient and eutrophication or heavy metal related impacts in Kansas lakes.

Table 18. Total lake area impaired by various source/stressor categories (in acres)

SOURCE CATEGORY AND CODES	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
Municipal Point Sources	25,600	120,691
Agriculture	36,251	120,991
Urban	955	7,664
Resource Extraction	0	899
Hydromodification	3,619	7,127
Natural Sources+	220	28,649
Resuspension	10,828	255
Introductions of Non-Native Organisms	12,966	132,379

+ Refers mainly to climate and drought impacts plus background levels of salinity and fluoride.

Table 19 lists the numbers and acreage of lakes impacted by nonpoint and/or point sources of pollution, plus those with no identified impairments. Although nonpoint source impairments impact more of the smaller lakes, most of the largest lakes in Kansas have both point and nonpoint sources present within their watersheds.

Table 19. Lakes with identifiable point and nonpoint source pollution contributions

Pollution Type	Number of Lakes	Acres of Lakes
Point Sources +	24	146,291
Nonpoint Sources +	246	176,728
No Identifiable Pollution Sources	66	12,205

+ Numbers include any level of point source contribution, and any magnitude and combination of nonpoint source pollution impacts. Due to the fact that lakes may have both source types within their watersheds, numbers will not sum to match the total number or acres assessed.

Related to the predominant impact that nutrient pollution and the resulting eutrophication process has on lake use support, a recurring activity within KDHE has been the description of what are generally referred to as "reference" trophic state conditions for lakes in Kansas. In essence, reference water quality conditions for lakes occur in watersheds with limited human activity and anthropogenic pollution loads. These "least impacted or better" waterbodies then describe the condition that would be generally attainable if polluting activities were reduced, well buffered, or otherwise mitigated in the general population of lakes and wetlands. Thus, reference condition provides a valuable and attainable water quality goal for a given class of waterbodies.

Based on the water quality and trophic state data collected since the 1970s for lakes in Kansas, the following general conclusions regarding reference trophic state conditions have been reached. Lakes in Kansas with minimal pollution loads can be expected to achieve mesotrophic-to-slightly eutrophic conditions (chlorophyll-a of under 10 to 12 µg/L), with low total nutrient concentrations (total phosphorus below 30 to 35 µg/L) and relatively high water clarity (Secchi depth deeper than 1.25 to 1.50 meters) (Dodds, et al., 2006; Carney, 2009). For this 305(b) cycle, 16 % of monitored lakes (comprising about 14% of assessed surface area) achieve "least impacted or better" status for nutrient levels and trophic state condition.

Trophic Status

Trophic state classification for Kansas lakes and wetlands is based primarily on the period of record for observed chlorophyll-a (corrected for phaeophytin-a). The rationale is based on the idea that planktonic algal biomass, as estimated by chlorophyll-a, comprises the vast majority of the base of the typical lacustrine food web in Kansas. Although macrophyte communities do contribute to the overall biological production in our lacustrine food webs, it is very rare that they provide a large portion of that food web base in and of themselves. A more typical situation would be a large macrophyte community providing structure so an increased epiphytic and benthic base for a food web could arise. Because of this, and the fact that absence of macrophyte beds is a far more common concern for the water quality and health of Kansas lakes, adjustment of trophic state classification due to macrophyte beds is rare.

The observed level of chlorophyll-a provides a very good estimate of overall lake productivity and production. In addition, higher levels of planktonic algal biomass correlate well with lower levels of aesthetic appeal and recreational opportunity, increased costs for producing drinking water, and increased problems for using lake water for livestock and irrigation (Willms, et al., 2002; Lardner, et al., 2005; Dodds, et al., 2009). Because of these factors, the trophic state estimate also becomes valuable for assessing levels of overall support for lakes and wetlands in Kansas.

Whereas higher levels of sedimentation are often concurrent with the eutrophication process in the Midwest, KDHE monitoring does not allow more than a rough indication of sedimentation impacts per se. For the majority of settings, sedimentation is inferred from shoreline and inflow area observations, as well as watershed land use configuration, and the general turbidity of a system. Where high turbidity seems a chronic problem, trophic state may alternately be assigned using total nutrient concentrations and turbidity levels.

Chlorophyll-a values are converted to a trophic state class assignment based on the mean period of record value for a given lake or wetland. The following scale is used in assigning a lake to a given class. The TSI score is that of Carlson (1977), based on chlorophyll-a**.**

The four primary classes are Oligomesotrophic, Mesotrophic, Eutrophic, and Hypereutrophic. The Eutrophic class is divided into three sub-classes, in order to better describe expected levels of use impairment. Likewise, the hypereutrophic class is divided into two sub-classes for the same reason. In the case of the Hypereutrophic sub-classes, the dominance, or lack thereof, for blue-green algae (cyanophytes) also factors into use support assignments.

In addition, two supplemental trophic state classes are used for lake and wetland assignments; Argillotrophic and Dystrophic. An Argillotrophic waterbody is chronically light limited and nutrient rich, resulting in artificially low algal biomass and chlorophyll-a. A Dystrophic waterbody is highly colored by humic/organic dissolved matter, resulting in potentially lower than expected chlorophyll-a. Dystrophic lakes in Kansas are very rare. **Table 20** presents lake trophic state designations for this reporting cycle.

Table 20. Trophic status of lakes during this reporting cycle

Trophic status	TSI+	Number of Lakes (number and percent total)		Lake Surface Area (acres and percent total)	
Argillotrophic		8	2.48%	22,032	11.57%
Oligomesotrophic	< 40	14	4.35%	407	0.21%
Mesotrophic	40 – 49.99	35	10.87%	12,364	6.49%
Slightly Eutrophic	50 – 54.99	48	14.91%	43,156	22.66%
Fully Eutrophic	55 – 59.99	63	19.57%	68,851	36.15%
Very Eutrophic	60 – 63.99	44	13.66%	32,333	16.98%
Lower Hypereutrophic	63.99 – 69.99	45	13.98%	7,864	4.13%
Upper Hypereutrophic	>69.99	55	17.08%	2,075	1.09%
Dystrophic		0	0.00%	0	0.00%
Unknown		10	3.11%	1,363	0.72%
Totals		322	~100%	190,445	~100%

+Trophic State Index (TSI) is based on chlorophyll levels and derived from Carlson (1977)

The greatest portion of individual lakes fell into the fully eutrophic and the hypereutrophic classes, whereas the greatest amount of surface acres were within the slightly-to-fully eutrophic and the argillotrophic classes. This difference primarily results from the skewed size range of Kansas lakes. The vast majority of lakes are smaller (and often shallower) systems, which may be more impacted by pollution sources (on a watershed acre-to-lake acre basis) than larger systems might be. Also, several of the larger Federal lakes in Kansas are located on rivers that tend to move a great deal of eroded sediment. Therefore, several of the largest lakes in Kansas are chronically turbid and assigned to the argillotrophic class.

Whereas roughly 3% of lakes reported for in this cycle lack data for assigning a trophic state class, they comprise <1% of the total reported acres. Some of these lakes are frequently dry systems, making long-term trophic classification problematic.

Trends in Lake Water Quality

Time trends in lake water quality in Kansas are difficult to determine for individual lakes, due to the programmatic emphasis on regional and statewide assessment rather than in-depth studies at specific waterbodies. Trophic state remains the best means to examine trends in overall lake water quality, much as trophic state was earlier identified as a good overall water quality indicator for our lakes. Trends indicated in **Table 21** are very general in nature. If a lake had three or more trophic state assessments over the years, a trend was assigned as follows:

If there was a strong upward direction in trophic state over time, the lake was assigned to the "degrading" category. If there was a strong downward direction in trophic state over time, the lake was assigned to the "improving" category. Lakes were assigned to the "stable" category for two different sets of conditions. First, if trophic state assessments did not change much with time or, second, if they varied to the extent that any obvious trend was masked. Otherwise, lakes were assigned to the "unknown" category if they had no data available, or if they had fewer than three trophic state assessments over the period of record.

A large number of lakes fell into the unknown category, but these only comprise about 3% of the total surface acreage. Of the remaining lakes most were in the stable category, though many are simply remaining in an advanced state of eutrophication. Very few lakes showed an improving trend in trophic status.

Table 21. Trophic state trends in lakes

Category	Number of Lakes		Surface Area of Lakes	
	Count	% Total	Acres	% Total
Improving	6	1.86%	582	0.31%
Stable	158	49.07%	162,357	82.25%
Degrading	36	11.18%	22,658	11.90%
Trend Unknown	122	37.89%	4,848	2.55%
Totals	322	~100%	190,445	~100%

Control Methods

Control methods for preventing or reversing pollution problems in Kansas lakes, as provided by KDHE, are primarily limited to the provision of technical advice and limited technical support, Section 319 grants aimed at citizen education and watershed best management practice (BMP) implementation, or guidelines for constructing or managing water supply lakes.

KDHE Bureau of Environmental Field Services (BEFS) and, now, Bureau of Water (BOW) have operated a technical assistance program for taste and odor problems in water supply lakes since 1989. Over 250 specific investigations have been undertaken as of 2017, dealing with water supply taste and odor problems, algae bloom concerns, fish kills, and other nuisance and public health concerns. Most such investigations are aimed at providing taxonomic assistance to water suppliers and lake managers. As of 2010, KDHE adopted a policy formalizing the response to algae bloom complaints and investigations in regard to public health, focused on recreational use.

In-depth lake sampling and restoration projects at specific lakes in the past were dependent on the Section 314 Clean Lakes Program grants. With those roles now being transferred to Section 319 Nonpoint Source programs, in-depth lake assessment projects and restoration projects have been reduced in scope if not number. In the past, matching effort from the many smaller communities in Kansas was a constant challenge for Clean Lakes Program projects. This problem is, if anything, more pronounced today.

The KDHE Bureau of Water (BOW) does maintain a statewide monitoring program for lakes and wetlands for the purposes of making statewide and regional assessments of overall lake water quality in Kansas. This network operates in order to comply with Federal requirements and expectations under the Clean Water Act as well as serve state and local needs for information and technical assistance. This network has been in place since 1975, with wetlands first added in 1988. The network strives to provide a near-census for publicly owned/managed lake surface acreage in the state. The water quality data collected to date has been used to develop numerous water quality models that serve as valuable lake management tools, develop numerous TMDLs, and provide a basis for determining statewide water quality conditions and trends.

The Kansas Department of Wildlife, Parks and Tourism (KDWPT) provides assistance and technical advice to lake managers and citizens, with the emphasis on fisheries management rather than overall lake water quality. Some practices, such as the use of grass carp (*Ctenopharyngodon idella*) for plant control, or aeration/destratification, often run counter to maintaining the overall water quality within lakes.

Restoration and Rehabilitation Efforts

Several restoration techniques have been applied in Kansas, but most instances are not documented in a fashion that makes such information readily available. Therefore, only restoration actions specific to projects directly involving KDHE, or higher profile projects primarily involved with other agencies, are discussed within this report.

Some of the most common activities, perhaps dubiously referred to as rehabilitation techniques by many, involve the use of copper sulfate for algae control and grass carp for macrophyte control. Although such activities are sometimes warranted, KDHE has tended to discourage the use of either practice as a prophylactic treatment. Copper sulfate should only be used for algae control if monitoring does show a strong need, and amounts should be applied with the full knowledge that copper will accumulate in the sediments. Grass carp, due to their impact on trophic state and water quality, should not be used for macrophyte control unless aquatic plants produce lake-wide problems to lake users and no other option is feasible.

Fortunately, there are at least two aquatic herbicides registered for use in Kansas with selective control capabilities for Eurasian watermilfoil (*Myriophyllum spicatum*) and other dicotyledonous aquatic species. As Eurasian watermilfoil continues to expand into lakes throughout Kansas, the use of these herbicides (fluridone and triclopyr) may supplant grass carp as the preferred plant control technique. Roughly 15-20% of monitoring network lakes have Eurasian watermilfoil present at varying levels of abundance. As stated elsewhere, the lack of macrophyte beds is a far more common problem for maintaining healthy lakes in Kansas, rather than lakes with excessive macrophyte growth. Therefore, any technique that might allow native macrophyte species to be maintained or encouraged, while dealing with more invasive species, is welcome.

KDWPT is involved in lake restoration and rehabilitation for the primary purpose of fisheries management for recreation. Techniques, such as the recycling of brush and Christmas trees for fish habitat, are also common. Water level fluctuations are utilized for management of fish spawning habitat as well as waterfowl management. KDWPT annually submits water level adjustment plans for many of the federal lakes in Kansas to the Kansas Water Office (KWO), which are reviewed and commented on at public meetings prior to submission to the USACE.

Aeration has become a common technique applied to smaller Kansas lakes in the attempt to control eutrophication. Unfortunately, almost all these efforts are undertaken without adequate study to determine whether aeration or destratification will positively impact lake water quality. Likewise, follow-up monitoring is typically limited to anecdotally observing a neutral-to-negative impact, followed by abandonment of the technique, or similarly observing a neutral-to-positive impact and continuing the technique into the future, whether or not it has had any measurable impact that could be definitively attributed to the technique. KDHE has strongly recommended to lake managers that aerators only be purchased and applied once a lake study has definitively shown aeration might improve water quality, versus other techniques.

The application of what are commonly referred to as “best management practices” (BMPs) continues to be the most common and useful means of lake restoration and rehabilitation in Kansas. BMPs can cover a wide range of practices, for both agricultural and urban lands. Some of the more common techniques include vegetated buffer strips along streams and shorelines, diversions of runoff, pre-treatment impoundments, improved cropping/fertilization practices, sediment retention ponds, and treatment wetlands. Most BMP installation is via the Natural Resource Conservation Service (NRCS) and local Conservation Districts, in cooperation with KDHE and/or KWO.

Wastewater National Pollutant Discharge Elimination System (NPDES) and confined animal feeding operation (CAFO) permits are sometimes used as a means to promote lake water quality restoration for Kansas lakes. Downstream impacts from such permitted facilities can be taken into account in the permitting process, and during public participation activities for such permits, regarding their limits on specific water quality parameters in effluents.

Dredging has also been an infrequent, and expensive, means to attempt to restore smaller lakes in Kansas. Dredging projects, due to the expense, have been few in number over the years. Such efforts have been even more infrequent since the Section 314 Clean Lakes Program ceased funding Phase 2 project grants through the Section 314 program specifically.

Since the transfer of lake protection and restoration grants to the Section 319 Nonpoint Source Pollution Program, watershed land treatment has become emphasized over in-lake restoration at the state funding level. Any discussion of specific Section 319 projects will be listed in that section of this report.

Acid Effects on Lakes

A total of 183,886 acres of lakes in Kansas were monitored for pH, accounting for 97% of the total reported acres for this report cycle. Water quality impacts in Kansas resulting from pH levels, as seen in the data presented in **Table 17,** are almost totally due to higher pH values attained when lakes are over-enriched with nutrients and suffer from eutrophication and a high trophic state. For this report cycle, only one lake had pH below 6.5 units.

Even for the Mined Land Lakes Recreation Area units, where past coal mining makes them "likely" sites for low pH problems, such problems are few and far between. Enough time has passed since these areas were actively mined, and many have also been sporadically treated with lime additions, so that low pH problems are almost non-existent. Anecdotal evidence, from conversations with some citizens in southeast Kansas, suggests maybe a number of privately owned strip pit lakes still have chronically low pH, but KDHE has no specific data to confirm this. As most of the private strip pit lakes are as old as the public units, it is anticipated that the majority of them also show moderation of their pH ranges as they have aged.

The lack of an extensive Kansas problem with acidification stems from our regional geology. Kansas is underlain with abundant limestone bedrock, and soils derived from that limestone. Therefore, our state has a built-in defense against atmospheric deposition of acid materials, or most other sources of acidic conditions. Other than the always possible, yet localized, chance of a spill of acidic material, the only significant sources for such water quality problems lie in past coal mined areas, or shale quarries, in Kansas. As shown by the pH data KDHE has collected throughout this region of southeast Kansas, such problems are mild and infrequent today.

Wetlands Assessment

Extent of Wetland Resources

The wetland area reported for this 305(b) cycle is 55,969 acres. This includes state and federal public wetland areas in Kansas, plus several that are owned or managed at the local level. This total does not include privately owned wetland areas, which likely comprise a larger total surface area in the state.

At present, Kansas does not have the data for a precise estimate of wetland loss from historic levels or for the current wetland area extant in the state. Several studies have been conducted in the past, but many have assumptions, based on their primary study purpose, that render them less useful for providing numbers related to total wetlands in Kansas. One of the better studies was that of Dahl (1990), which suggested that by the 1980s the conterminous United States had lost roughly 53% of its wetlands whereas Kansas had lost 48%. This suggests that our wetland loss is similar to the general estimates for the United States at about 2% per year.

The Dahl (1990) study suggested that historical wetland area in Kansas was around 841,000 acres total. A 1992 Wetland Rapid Assessment Procedure (WRAP) study by the Kansas Water Office (Kansas Water Office 1993) also suggested that total wetland area in Kansas, as of the 1980s, totaled around 435,400 acres, which is fairly consistent with estimated losses from historic levels from the Dahl study. Applying the 2% per year general loss rate to the USFWS value, perhaps 215,000 to 265,000 acres of wetlands still exist in Kansas. If accurate, the majority of extant wetlands in Kansas are on private lands.

No estimates are available that differentiate the wetlands in Kansas among various wetland types, however, field observations suggest the majority of Kansas wetlands are palustrine freshwater marshes, palustrine saltwater (oligohaline) marshes, riparian wetlands, playas, and wet meadows.

Integrity of Wetland Resources

Of the 55,969 wetland acres (36 wetlands) assessed during this reporting cycle, 40,905 acres (10 wetlands) are considered to be monitored sites. This represents 73% of the reported acreage. An additional 11 wetlands comprising 1,529 acres are reported as evaluated. A total of 13,535 acres (15 wetlands) were assigned to the unknown category due to insufficient data. In most cases, "insufficient water quality data" resulted from the intermittent nature of standing water in wetlands (regarding both availability and depth) from which representative water samples might be collected. Many of these areas above major federal lakes are filled seasonally for fall and winter recreation, and frequently are dry during the summer sampling period.

Wetlands in Kansas have had use attainability analyses (UAAs) completed for the range of designated uses, but the primary functions of wetlands in Kansas are as aquatic life support and recreational sites. Therefore, only those specific individual uses are reported in **Table 22.**

Table 22. Individual use summary for wetlands (in acres)

Goals	Use	Size Assessed	Fully Supporting	Full Support But Threatened	Partially Supporting	Non Supporting	Insufficient Data
Protect and Enhance Ecosystems	Aquatic Life (acute criteria)	55,969	104	2,526	1,391	38,413	13,535
Protect and Enhance Public Health+	Fish Consumption++	55,969	27,404	0	2,240	12,790	13,535
	Secondary Contact	55,969	104	0	1,391	40,939	13,535

+ = Shellfishing use category not applicable and thus not reported
++ = Based on food procurement criteria for water

Table 23 presents data on the causes of use impairment in wetlands, i.e., the parameters associated with impairment. The primary causes of wetland use impairment for this 305(b) cycle are over-enrichment and extreme trophic state conditions and elevated pH levels due to these extreme conditions.

Table 23. Total wetland acres impacted by various cause categories (in acres)

CAUSE CATEGORY AND CODES	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
Pesticides - atrazine (148)	0	3,295
Heavy Metals – arsenic (145)	0	2,240
Heavy Metals – lead (663)	0	1,175
Heavy Metals – selenium (984)	0	1,265
Nutrients and Eutrophication (483 and 746)	23,649	18,493
Chloride (272)	0	35,933
Sulfate (1016)	0	28,398
High pH (620)	13,200	3,505
Flow Alterations (546)	0	13,933

Table 24 presents data on the sources of use impairment in Kansas wetlands. The major sources of wetland use impairment are agricultural runoff, hydrologic modifications, and natural processes. Natural sources refer primarily to climate and weather driven impacts (such as water depletion from drought) and naturally high salinity in some locales. Natural sources account for virtually none of the nutrient/eutrophication or heavy metal related impacts in Kansas wetlands.

During this reporting cycle, 41,965 acres of wetlands were assessed as hypereutrophic. This represents 75% of the total acreage and nearly 99% of the acreage with available data. In many cases, the degree of hypereutrophy was extreme. Certainly, the level of nutrient enrichment was far above the expectations for wetland water quality in relatively low-impact drainages (*i.e.*, “least-impacted” or better) (KDHE 2002). These numbers indicate that the vast majority of the remaining Kansas wetlands under public control and management suffer an inordinately high degree of impact from nutrient enrichment and eutrophication.

Table 24. Total wetland acres impacted by various source categories

SOURCE CATEGORY AND CODES	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
Municipal Point Sources	4,572	13,934
Agriculture	1,555	44,141
Urban	70	20
Resource Extraction	0	220
Hydromodification	0	36,009
Natural Sources+	0	14,934
Resuspension	0	1,175

+ Refers mainly to climate and drought impacts plus background levels of salinity

This current situation has led to the erroneous general impression that wetlands in Kansas are, as a matter of course, possessed of poorer water quality and extreme trophic state conditions. Whereas wetlands would be expected, on average, to have higher nutrients and trophic status than comparable lakes, least impacted condition for wetlands is only marginally higher than least impacted condition for lakes. Wetland trophic status value are given in **Table 25**, and trophic trends were all either stable or unknown for this cycle, as shown in **Table 26**.

Table 25. Trophic status in wetlands

Trophic status	Number of wetlands		Acreage of wetlands	
	Count	Percent of total	Acres	Percent of total
Argillotrophic	0	0.00%	0	0.00%
Oligomesotrophic	2	5.56%	40	0.07%
Mesotrophic	1	2.78%	1	<0.01%
Slightly Eutrophic	0	0.00%	0	0.00%
Eutrophic	3	8.33%	63	0.11%
Very Eutrophic	2	5.56%	365	0.65%
Lower Hypereutrophic	2	5.56%	1,026	1.83%
Upper Hypereutrophic	11	30.56%	40,939	73.15%
Dystrophic	0	0.00%	0	0.00%
Unknown	15	41.67%	13,535	24.18%
Totals	36	~100%	55,969	~100

Table 26. Trophic state trends in wetlands

Category	Number of wetlands		Acreage of wetlands	
	Count	Percent of total	Count	Percent of total
Improving	0	0.00%	0	0.00%
Stable	19	52.78%	42,304	75.58
Degrading	0	0.00%	0	0.00%
Trend Unknown	17	47.22%	13,665	24.42%
Assessed for Trends	36	~100%	55,969	~100%

Development of Wetland Water Quality Standards

Wetlands are currently classified as "waters of the state" within the Kansas surface water quality standards (KDHE 2015). UAA analyses have been completed for all designated uses, and the results of these UAAs are incorporated into the Kansas surface water register. Wetlands receive equal treatment and protection with lakes, regarding application of state water quality standards for narrative and numeric criteria, antidegradation provisions, and implementation procedures. The US Environmental Protection Agency (USEPA) has proposed wetland specific biocriteria, but the development of such biocriteria is not considered feasible at this point in time.

Additional Wetland Protection Activities

Wetland protection tends to be distributed among agencies in Kansas, with no agency having a primary function for all aspects of wetland management. Kansas Department of Health & Environment (KDHE), Kansas Department of Wildlife, Parks and Tourism (KDWPT), the Kansas Department of Agriculture (KDA), and Kansas Water Office (KWO), as well as the federal Army Corps of Engineers (USACE) all have involvement in wetland protection and regulation. Kansas statutes (K.S.A. 82a-325 *et seq.*) require a total of eight state agencies, including KDHE, to review proposed water development projects for "beneficial and adverse environmental effects."

Persons desiring to alter regulatory wetlands in Kansas must file for Section 404 "dredge and fill" permits with the USACE. Simultaneously, such permit requests come to KDHE for a Section 401 water quality certification. The department makes a determination of the projected impact on water quality resulting from the proposed action and may approve the action, approve it with modifications, or deny the action based on these projected water quality impacts.

One activity within KDHE has been the description of what are generally referred to as "reference" conditions for lakes and wetlands in Kansas. In essence, reference water quality conditions for lakes and wetlands occur in watersheds with limited levels of human activity and anthropogenic pollution loads. These "least impacted or better" waterbodies then describe the condition that would be generally attainable if polluting activities were reduced, well buffered, or otherwise mitigated in the general population of lakes and wetlands. Thus, reference condition provides a valuable and attainable water quality goal for a given class of waterbodies.

Based on the water quality and trophic state data collected since the 1970s for lakes and wetlands in Kansas, the following general conclusions regarding reference conditions have been reached. Lakes in Kansas with minimal pollution loads can be expected to achieve mesotrophic-to-slightly eutrophic conditions, with low total nutrient concentrations and relatively high water clarity (Dodds, Carney and Angelo 2006) (Carney 2009) Wetlands with similar minimal pollutant loads could be expected to achieve a trophic state in the low-to-mid range of eutrophic (chlorophyll-a at or under 12-to-18 µg/L), with moderate total nutrient levels (total phosphorus at or under 50-to-80 µg/L) (KDHE 2002). For this 305(b) cycle, 6 wetlands achieved "least impacted or better" status for nutrient levels and trophic state condition, however all were small and totaled less than 1% of the wetland acres assessed. As stated earlier in this report section, over 90% of wetland acres exceed this least impacted or better threshold by a sizeable margin, suggesting public wetlands in Kansas are at high risk from nutrient pollution and eutrophication.

III. 303(D) ASSESSMENT RESULTS

The state's 2020 303(d) list identifies 486 station/pollutant combinations of water quality impairment on lakes, wetlands, and stream systems (watersheds), encompassing 2,278 stream segment/pollutant combinations, and needing the development of Total Maximum Daily Load plans (TMDLs) to address the offending pollutants. The 2020 list also identifies 514 station/pollutant combinations of waters that were previously cited as impaired in prior lists but now meet water quality standards, with 44 of these being new in 2020. The complete list is included in **Appendix B**). Supporting documents can be accessed by the public via the internet at http://www.kdheks.gov/tmdl/methodology.htm.

Public Health Issues

Kansas is one of only half a dozen states in the nation to house both Health and Environment functions within a single organization. As such, the KDHE strives to integrate functions to best serve the environmental health of its citizens. In ambient water monitoring, three environmental areas stand out as potential public health concerns, and as such receive special attention: Drinking water use, Beach and water recreation use, and Fish Consumption. In addition, the agency has several rapid response programs and a tracking system to respond to public concerns.

I. DRINKING WATER USE

Use of surface waters in Kansas for drinking water supply (both public and domestic) is first determined through Use Attainability Analyses (UAAs). The domestic water supply use can be either existing or attainable; therefore, the UAA process examines the likely hydrology and ambient water quality to determine attainability. Existing drinking water supply use can be verified by inspection of water rights from the Division of Water Resources of the Kansas Department of Agriculture. Attainable use is assigned to perennial streams that exhibit parameter concentrations (chloride, sulfate, fluoride, total dissolved solids) that are less than twice applicable criteria or guidance. As a result of this screening, most streams in the central and eastern portions of Kansas could potentially support drinking water uses. Similarly, lakes are assessed and, more often than not, found to support attainable drinking water supply uses.

Currently, 21,705 stream miles (72% of the Kansas Surface Water Register) and 188,924 acres of lakes bear the designated use for Domestic Water Supply. Of the lake acreage, 149,839 acres currently serve as existing and emergency public water supply, but no such calculation can be made easily for stream mileage. Moreover, assessment of support for this use is complicated by the provisions of the Kansas Surface Water Quality Standards. Application of water quality criteria protective of drinking water is to occur at "the point of domestic water supply diversion." Therefore, true assessment is focused on support of existing uses. Furthermore, domestic water supply use is defined as the production of potable water after appropriate treatment. The ambient water quality should not confound the routine treatment of the raw water supply into potable water for human consumption. However, assessment of drinking water use support under 303(d) is chiefly directed at the potential, attainable use of that water at some unspecified future time.

Assessing support of the water quality criteria underlying the drinking water use involves evaluating monitoring data for too-frequent excursions from applicable numeric criteria, such as nitrate, sulfate, chloride, arsenic or fluoride. In cases of elevated nitrate, the root cause has typically been wastewater with insufficient denitrification. Such situations call for the water to be classed Category 5 with a TMDL scheduled for development.

Impairments due to chloride, sulfate, arsenic and fluoride are often contributed by natural, geologic sources, sometimes exacerbated by water use and reuse, concentrating salts through water loss induced by evapotranspiration. To the degree possible, background concentrations are established as part of the water quality standards that reflect natural contributions that exceed the existing criteria for those pollutants, are not influenced by flow alterations or diversions, and leave the surface water usable under the definition of domestic water supply use.

Impairment from excessive nutrients is assessed relative to trophic conditions in lakes that present problems to aquatic life, recreation, and drinking water. Endpoints used by eutrophication TMDLs are set at level that should assure full attainment of all three of these designated uses. Similarly, screening for excess phosphorus in streams result in adaptive TMDLs that continue to reduce loadings of phosphorus from point and non-point sources until such time that blue-green algae counts and complaints of taste and odor in drinking water are minimized.

II. BEACH USE (HARMFUL ALGAL BLOOMS AND ALGAL TOXINS)

Background

Eutrophication, the enrichment of waterbodies with excess nutrients and the nuisance algal growth that results, causes many impacts to water quality and to the beneficial uses we expect our lakes and streams to provide us. Impacts can range from disrupting ecological system integrity, to reducing revenues from recreational use, to increasing costs and risks related to providing drinking water (Dodds, Bouska, et al. 2009). Perhaps the most noticeable impact to the general public is the generation of large population explosions of phytoplankton that are generally called "blooms." These algae blooms are the net result of over-enrichment of lakes with plant nutrients (primarily phosphorus, but also nitrogen). Blooms can occur suddenly, and at all times of the year, and can be composed of numerous species from various taxonomic groups. However, the most common blooms, and certainly of the most concern to public health, are blooms composed of blue-green algae (cyanophytes).

Blue-green algae are free-living photosynthetic bacteria. They are a natural part of the ecology, usually occurring in fairly small numbers, only becoming a problem when they grow to extreme populations. They are lumped under the functional term "algae" with other organisms because they share many of the same habitat requirements as these other types of algae (green algae, diatoms, euglenoids, dinoflagellates, *etc.*). A blue-green algae bloom can be extremely large, numbering in the millions of cells per milliliter of water. Such blooms create conditions that are visually objectionable to the public, produce foul odors, obstruct boats and other forms of recreation, cause taste and odor problems in finished drinking water, and cause fishkills. Most blue-green algae blooms will occur in nutrient enriched lakes during the summer, when water temperatures are highest, but a few species prefer cooler temperatures. Although they produce sufficient aesthetic problems to impair many recreational and economic activities, their ability to produce toxic compounds makes them a threat to public health as well.

Blue-green algae are capable of producing a number of different biochemical compounds that are toxic to warm blooded organisms (for the most part). These compounds fall into three general categories: hepatotoxins (which primarily affect the liver and other internal organs), neurotoxins (which primarily impact the nervous system), and dermatotoxins (which affect the skin, mucus membranes, eyes, ears, and throat). Over 200 different algal toxins have been identified in freshwaters (where blue-green algae are the most common toxic species) and in marine environments (where dinoflagellates tend to be the most common type of toxic algae). In the Midwest, microcystins (a type of hepatotoxin) are the most commonly documented algal toxin type (Graham, et al. 2010), although other toxins (such as the neurotoxic anatoxin-a and saxitoxin) do occur at a lesser frequency. There are almost 100 identified variants of the microcystin toxin known. Some of these algal toxins rival, or exceed, the potency of cobra venom.

Over two dozen genera of blue-green algae may be found in the waters of Kansas, but the majority of blooms and complaints are attributable to five genera. All are colonial forms, forming filaments or large globs of cells that look like green cottage cheese floating in the water. These include *Microcystis* spp. (species can produce the hepatotoxin microcystin), *Dolichospermum* (formerly *Anabaena)* spp. (species can produce both hepatotoxins and neurotoxins), *Aphanizomenon spp.* (species can produce neurotoxins), *Planktothrix* spp. (species can produce both neurotoxins and the hepatotoxin microcystin), and *Cylindrospermopsis raciborskii* (can produce the hepatotoxin cylindrospermopsin). Essentially all species of blue-green algae produce dermatotoxins that are associated with their cell walls. Most blue-green algae have optimal growth at higher ambient temperatures (>27° C), but some species, such as *Planktothrix rubescens* seem to grow quite well in the middle of winter, often forming reddish masses of algae under ice layers.

Around the world, pets, livestock, wildlife, and people have become ill or died after exposure to blue-green blooms and their toxins, including Kansas. Exposure to algal toxins is primarily through the ingestion of water containing blue-green algae, but exposure can also occur through breathing aerosols or through skin contact. Because of the increase in lakes and streams suffering from nutrient enrichment and eutrophication, problems related to blue-green algae and their blooms have also increased dramatically over the last few decades. Many U.S. states, and a number of foreign countries, have adopted formal programs and protocols for dealing with the public health threat posed by excessive blue-green algae in our waters. Kansas joined those other entities several years ago by adopting a formal response policy on August 13, 2010.

Harmful Algal Bloom Response Program

The program adopted by the Kansas Department of Health and Environment is a joint effort among several Bureaus within both Divisions (Health and Environment) of the agency. It is complaint driven, with citizens, lake managers, or other officials able to access and submit a form through the Harmful Algal Bloom response program at www.kdheks.gov/algae-illness. Once received, the complaint is vetted, and appropriate sampling of the waterbody is conducted.

Sampling is directed towards the major points of public access onto the water (marinas, swimming beaches, main boat ramps or dock facilities, *etc.*), and continues until algal cell counts and toxin levels decline to safe thresholds. The program is limited to publicly owned or managed waterbodies. The primary purposes of the program are to inform the public of health risks associated with the current condition of the lake, to advise lake managers as to what course of action is most appropriate, and to supply technical expertise to those lake managers.

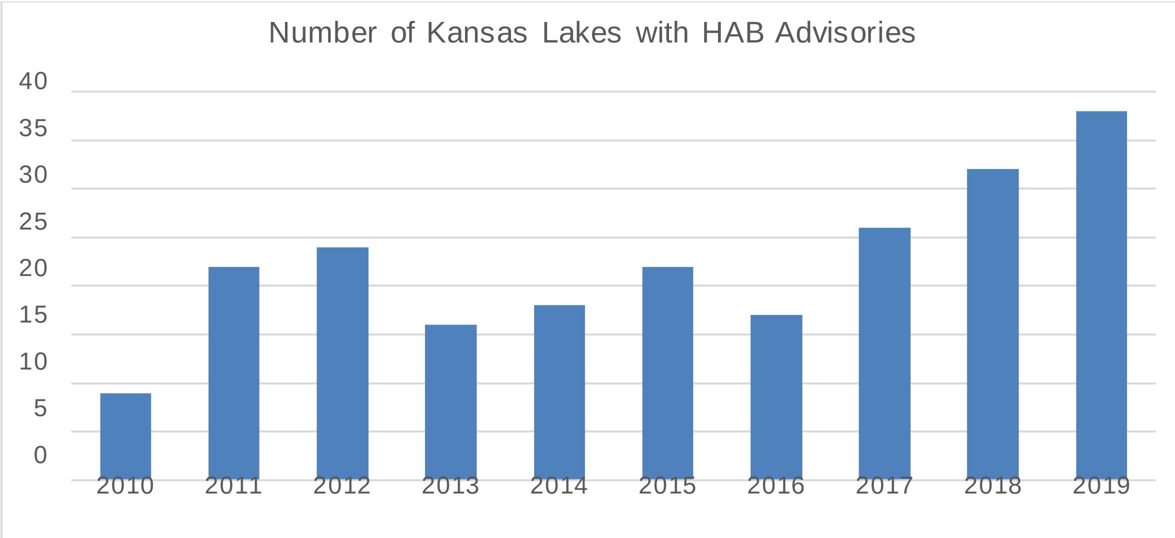
Advisory criteria can be updated to reflect empirical data, new science, or newly published guidance. The three levels of threat have been recognized under the program from 2015 through 2019 are:

- "Public Health Watch," where hazardous conditions are possible or present;
    - ≥80,000 to <250,000 blue-green cells/ml OR
    - microcystin concentrations of ≥4 to <20 µg/L
- "Public Health Warning," where conditions are believed to represent a threat to health and safety
    - ≥250,000 to ≤10,000,000 blue-green cells/ml OR
    - microcystin concentrations ≥20 µg/l to 2,000 µg/L OR
    - documented visible, pervasive cyanobacterial surface scum
- "Recommended Lake Closure," where it is recommended that all in-lake recreation cease and that picnic, camping, and other public land activities adjacent to affected waters be closed (Chorus and Bartram 1999)
    - >10,000,000 blue-green cells/ml OR
    - microcystin concentrations of >2,000 µg/L

The Harmful Algal Bloom response program is managed through the Bureau of Water in the Division of Environment, but it works collaboratively with the Bureau of Environmental Field Services and Division of Public Health. The program can be reached by telephone (785-296-1664) or through a web reporting interface (http://www.kdheks.gov/algae-illness/index.htm). Through the web interface, private citizens, organizations or agencies, or medical and veterinary professionals can complete and submit an Algae Bloom Report Form, a Human Algae Illness Reporting Form, or an Animal Illness Reporting Form. Reports are channeled to the appropriate entities at KDHE, which may include surface water monitoring, drinking water, and epidemiology. Credible reports are followed with monitoring as needed, and Protected Health Information is handled appropriately and investigated as needed. Lakes that have confirmed BGA blooms of a given magnitude are placed on Watch or Warning status and subject to follow up monitoring until the advisory is lifted; lake status is posted on the same website and updated weekly.

The number of samples collected for each lake is determined by the HAB program on a site specific basis, as determined by the size of the lake and number of public access points, which are often associated with the locations of swimming beaches, boat ramps, and fishing docks. From 2010 to 2019, the Harmful Algal Bloom Response Program has investigated over 110 lakes for bloom related complaints.

Figure 9. Number of Kansas Public Lakes affected by Harmful Algal Blooms, by year



Harmful Algal Bloom advisories are issued during the recreational season, which is from April 1st through October 31st for Kansas Lakes. As seen in **Figure 9**, Kansas has consistently seen 15-39 lakes affected by HABs each season, with the number climbing steadily. The HAB events tend to increase as summer temperatures increase. Some HAB events are short in duration, but others are severe, widespread blooms that tend to persist for the majority of the time from late June through late August.

III. Fish Consumption

Public health concerns related to the consumption of locally caught fish are addressed in the annual fish advisories. These advisories are released by the KDHE communications office (2020 advisory: https://khap2.kdhe.state.ks.us/NewsRelease/PDFs/1-24-20%20fish%20tissue.pdf) and also printed in each year's KDWPT Fishing Atlas (KDWPT 2020).

For many years, KDHE has designated waterbody-specific advisories and warnings. However, in 2013, for the first time, KDHE also issued a statewide advisory due to the presence of mercury in fish tissue. Restrictions are based on consumer type (sensitive population *vs.* general public) as well as fish species. Harmful algae blooms are also mentioned in the advisory as they relate to fish consumption.

OTHER CONSIDERATIONS

In addition to routine and proactive surface water monitoring, KDHE also provides immediate response to events that may affect or reflect surface water quality, ground water quality, or public health. The agency also places a priority on quick response to citizen and business concerns. One of these programs is the Harmful Algal Blooms program, which has already been discussed. Others include the Spills program and Fishkill program.

Spills Program

One rapid response program is the Spills Program, administered by the Bureau of Environmental Remediation and operated in conjunction with the Kansas Corporation Commission (KCC), for spills on oil leases. Private citizens, businesses, and organizations can use the Kansas Spill hotline to report spills, discharges and emergency releases. The program can be reached by telephone (785-291-3333) or email (Kdhe.SpillHotline@ks.gov), 24/7.

The Spills Program is authorized by Kansas law (KSA 65-171d and KAR 28-48) and is used to address events that can be quickly resolved with the goal of preventing long term harm to our soil or water resources. If a spill or release impacts groundwater, it may be referred to a remedial program to address the problem, but sometimes the spiller is successful in isolating groundwater impacts and can remediate it immediately through the Spills Program.

Table 27 presents a brief summary of events investigated and resolved by the Spills Program in 2018-2019. This count does not include spills that occurred in contained, non-flowing waterways (such as dry road ditches or dry storm sewers) and were cleaned up before flowing water or stormwater was introduced into the system. Also, it does not include events overseen or investigated by KCC, which would include any spill related to petroleum extraction (hydrocarbons, drilling fluids, brine, *etc.*) before it is sold by the producer.

Table 27. Summary of 2018-2019 spill events.

Category	2018	2019
KDHE purview: surface water impacted	16	16
with fishkill events	*(0)*	*(1)*
KDHE purview: Groundwater impacted	3	2
with referral to long-term remediation	*(0)*	*(0)*

Fishkill Program

Another rapid response program is the Fish Kill Response program, administered through the Bureau of Environmental Field Services and coordinated with colleagues from KDWPT. In 2018-2019, KDHE responded to 8 fish kill events. These were investigated and resolved, and a brief summary is presented in **Table 28.** None of the fish kills were associated with Hazmat spills noted in **Table 27,** but four fish kills were associated with accidental discharge events that were reported and cleaned up through different reporting channels.

Table 28. Summary of fish kill events investigated by KDHE 2018-2019

Waterbody Type	Cause	Year		Grand Total
		2018	2019	
Lake or Pond	Natural kill, winter kill, summer kill, algal toxins, algal oxygen depletion	7	1	8
	Temperature extremes	1	0	1
	Toxics, chlorine, surfactants, organic compounds	0	0	0
	Unknown	0	1	1
	TOTAL	**8**	**2**	**10**
Spillway	Flow related event	0	1	1
	TOTAL	**0**	**1**	**1**
River, Stream, or Creek	Natural	1	0	1
	Toxics, chlorine, surfactants, organic compounds	0	3	3
	Unknown	1	0	1
	TOTAL	**2**	**3**	**5**
GRAND TOTALS		**10**	**6**	**16**

*This was associated with an oil spill. Spills related to mineral extraction are not handled through the KDHE BER Spills Program, but rather through the Kansas Corporation Commission.

Environmental Complaint Tracking System

In 2017, the Kansas Department of Health and Environment Information Technology (IT) department developed a new Environmental Complaint Tracking System (ECTS). In the past, the agency used several different internal systems within each Bureau to track and resolve environmental complaints. The recently implemented ECTS is a single unified system, used across the Division of Environment, linking the Bureau of Air, Bureau of Water, Bureau of Waste Management, Bureau of Remediation, and the Bureau of Environmental Field Services, which oversees the six district offices located throughout Kansas. This system streamlines communications across the Division of Environment and supports seamless compliant resolution. Complaint information and details can now be easily shared between staff on an internal platform improving data access and exchange. Program supervisors and managers can also use the system to query compliant data to better manage staff workload and resources, ensuring high quality customer service to the public.

Table 29 shows complaints entered and tracked for 2018-2019. Many, but not all, have been resolved.

Table 29. Complaints received and tracked through the KDHE Environmental Complaint Tracking System (ECTS) in 2018-2019.

Bureau	Complaint Type	Count
Bureau of Environmental Field Services	Livestock Waste	133
	On-Site Wastewater	45
	Private Well	5
	Septic System	12
Bureau of Air	Air Emission	66
	Asbestos	9
	Fugitive Dust	24
	Open Burning	57
	Other	16
Bureau of Environmental Remediation	Contamination Issues Referred to Remediation	75
	Storage Tank	13
	Surface Water Quality Concern	15
	Other	32
Bureau of Waste Management	Burning	11
	Hazardous Waste	35
	Solid Waste	227
	Tires	18
	Used Oil	30
	Other	17
Bureau of Water	Construction/Municipal Stormwater	51
	Municipal or Industrial Wastewater	60
	Private Well Construction	5
	Public Water Supply	82
	Surface Water Quality Concern	30
	Other	11

PART D. GROUNDWATER MONITORING AND ASSESSMENT

Overview

Kansas no longer maintains a statewide groundwater quality monitoring program, and funding for its renewal appears unlikely in the near future. However, an earlier monitoring program (suspended in 2002 owing to budgetary constraints) routinely evaluated groundwater quality at more than 200 sites. Individual wells in the monitoring network were sampled on a two-year rotational basis, with approximately half the wells being sampled in any given year. All wells in the network adhered to specific siting, depth, and construction criteria, and the network as a whole was deemed representative of the state's major aquifer systems. The program's surviving electronic database contains roughly 150,000 records spanning 120 different physical, chemical, and radiological parameters and 327 groundwater quality monitoring locations. Additional background information is presented in the program's Quality Assurance Project Plan and accompanying set of Standard Operating Procedures, last revised in 2000 **(KDHE 2000)**,

Groundwater Monitoring by Other Agencies

The Kansas Geological Survey, with funding from the Kansas Water Office, maintains the state's Master Ground-Water Well Inventory, which links together its own databases with those from KDHE and Kansas Department of Agriculture's Division of Water Resources (http://www.kgs.ku.edu/HighPlains/data/). Most of the information in these databases relates to well logs and water levels, rather than water quality.

In addition to some monitoring done by KDHE, other agencies and entities perform groundwater quality monitoring, typically as part of focused projects on specific issues. Groundwater Management Districts, the Kansas Geological Survey, and the U.S. Geological Survey (USGS) test groundwater for various management and research purposes and have done so for many years. One example is a series of cooperative projects done by Kansas Geological Survey, US Bureau of Reclamation, Groundwater Management District 2, and the Kansas Water Office to look at salt intrusion into the Equus Beds of the High Plains Aquifer; information is available at http://www.kgs.ku.edu/Hydro/Equus/index.html, and some results are available as Kansas Geological Survey reports (Young, et al. 2001). Another is a more recent water quality study, still underway, done by the Kansas Geological Survey, in cooperation with the Kansas Water Office and the Missouri Basin Regional Planning Area, aimed at understanding alluvial dynamics along the Missouri River (Batlle-Aguilar, Butler and Whittemore 2017) (Bohling, et al. 2019).

The High Plains Aquifer is the primary water source for the western half of the state; the *Equus* Beds aquifer is an area of relatively higher potential recharge where interaction with surface water and alluvial aquifers occurs. The USGS continues to monitor activities related to the *Equus* Beds aquifer and is conducting some additional groundwater monitoring (Teresa Rasmussen, USGS, pers. comm. March 2020); a summary follows.

The USGS collected groundwater samples during 2018-9 as part of the *Equus* Beds groundwater project. The purpose of the *Equus* project is to define water quantity and quality conditions related to artificial recharge of the *Equus* Beds aquifer, to describe the chemical and hydrologic processes affecting the aquifer, and to evaluate the effects of aquifer storage and recovery on water quantity and quality. Since 1995, more than 10,000 surface water and groundwater water-quality samples have been collected and analyzed for more than 400 compounds, including most of the compounds on the USEPA's primary drinking-water standards maximum contaminant level list and secondary drinking-water regulations secondary maximum contaminant level list. Samples were analyzed for major ions, trace elements, nutrients, bacteria, pesticides, volatile organic compounds, dissolved radionuclides, coliphage, arsenic species, and glyphosate. Water-quality constituents of concern for the *Equus* project include specific conductance, oxidation-reduction potential, chloride, sulfate, manganese, nitrate, iron, arsenic, and total coliform bacteria. An overview of the project, with links to reports and data tables, is available at https://www.usgs.gov/centers/kswsc/science-topics/equus-beds-aquifer, and published reports are also available (Klager 2016, M. Stone 2017, Stone, Klager and Ziegler 2019)

As part of the National Water Quality Assessment Program (NAWQA) groundwater program, the USGS also collected groundwater samples from 16 stream valley aquifer public supply wells in Kansas during summer 2018. Samples were analyzed for trace elements, nutrients, organics, microbiological indicators, emerging contaminants, and age tracers. Data from the sites will be used as part of NAWQA's principal aquifer studies to assess trends in groundwater quality and suitability as a source of drinking water. Data can be downloaded from http://waterdata.usgs.gov/nwis.

Groundwater Monitoring by KDHE

Some groundwater quality information continues to be gathered by KDHE through the efforts of its major regulatory bureaus; see **Table 30** for an overview of state groundwater protection and monitoring programs. The Bureau of Environmental Remediation routinely samples groundwater from the vicinity of groundwater remedial sites, storage tank cleanup sites, and a few active surface mining operations. The Bureau of Waste Management obtains groundwater quality information from 62 active (18 Subtitle D municipal solid waste landfills, 30 small arid landfills, 12 industrial landfills, and 2 construction and demolition landfill) and 94 closed landfills, as well as hazardous waste sites across the state. BOW requires a number of major NPDES permit holders to periodically submit data on groundwater quality. Examples include large CAFOs, meat processing facilities, electrical power plants, and a few municipal WWTFs. Underground Hydrocarbon Storage well and brine storage pond permits as well as Underground Injection Control Class III salt solution mining well regulations also require submittal of data on groundwater quality. The Underground Storage Well and brine storage pond regulations and the Underground Injection Control regulations require monitoring the shallow groundwater for brine and product releases to help ensure operations are conducted in a protective manner.

Monitoring activities generally focus on surficial groundwater and/or a very limited set of analytical parameters; see **Table 31** for a summary of major sources of groundwater contamination in Kansas. The most important and ubiquitous contaminant found in groundwater is nitrate, because it affects usability of water as a drinking water source. Nitrates are primarily from anthropogenic sources: fertilizer storage and application as well as human and livestock waste. Agricultural and industrial chemicals and refined hydrocarbons found in groundwater (such as atrazine, carbon tetrachloride, and gasoline) are also of human origin. However, other groundwater contamination is the result of leaching or concentration of naturally occurring soil chemicals (such as chloride, fluoride, arsenic, selenium, and radionuclides); human activities may facilitate the leaching or concentration of substances, but the contamination is indirect.

A statewide cumulative summary of groundwater contamination is provided in **Table 32**. These assorted monitoring operations are not intended to provide representative information on the state's major aquifer systems or to serve as a coordinated and comprehensive ambient groundwater quality monitoring program, but rather a tracking system for known contamination issues. For Underground Injection and Hydrocarbon and brine wells, a site is considered "resolved" once all appropriate cleanup actions are underway, even if the process may require a number of years for complete cleanup. Groundwater monitoring at CAFOs is used to detect if the waste management system is protecting groundwater from nutrient releases rather than an implied discharge. Some swine facilities are required by Kansas Statutes to install groundwater monitoring based upon number of animal units confined and the depth to groundwater. The secretary may require installation and sampling of groundwater monitoring wells in the vicinity of any waste retention lagoon or pond when the Secretary determines necessary.

Groundwater monitoring related to PWSSs is addressed separately in the next section, because of its direct impact on human health. Under the Safe Drinking Water Act, public water suppliers are required to submit data on source water quality. In Kansas, a majority of sources are groundwater.

Table 30. Summary of state groundwater protection programs

Programs or Activities	Check (X)	Implementation Status	Responsible Agency / Bureau
Monitoring, mapping, and characterization			
Ambient groundwater quality monitoring		(Suspended in 2002)	(KDHE)
Aquifer mapping	X	Established	KGS
Aquifer characterization	X	Ongoing	KGS
Aquifer vulnerability assessment	X	Ongoing	KDHE-BOW
Comprehensive data management	X	Ongoing	KGS, KDHE-BOW, -BER, -BWM
Protection and planning			
Interagency coordination for groundwater protection initiatives	X	Ongoing	KWO
Best Management Practices (nonpoint)	X	Established	KDHE, KWO
Groundwater classification – for CAFO design	X	Established	KDHE-BOW
Pollution Prevention Program (for small businesses)	X	Established	KDHE-BER
Source Water Assessment Program (SWAP)	X	Established	KDHE-BOW
Drinking Water Protection Program (DWPP)	X	Ongoing	KDHE-BOW
Vulnerability assessment for drinking water	X	Ongoing	KDHE-BOW
State septic system regulations	X	Established	KDHE-BOW
Underground Storage Tank (UST) installation requirements (designed to prevent release of petroleum and hazardous materials)	X	Established	KDHE-BER
Permitting			
Industrial and Municipal discharge permits	X	Established	KDHE-BOW
CAFO-specific Groundwater protection regulations	X	Established	KDHE-BOW
Livestock Waste Management Program to prevent surface water and groundwater pollution	X	Established	KDHE-BOW
Water quality standards for groundwater recharge use	X	Established	KDHE-BOW
Pesticide State Management Plan	X	Established	KDA
Underground Storage Tank (UST) Permit Program (permits issued to ensure compliance with operating regulations)	X	Established	KDHE-BOW
Underground Hydrocarbon Storage Well Program (for pressurized HCs in salt caverns and associated brine storage ponds)	X	Established	KDHE-BOW
Underground Injection Control Program (for Class I deep disposal injection wells, Class III salt solution mining wells, and Class V shallow injection wells)	X	Established	KDHE-BOW
Underground Injection Control Program (for Class II injection wells)	X	Established	KCC
Well installation regulations for water wells, Class I, III, and V injection wells, and underground HC storage wells)	X	Established	KDHE-BOW
Well installation regulations (for Class II injection wells)	X	Established	KCC

Table 30, cont'd.

Programs or Activities	**Check (X)**	**Implemen-tation Status**	**Responsible Agency / Bureau**
Remediation			
Active Superfund Amendments and Reauthorization Act (SARA) Title III program	X	Established	KDHE-BER
Resource Conservation and Recovery Act (RCRA) Primacy	X	Established	KDHE-BWM
Groundwater monitoring at landfills	X	Establised	KDHE-BWM
State Cooperative, Voluntary Cleanup and Dry Cleaner Remediation Programs (State-led equivalents to Federal Superfund)	X	Established	KDHE-BER
State Water Plan Orphan Sites (Response to contamination where no viable responsible party has been identified)	X	Established	KDHE-BER
UST Remediation Fund (provides financial assurance for cost of remediating releases of petroleum)	X	Established	KDHE-BER
Well abandonment regulations (for both water and mineral wells)	X	Established	KDHE & KCC

KGS = Kansas Geological Survey
KDA =Kansas Department of Agriculture
KCC = Kansas Corporation Commission
KWO = Kansas Water Office
KDHE-BOW = Kansas Department of Health and Environment Bureau of Water
KDHE-BER = KDHE Bureau of Environmental Remediation
KDHE-BWM = KDHE Bureau of Waste Management

Table 31. Major sources of groundwater contamination for Kansas

Highest Priority Contaminant Sources	Factors Considered in Selecting a Contaminant Source	Types of Contaminants
Agricultural Activities:		
Chemical and grain facilities	A, C, D	2, 3, 4, 5
Animal feedlots	A, C, D, E	5, 7, 10
Irrigation practices	A, C, E, F, H	6, 7, 8, 9
Land application of pesticides, fertilizer and manure	A, C, E	1, 2, 5,10,12
Storage and Treatment Activities:		
Land application (regulated/permitted)	A, C, D, E	5, 7, 10
Storage tanks (AST/LUST)	A, B,C, D	4
Surface impoundments	A, E	5, 8
Disposal Activities:		
Landfills and illegal dumping	A, C,E	3, 4, 7, 8
Deep injection wells	A, G	4, 7, 8, 13
Other Activities:		
Active/abandoned industrial facilities (including dry cleaning)	A, B, C	2, 3, 4, 5, 7, 8, 9, 13
Oil and gas activities (including extraction and refineries)	A, B, C, D	4, 7, 8, 9
Pipelines and sewer lines	A, E	3, 4, 5
Salt water intrusion	B, C, D, E	7
Spills, trucking, rail	A, D	2, 3, 4, 5, 7, 8

Factors Considered in Selecting a Contaminant Source:
(A) Human health and/or environmental risk (toxicity)
(B) Size of population at risk
(C) Location of sources relative to drinking water sources
(D) Number and/or size of contaminant sources
(E) Hydrogeologic sensitivity
(F) State findings, other findings
(G) Documented from mandatory reporting
(H) Geographic distribution/occurrence
(I) Other criteria as described in narrative

Types of Contaminants:
(1) Inorganic pesticides
(2) Organic pesticides
(3) Halogenated solvents
(4) Petroleum compounds
(5) Nitrate
(6) Fluoride
(7) Salinity/brine
(8) Metals
(9) Radionuclides
(10) Bacteria
(11) Protozoa
(12) Viruses
(13) PCBs
(14) Other contaminants as described in narrative

Table 32. Groundwater contamination: statewide cumulative summary through December 31, 2019

Source Type	# of KS Sites	# of Sites with Confirmed Releases	# with Confirmed Groundwater Contamination	Primary Contaminants	# of Site Assessments	# of Sites with Source Removed	# of Sites with Corrective Action Plans	# of Sites with Active Remediation	# of Sites with Ongoing Monitoring	# of Sites with Cleanup Resolved
NPL **	12	12	11	VOCs, metals	12	Unavail	0	7	8	0
CERCLIS (non-NPL)**	100	100	19	VOCs, metals, PCBs	100	Unavail	1	4	2	68
DOD/FUDS**	5677	577	137	VOCs, metals, refined petroleum	577	Unavail	3	46	120	182
LUST (Leaking Underground Storage Tanks)	11,278	5,354	4,550	gasoline and diesel fuels	11,278	Unavail	N/A	193	1,084	10,000
State Sites (not including LUST sites or KCC jurisdiction sites)	2,590	2,590	1,158	VOCs, metals, refined petroleum, nitrates	2,590	Unavail	76	197	201	1,346
Concentrated Animal Feeding Operations	2,721	58	23	Nitrate and chloride	2,258	Unavail	0	0	33	0
RCRA Corrective Action (incl. 6 military sites)	53	53	53	VOCs, metals, semi-volatiles	46	13	29	24	38	16
Solid Waste Landfills-Active +	62	40	40	VOCs & metals, semi-volatiles	62	0	2	0	62	0
Solid Waste Landfills – Closed +	94	94	94	VOCs & metals, semi-volatiles	94	0	0	0	94	0
Underground Injection Wells ++	33	4	3	Brine	4	4	2	2	4	4
Underground Hydrocarbon Storage Wells	10	1	0	Brine	1	1	1	1	1	1
Underground Hydrocarbon Storage Brine-Storage Ponds (Multiple ponds per site)	9	9	9	Brine	9	9	9	9	9	9

+ KDHE Bureau of Waste Management requires groundwater monitor at all active landfills and for a minimum 30 years at all closed landfills,
++ Represents Class I and III injection wells but does not include Class II brine injection wells.
N/A - not applicable; CERCLIS - Comprehensive Environmental Response, Compensation, and Liability Information System; Includes non-NPL Management Assistance (CERCLA Lead and Superfund sites); DOD/FUDS - Department of Defense/Formerly Used Defense Sites; LUST - Leaking Underground Storage Tanks; NPL - National Priority List; NPS - Nonpoint Source; RCRA - Resource Conservation and Recovery Act; VOC – volatile organic compounds

Groundwater Monitoring associated with Public Water Supply Systems

A Public Water Supply System (PWSS) entity may be composed of multiple facilities or components: groundwater wells, surface intakes, consecutive connections, treatment plants, storage tanks, and distribution systems. Normally, water flows from a raw source (or consecutive connection, if purchased from another entity) into a treatment plant, and then into the distribution system. Treated water can also be purchased through a consecutive connection from another PWSS which would flow directly into the distribution system with no further treatment. Public water supply compliance monitoring is usually performed at the end of the treatment plant processes just prior to entry into the distribution system, or in the distribution system itself. Treated water samples do not necessarily reflect the unaltered state of the raw water that initially flows into the treatment plant.

Only a few compliance samples are collected at the raw water source, *i.e.*, groundwater wells and surface intakes. However, some raw water monitoring is performed under the aegis of Public Water Supply, and the results are reported here. Raw water sampling (whether from a groundwater or surface water source) is normally limited to just a few types of sampling:

1. (Compliance Monitoring) Total organic carbon samples are collected from intakes to be used as part of the Disinfection By-Product rule determinations. The samples are matched up with a corresponding treatment plant sample so compliance can be determined.
2. (Compliance Monitoring) Groundwater samples are collected as part of the Groundwater Rule, which requires source monitoring after a positive microbiological sample is collected in the distribution system. The goal is to determine whether a positive in the distribution system can be traced back to raw source water. In Kansas, since the inception of the GWR, few positive samples have been collected at a well after a distribution system positive sample.
3. (Not for Compliance Monitoring) When an application is made for installation of a new public water supply well, plans are submitted, inspections are performed, and water quality test well kits are taken to provide baseline testing on a broad spectrum of inorganic, organic, radiological, and microbiological parameters. As a service to Public Water Supply Systems, KDHE offers special study sampling and test well kit monitoring to help identify the best sources of water. Test wells are drilled and water quality is determined before permits are issued. These samples are not used for compliance determinations but rather are considered special study samples specifically for the permitting process.
4. (Not for Compliance Monitoring) Special study samples are performed intermittently by systems for many different reasons. Normally these samples help systems identify or correct a problem of which they may or may not be aware. Often special studies are completed as part of an engineering firm’s work when they are hired by the PWSS to make improvements or perform maintenance.

Drinking water facilities are tested on a three-year rotating cycle, so every facility in the state should be represented once in any consecutive three year window. **Table 33** presents results of 2017-2017 groundwater testing from both routine compliance monitoring samples and special study sampling (not related to compliance monitoring) completed at water treatment plants and groundwater wells.

Treated groundwater source samples are from wells used to supply drinking water. Untreated groundwater source samples may be from wells used to supply drinking water, or may be locations where groundwater was tested for future possible use for drinking water supply. Note that Maximum Contaminant Levels (MCLs) do not apply to untreated drinking water, as treatment removes most contaminants, but counts of MCL exceedances are given as reference points.

Fluoride enters groundwater from natural deposits and by water additives via drinking water treatment known as fluoridation. Water systems that fluoridate their water are required to monitor their treated water more frequently than systems that have do not fluoridate their drinking water and have negligible or low levels of naturally occurring fluoride in their drinking water source.

The data provided here are presented only as an auxiliary to groundwater monitoring. Complete reporting on drinking water monitoring and compliance can be found on the KDHE Public Water Supply Section website at:
http://www.kdheks.gov/pws/monitoringcompliance/annualcompliancereports.html

Table 33. Results of groundwater monitoring associated with Public Water Supply Systems, 2017-2019

Monitoring Data Type	Parameter / Group	Sources	Total Samples	Samples with No Detects	Samples with Detects	Detects Nitrate ≤ 5 mg/L	Detects Nitrate >5 and ≤ 10 mg/L	Detect Sample Exceeding MCL *	Compliance Violations **
Untreated Water	VOC	34	5769	5721	48	--	--	5	--
	SOC	33	1220	1193	27	--	--	0	--
	EDB	33	226	226	0	--	--	0	--
	Arsenic	33	56	13	43	--	--	2	--
	Fluoride	31	46	8	38	--	--	0	--
	Mercury	31	47	47	0	--	--	0	--
	Nitrate	37	91	12	79	45	20	14	--
	Selenium	32	48	12	36	--	--	1	--
	E. coli	223	1222	1177	45	--	--	--	--
Finished Drinking Water	VOC	493	19887	19816	71	--	--	0	0
	SOC	490	1760	1481	279	--	--	5	0
	EDB	492	899	899	0	--	--	0	0
	Arsenic	497	898	146	752	--	--	45	29
	Fluoride	495	1195	182	1013	--	--	3	2
	Mercury	495	797	797	0	--	--	0	0
	Nitrate	570	3759	204	3555	2254	1085	216	99
	Selenium	496	836	743	93	--	--	24	9

This shows all detected parameters, whether they were measured for compliance or other purposes. Only the "Violations" column applies to MCL exceedances due to actual compliance monitoring results. Special studies or test well kit samples are never used to determine compliance or violations. Many untreated waters are tested but never developed into drinking water sources. Maximum Contaminant Level (MCL) for nitrate is 10 mg/L. EDB = ethyl dibromide. VOC = volatile organic compounds other than EDB; SOC = synthetic organic compounds. *note that MCLs only apply to finished drinking water, but they are provided for untreated sources as a point of reference. ** Compliance Violations can actually be greater than Number of Exceedances for most analytes, because a single large exceedance can result in up to four compliance violations, due to the four-quarter averaging rule (which applies to all analytes except nitrate).

PART E. PUBLIC PARTICIPATION

As required by federal regulation and the Kansas continuing planning process, the 2018 303(d) list and associated methodology were subjected to public review. Formal public notice of the list was made via the Kansas Register; this notice included a link to the KDHE TMDL website, from which interested parties were able to review and download the entire 303(d) list and a detailed description of the listing methodology. The public notice for the 2020 draft 303(d) list provides a mechanism for soliciting all readily available and existing water quality data from other agencies. In most cases, any submitted data corroborated the conclusions reached from the corresponding KDHE data. The public comment period ended March 27, 2020. No comments were received from the public which required modification of the list. The final 303(d) list, submitted to USEPA, effective March 30, 2020, and presented in Appendix B, identifies 486 station/pollutant Category 5 water quality impairments encompassing approximately 2,278 stream segment/pollutant combinations.

SOURCES CITED

National Oceanic and Atmospheric Administration. 2016. *National Centers for Environmental Information.* Accessed February 11, 2016. http://www.ncdc.noaa.gov/cag/time-series/us.

Angelo, R.T., M.S. Cringan, and S.G. Haslouer. 2003. "Response of stream biological communities to agricultural disturbances in Kansas: An historical overview with comments on the potential for aquatic ecosystem restoration." *Proceedings of the Central Plains Bioassessment and Biocriteria Symposium.* Lawrence, KS: University of Kansas. 23.

Angelo, Robert T. 1994. "Impacts of declining stream flow on surface water quality." *Proceedings of the 11th Annual Conference on Water and the Future of Kansas.* Manhattan, KS. 1-2.

Arruda, J.A., M.S. Cringan, D. Gilliland, S.G. Haslouer, J.E. Fry, R. Broxterman, and K.L. Brunson. 1987. "Correspondence between urban areas and the concentrations of chlordane in fish from the Kansas River." *Bulletin of Environmental Contamination and Toxicology* 39: 563-570.

Arruda, J.A., M.S. Cringan, D. Gilliland, S.G. Haslouer, J.E. Fry, R. Broxterman, and K.L. Brunson. 1987. *Results of follow-up chlordane fish tissue analysis from the Kansas River.* Topeka, KS: Kansas Department of Health and Environment, Bureau of Water Protection, 26 pp.

Batlle-Aguilar, Jordi, Jim Butler, and Donald Whittemore. 2017. "Addressing Groundwater Goals of the Missouri Regional Planning Area: Phase I Final Report." Kansas Geological Survey Open File Report.

Bohling, Geoffrey C, Donald O Whittemore, Andrea E Brookfield, Edward C Reboulet, Blake B Wilson, and James J Butler. 2019. "Addressing Groundwater Goals of the Missouri Regional Planning Area, Phase II: First Year Progress Report." KGS Open-file Report 2019-3, Lawrence, KS.

Carlson, R.E. 1977. "A trophic state index for lakes." *Limnology and Oceanography* 22(2): 361-369.

Carney, E. 2009. "Relative influence of lake age and watershed land use on trophic state and water quality of artificial lakes in Kansas." *Lake and Reservoir Management* 25(2): 199-207.

Chapman, S.S., J.M. Omernik, J.A. Freeouf, D.G. Huggins, J.R. McCauley, C.C. Freeman, G. Steinauer, R.T. R.T. Angelo, and R.T. Schlepp. 2001. *Ecoregions of Nebraska and Kansas (1:1,950,000-scale map with color poster, descriptive text, summary tables, and photographs).* Reston, VA.: U.S. Geological Survey.

Chorus, I., and J. Bartram, . 1999. *Toxic Cyanobacteria in Water.* London, England: E&FN Spon.

Connelly, Nancy A., Charls. R. O'Neill Jr., Barbara A. Knuth, and Tommy L. Brown. 2007. "Economic Impacts of Zebra Mussels on Drinking Water Treatment and Electric Power Generation Facilities." *Environmental Management* 40: 105-112.

Dahl, T.E. 1990. *Wetlands losses in the United States, 1780s to 1980s.* Washington, D.C.: U.S. Department of the Interior, Fish and Wildlife Service.

Diaz-Ramos, S., D.L. Stevens, and A.R. Olsen. 1996. *EMAP statistical methods manual, USEPA/620/R-96/002.* Corvallis, OR: U.S. Environmental Protection Agency, Office of Research and Development, NHEERL-Western Ecology Division, iv + 13 pp.

Dodds, W.K., E. Carney, and R.T. Angelo. 2006. "Determining ecoregional reference conditions for nutrients, Secchi depth, and chlorophyll-a in Kansas lakes and reservoirs." *Lake and Reservoir Management* 22: 151-159.

Dodds, W.K., W.W. Bouska, J.L. Eitzmann, T.J./ Pitts, K.L. Pilger, A.J. Riley, J.T. Schloesser, and D.J. Thornbrugh. 2009. "Eutrophication of U.S. freshwaters: analysis of potential economic damages." *Environmental Science and Techonology* 43(1): 12-19.

Glassmeyer, S., E. Furlong, D. Kolpin, A. Batt, B. Benson, S. Boone, O. Conerly, M. Donohue, D. King, M. Kostich, H. Mash, S. Pfaller, K. Schenck, Jane Ellen Simmons, E. Varughese, S. Vesper, E. Villegas, AND V. Wilson. 2017. "Nationwide reconnaissance of contaminants of emerging concern in source and treated drinking waters of the United States." *Science of the Total Environment* (581582): 909-922.

Graham, J.L., K.A. Loftin, M.T. Meyer, and A.C. Ziegler. 2010. "Cyanotoxin mixtures and taste-and-odor compounds in cyanobacterial blooms from the midwestern United States." *Environmental Science and Techonology* 44(19): 7361-7368.

Herlihy, A.T., D.P. Larsen, S.G. Paulsen, N.S. Urquhart, and B.J. Rosenbaum. 2000. "Designing a spatially balanced, randomized site selection process for regional stream surveys: The EMAP mid-Atlantic pilot study." *Environmental Monitoring and Assessment* 63: 95-113.

Herlihy, A.T., J.L. Stoddard, and C. Burch-Johnson. 1998. "The relationship between stream chemistry and watershed lend cover data in the mid-Atlantic region, U.S." *Wate, Air, and Soil Pollution* 105: 377-386.

Juracek, Kyle E. 2015. *Streamflow Characteristics and Trends at Selected Streamgages in Southwest and South-Central Kansas, Scientific Investigations Report 2015-5167 (30 pp).* Washington, DC: US Geological Survey.

Kansas Department of Wildlife, Parks, and Tourism. 2015. *Kansas Fishing Regulations 2015.* Topeka, KS.

Kansas Water Office. 2010-2014. "Annual Drought Reports." Topeka.

Kansas Water Office. 1993. *Classification of Wetland and Riparian Areas in Kansas.* whitepaper, Topeka, KS: Kansas Water Office.

Kaufmann, P.R., A.T. Herlihy, M.E. Mitch, J.J. Messer, and W.S. Overton. 1991. "Chemical characteristics of streams in the eastern United States: I. Synoptic survey design, acid-base status and regional chemical patterns." *Water Resources research* 27: 611-627.

KDHE. 2019. *2019-2028 Kansas Water Quality Monitoring and Assessment Strategy.* Topeka, KS: State of Kansas, Kansas Department of Health and Environment, Bureau of Water.

KDHE. 2000. *Division of Environment Quality Management Plan Part III: Groundwater Quality Monitoring Program Quality Assurance Management Plan (Rev. 4).* Topeka, KS: Kansas Deparment of Health and Environment, 74 pp.

KDHE. 2017. *Division of Environment Quality Management Plan Part III: Lake and Wetland Monitoring Program Quality Assurance Management Plan (Rev. 5).* Topeka, KS: Kansas Department of Health and Environment, Division of Environment, 96 pp.

KDHE. 2012. *Division of Environment Quality Management Plan Part III: Stream Biological Monitoring Program Quality Assurance Management Plan (Rev. 4).* Topeka, KS: Kansas Department of Health and Environment, Division of Environment, 71 pp.

KDHE. 2014. *Division of Environment Quality Management Plan Part III: Stream Chemistry Monitoring Program Quality Assurance Management Plan (Rev. 3).* Topeka, KS: Kansas Department of Health and Environment, Division of Environment, 125 pp.

KDHE. 2017. *Division of Environment Quality Management Plan Part III: Stream Probabilistic*

Monitoring Program Quality Assurance Management Plan (Rev. 6). Topeka, KS: Kansas Department of Health and Environment, Division of Environment, 91 pp.

KDHE. 2014. *Division of Environment Quality Management Plan Part III: Subwatersheds Monitoroing Program Quality Assurance Management Plan (Rev. 2).* Topeka, KS: Kansas Department of Health and Environment, 112 pp.

KDHE. 2012. *Division of Environment Quality Management Plan Part III: Surface Water Use Designation Program Quality Assurance Management Plan (Rev. 2).* Topeka, KS: Kansas Department of Health and Environment, Division of Environment, 173.

—. 2018. *Kansas Issues Revised Fish Consumption Advisories.* January 3. https://khap2.kdhe.state.ks.us/NewsRelease/PDFs/1-3-18%20Kansas%20issues%20revised%20fish%20consumption%20advisories.pdf.

KDHE. 2015. "Kansas Surface Water Quality Standards. Kansas Administrative Regulations 28-16-28b through 28-16-28g and 28-16-58." Topeka, KS.

KDHE. 2013. *Kansas Surface Water Register.* Topeka, KS: Kansas Deparment of Health and Environment, Division of Environment, 74.

KDHE. 2010. *Kansas water quality monitoring and assessment strategy, 2011-2015.* Topeka, KS: Kansas Department of Health and Environment, Bureau of Environmental Field Services, 59 pp.

KDHE. 2002. *Kansas wetland survey: Water quality and functioanl potential of public wetland areas.* Topeka, KS: Kansas Deparment of Health and Environment, Bureau of Environmental Field Services.

KDHE. 1988. *Regional ambient fish tissue monitoring program (RAFTMP) report summary for 1987.* Topeka, KS: Kansas Department of Health and Environment, Bureau of Water Protection, 12 pp.

KDHE. 1988. *State/EPA agreement fish tissue (Kansas target lakes study) analysis reprot summary for 1987.* Topeka, KS: Kansas Department of Health and Environment, Bureau of Water Protection, 17 pp.

KDWPT. 2018. *Kansas Fishing Atlas.* Topeka, KS: Kansas Department of Wildlife, Parks, and Tourism, 84 pp.

KDWPT. 2020. *Kansas Fishing Atlas.* Topeka, KS: Kansas Department of Wildlife, Parks, and Tourism, 84 pp.

Klager, B.J. 2016. *Staus of groundwater levels and storage volume in the Equus Beds aquifer near Wichita, Kansas.* US Geological Survey Scientific Investigations Report 2016-5165, US Geological Survey.

KWO. 1992. *Wetland and Riparian Areas Project (WRAP): classification of wetland and riparian areas in Kansas.* Topeka, KS: Kansas Water Office.

Lardner, H.A., B.D. Kirychuk, L. Braul, W.D. Willms, and J. Yarotski. 2005. "The effect of water quality on cattle performance on pasture." *Australian Journal of Agricultural Research* 56: 97-104.

Larsen, D.P., K.W. Thornton, N.S. Urquhart, and S.G. Paulsen. 1994. "The role of sample surveys for monitoring the conditions of the nation's lakes." *Environmental Monitoring and Assessment* 2: 101-134.

Messer, J.J., R.A. Linthurst, and W.S. Overton. 1991. "An EPA program for monitoring ecological status and trends." *Environmental Monitoring and Assessment* 17: 67-78.

Monda, Matthew J., Kerry L. Wedel, and Eric Schenck. 1993. *Kansas Wetland and Riparian Areas Project (WRAP).* whitepaper, Topeka, KS: Kansas Water Office.

National Oceanic and Atmospheric Administration. 2016. *National Climatic Data Center.* Accessed February 11, 2016. http://www.ncdc.noaa.gov/temp-and-precip/state-temps/.

Olsen, A.R. 2009. *Kansas statewide stream survey design. March 11, 2009.* Unpublished communication: 800-point ArcGIS coverage and accompanying design documentation. , Corvallis, OR: U.S. Environmental Protection Agency, Office of Research and Development, NHEERL-Western Ecology Division.

Olsen, A.R. 2009. *Kansas statewide stream survey design. March 11, 2009.* Unpublished communication: 800-point ArcGIS coverage and accompanying design documentation, Corvallis, OR: US Environmental Protection Agency, Office of Research and Development, NHEERL-Western Ecology Division.

Perry, C.A., D.M. Wolock, and J.C. Artman. 2002. *Estimates of median flows for streams on the Kansas Surface Water Register; Water-Resources Investigations Report 02-4292.* Lawrence, KS: US Geological Survey.

State of Kansas. January 2015. "A long term vision for the future of water supply in Kansas, developed based upon input from the citizens of Kansas. 81 pp." Topeka, KS.

State of Kansas. 2017. *Blue Ribbon Funding Task Force for Water Resource Management, Final Reprot to Governor Sam Brownback.* whitepaper, Topeka, KS: Kansas Water Office.

Stephen, Charles E., Donald I. Mount, David J. Hansen, John R. Gentil, Gary A. Chapman, and William A. Brungs. 1985. *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection Of Aquatic Organisms and Their Uses (PB85-227049).* whitepaper, Washington, DC: United States Environmental Protection Agency.

Stevens, D.L., and A.R. Olsen. 2004. "Spatially balanced sampling of natural resources." *Journal of the American Statistical Association* 99: 262-278.

Stevens, D.L., and A.R. Olsen. 2003. "Variance estimation for spatially balanced samples of environmental resources." *Environmentrics* 14: 593-610.

Stone, M.L. 2017. *Eighty years of cooperative water science (ver. 1.1, October 2019).* U.S. Geological Survey General Information Product 174, US Geological Survey.

Stone, ML, BJ Klager, and AC Ziegler. 2019. *Water-quality and geochemical variability in the Little Arkansas River and Equus Beds aquifer, south-central Kansas, 2001–16.* US Geological Survey Scientific Investigations Report 2019–5026, US Geological Survey.

Strahler, A.N. 1957. "Quantitative analysis of watershed geomorphology." *American Geophysical Union Transactions* 38L 913-920.

Tappa, D.J., J.L. Lanning-Rush, B.J. Klager, C.V. Hansen, and A. Ziegler. 2015. *Water Quality of the Little Arkansas River and Equus Beds Aquifer Before and Concurrent with Large-Scale Artificial Recharge, South-Central Kansas, 1995–2012 (Scientific Investigations Report 2015-5023).* Washington, D.C.: USGS.

Urquhart, N.S., S.G. Paulsen, and D.P. Larsen. 1998. "Monitoring for regional and policy-relevant trends over time." *Ecological Applications* 8: 246-257.

USEPA. October 2011. *A Primer on Using Biological Assessments to Support Water Quality Management (801-R-11-01).* Washington, DC: USEPA.

USEPA. 2013. *Contaminants of Emerging Concern (CECs) in Fish: Pharmaceuticals and Personal Care Products (PPCPs) (EPA 820-F-13-004).* Washington, DC: United States Environgmental Protection Agency.

USEPA. 2000. *Guidance for assessing chemical contaminant data for use in fish advisories. Volume 1: Fish sampling and analysis (3rd Edition), USEPA 823-B-00-007.* Washington, D.C.: U.S. Environmental Protection Agency, Office of Science and Technology and

Office of Water, 360 pp + appendices.
USEPA. 2000. *Guidance for assessing chemical contaminant data for use in fish advisories. Volume 2: Risk assessment and fish consumption limits (3rd Edition).* Washington, D.C.: U.S. Environmental Protection Agency, Office of Science and Technology and Office of Water, 257 pp + appendices.
USEPA. 2004. *Wadeable streams assessment site evaluation guidelines. USEPA841-B-04-006* . Washington, D.C.. 15 pp: U.S. Environmental Protection Agency, Office of Water and Office of Environmental Information, 15 pp.
USEPA. 2006. *Wadeable Streams Assessment: A collaborative survey of the nation's streams. USEPA 841-B-06-002 r.* Washington, D.C.: U.S. Environmental Protection Agency, Office of Research and Development and Office of Wate, ii + 98 pp.
Willms, W.D., O.R. Kenzie, T.A. McAllister, D. Colwell, D. Viera, J.F. Wilmshurst, T. Entz, and M.E. Olson. 2002. "Effects of water quality on cattle performance." *Journal of Range Management* 55: 452-260.
Young, D.P., R.W. Buddemeier, D.O. Whittemore, and H. Rubin. 2001. *Final Summary and Data Report: The Equus Beds Mineral Intrusion Project (Open-file Report 2000-30).* Lawrence, KS: Kansas Geological Survey.

APPENDICES

Appendix A. Routine and Supplemental Parameters

I. APPENDIX A-1: WATER CHEMISTRY PARAMETERS

Routine and supplemental water chemistry and related parameters analyzed by the Targeted Stream Chemistry Monitoring Program, the Lake and Wetland Program, and the Probabilistic Stream Monitoring Program. R = routine / s = supplemental / . = N/A

TYPE	PARAMETER	Targeted Stream Chemistry Program	Probabilistic Stream Program	Lake and Wetland Program
Inorganic / Composite	Alkalinity, total (as CaCO3)	R	R	R
Inorganic / Composite	Aluminum, total recoverable	R	R	R
Inorganic / Composite	Ammonia, total (as N)	R	R	R
Inorganic / Composite	Antimony, total recoverable	R	R	R
Inorganic / Composite	Arsenic, total recoverable	R	R	R
Inorganic / Composite	Barium, total recoverable	R	R	R
Inorganic / Composite	Beryllium, total recoverable	R	R	R
Inorganic / Composite	Boron, total recoverable	R	R	R
Inorganic / Composite	Bromide	R	R	R
Inorganic / Composite	Cadmium, total recoverable	R	R	R
Inorganic / Composite	Calcium, total recoverable	R	R	R
Inorganic / Composite	Carbon, total inorganic (calculated)	.	.	R
Inorganic / Composite	Carbon, total organic	R	R	R
Inorganic / Composite	Chloride	R	R	R
Inorganic / Composite	Chromium, total recoverable	R	R	R
Inorganic / Composite	Cobalt, total recoverable	R	R	R
Inorganic / Composite	Conductivity (field)	R	R	.
Inorganic / Composite	Copper, total recoverable	R	R	R
Inorganic / Composite	Dissolved oxygen (lab)	R	R	R
Inorganic / Composite	Dissolved oxygen (field)	.	R	R
Inorganic / Composite	Fluoride	R	R	R
Inorganic / Composite	Hardness, total (as CaCO3)	R	R	R
Inorganic / Composite	Iron, total recoverable	R	R	R
Inorganic / Composite	Kjeldahl nitrogen	R	R	R
Inorganic / Composite	Lead, total recoverable	R	R	R
Inorganic / Composite	Magnesium, total recoverable	R	R	R
Inorganic / Composite	Manganese, total recoverable	R	R	R
Inorganic / Composite	Mercury, total	R	R	R

TYPE	PARAMETER	Targeted Stream Chemistry Program	Probabilistic Stream Program	Lake and Wetland Program
Inorganic / Composite	Molybdenum, total recoverable	R	R	R
Inorganic / Composite	Nickel, total recoverable	R	R	R
Inorganic / Composite	Nitrate (as N)	R	R	R
Inorganic / Composite	Nitrite (as N)	R	R	R
Inorganic / Composite	pH (lab)	s	s	s
Inorganic / Composite	pH (field)	R	R	R
Inorganic / Composite	Phosphate, ortho- (as P)	R	R	R
Inorganic / Composite	Phosphorus, total (as P)	R	R	R
Inorganic / Composite	Potassium, total recoverable	R	R	R
Inorganic / Composite	Selenium, total recoverable	R	R	R
Inorganic / Composite	Silica, total recoverable	R	R	R
Inorganic / Composite	Silver, total recoverable	R	R	R
Inorganic / Composite	Sodium, total recoverable	R	R	R
Inorganic / Composite	Specific conductance	R	R	R
Inorganic / Composite	Strontium, total recoverable	R	R	R
Inorganic / Composite	Sulfate	R	R	R
Inorganic / Composite	Temperature water (field)	R	R	R
Inorganic / Composite	Thallium, total recoverable	R	R	R
Inorganic / Composite	Total dissolved solids (calculated)	R	R	R
Inorganic / Composite	Total suspended solids	R	R	R
Inorganic / Composite	Turbidity	R	R	R
Inorganic / Composite	Uranium, total recoverable	R	R	R
Inorganic / Composite	Vanadium, total recoverable	R	R	R
Inorganic / Composite	Zinc, total recoverable	R	R	R
Microbiological	*Escherichia coli (E. coli)*	R	R	R
Organic	Acetochlor	R	R	R
Organic	Alachlor	R	R	R
Organic	Aldrin	R	R	R
Organic	Alpha BHC	R	R	R
Organic	Atrazine (Aatrex)	R	R	R
Organic	beta-BCH	R	R	R
Organic	Bromacil	R	R	R
Organic	Butachlor	R	R	R
Organic	Carbofuran (Furadan)	R	R	R
Organic	Chlordane	R	R	R
Organic	Cyanazine (Bladex)	R	R	R
Organic	DCPA (Dacthal)	R	R	R
Organic	Delta BHC	R	R	R

TYPE	PARAMETER	Targeted Stream Chemistry Program	Probabilistic Stream Program	Lake and Wetland Program
Organic	Dieldrin	R	R	R
Organic	Endosulfan I	R	R	R
Organic	Endosulfan II	R	R	R
Organic	Endosulfan sulfate	R	R	R
Organic	Endrin	R	R	R
Organic	Gamma BHC (Lindane)	R	R	R
Organic	Heptachlor	R	R	R
Organic	Heptachlor epoxide	R	R	R
Organic	Hexachlorobenzene	R	R	R
Organic	Hexachlorocyclopentadiene	R	R	R
Organic	Methoxychlor	R	R	R
Organic	Metolachlor (Dual)	R	R	R
Organic	Metribuzin (Sencor)	R	R	R
Organic	p,p'-DDD	R	R	R
Organic	p,p'-DDE	R	R	R
Organic	p,p'-DDT	R	R	R
Organic	PCB-1016	R	R	R
Organic	PCB-1221	R	R	R
Organic	PCB-1232	R	R	R
Organic	PCB-1242	R	R	R
Organic	PCB-1248	R	R	R
Organic	PCB-1254	R	R	R
Organic	PCB-1260	R	R	R
Organic	Prometon (Pramitol)	R	R	R
Organic	Propachlor (Ramrod)	R	R	R
Organic	Propazine (Milogard)	R	R	R
Organic	Simazine	R	R	R
Organic	Toxaphene	R	R	R
Other	Algal taxonomy (field)	s	R	R
Other	Chlorophyll-a	s	R	R
Other	Macrophyte abundance (field)	.	.	R
Other	Microcystins (by ELISA)	.	.	s
Other	Pheophytin-a	s	s	R
Other	Photosynthetically active radiation (PAR)*	.	.	s
Other	Secchi depth (field)*	.		R
Radiological	Actinium-228	s	.	.
Radiological	Americum-241	s	.	.

TYPE	PARAMETER	Targeted Stream Chemistry Program	Probabilistic Stream Program	Lake and Wetland Program
Radiological	Antimony-125	s	.	.
Radiological	Barium-140	s	.	.
Radiological	Beryllium-7	s	.	.
Radiological	Cerium-141	s	.	.
Radiological	Cerium-144	s	.	.
Radiological	Cesium-134	s	.	.
Radiological	Cesium-136	s	.	.
Radiological	Cesium-137	s	.	.
Radiological	Cobalt-57	s	.	.
Radiological	Cobalt-60	s	.	.
Radiological	Gross alpha	s	.	.
Radiological	Gross beta	s	.	.
Radiological	Indium-111	s	.	.
Radiological	Iodine-123	s	.	.
Radiological	Iodine-131	s	.	.
Radiological	Iodine-132	s	.	.
Radiological	Iodine-133	s	.	.
Radiological	Iron-59	s	.	.
Radiological	Lanthanum-140	s	.	.
Radiological	Manganese-54	s	.	.
Radiological	Molybdenum-99	s	.	.
Radiological	Neodymium-147	s	.	.
Radiological	Neptunium-239	s	.	.
Radiological	Niobium-95	s	.	.
Radiological	Potassium-40	s	.	.
Radiological	Ruthenium-103	s	.	.
Radiological	Ruthenium-106	s	.	.
Radiological	Silver-110m	s	.	.
Radiological	Technetium-99m	s	.	.
Radiological	Thorium-228	s	.	.
Radiological	Tritium	s	.	.
Radiological	Ytterbium-169	s	.	.
Radiological	Zinc-65	s	.	.
Radiological	Zirconium-95	s	.	.

II. APPENDIX A-2: FISH TISSUE PARAMETERS

Routine fish tissue parameters analyzed by the USEPA Region 7 laboratories for the Fish Tissue Contamination Program and Stream Probabilistic Monitoring Programs. R = routine / . = N/A

Type	Parameter	Fillet (through 2013 only)	Whole-fish (through 2013 only)	Fillet and Whole-fish (Current parameters)	Plug (2011 to present)
inorganic	Cadmium	R	R	.	.
inorganic	Lead	R	R	.	.
inorganic	Mercury	R	R	R	R
inorganic	Selenium	R	R	.	.
organic	1,2,4,5 -Tetrachlorobenzene	.	R	.	.
organic	p,p’-DDD	R	R	R	.
organic	p,p’-DDE	R	R	R	.
organic	p,p’-DDT	R	R	R	.
organic	Dieldrin	R	R	R	.
organic	Heptachlor	R	R	.	.
organic	Heptachlor epoxide	R	R	.	.
organic	Hexachlorobenzene	R	R	.	.
organic	gamma-Hexachlorocyclohexane (gamma-BHC)	R	R	.	.
organic	Mirex	.	R	.	.
organic	PCB-1248	R	R	R	.
organic	PCB-1254	R	R	R	.
organic	PCB-1260	R	R	R	.
organic	Pentachloroanisole	R	R	.	.
organic	Pentachlorobenzene	.	R	.	.
organic	Technical Chlordane	R	R	.	.
organic	Oxychlordane	R	.	R	.
organic	cis-Chlordanet	R	.	R	.
organic	trans-chlordane	R	.	R	.
organic	cis-Nonachlor	R	.	R	.
organic	trans-Nonachlor	R	.	R	.
organic	Trifluralin (Treflan)	R	R	.	.

Appendix B. The 303(d) Impaired Waters List

2020 303(d) List of All Impaired/Potentially Impaired Waters

Cimarron River Basin

11040002
Upper Cimarron

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Point of Rocks Lake (Moss Lake West)	Aquatic Life	Eutrophication	LM060501	MT	Lake	2023
5	Point of Rocks Lake (Moss Lake West)	Water Supply	Fluoride	LM060501	MT	Lake	2023
5	Point of Rocks Lake (Moss Lake West)	Water Supply	Sulfate	LM060501	MT	Lake	2023
3	Point of Rocks Lake (Moss Lake West)	Aquatic Life	Dissolved Oxygen	LM060501	MT	Lake	

11040006
Upper Cimarron-Liberal

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Cimarron River Near Forgan, Oklahoma	Aquatic Life	Dissolved Oxygen	SC222	ME, MT, SV, SW	Watershed	2023
5	Cimarron River Near Forgan, Oklahoma	Aquatic Life	Selenium	SC222	ME, MT, SV, SW	Watershed	2023
5	Cimarron River Near Forgan, Oklahoma	Aquatic Life	Total Phosphorus	SC222	ME, MT, SV, SW	Watershed	2023
4a	Cimarron River Near Forgan, Oklahoma	Water Supply	Chloride	SC222	ME, MT, SV, SW	Watershed	Low
4a	Cimarron River Near Forgan, Oklahoma	Aquatic Life	pH	SC222	ME, MT, SV, SW	Watershed	Low
3	Cimarron River Near Forgan, Oklahoma	Recreation	E. coli	SC222	ME, MT, SV, SW	Watershed	

11040007
Crooked Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Crooked Creek Near Englewood	Aquatic Life	Dissolved Oxygen	SC600	GY, HS, ME	Watershed	2023
5	Crooked Creek Near Englewood	Water Supply	Fluoride	SC600	GY, HS, ME	Watershed	2023

11040007
Crooked Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Crooked Creek Near Englewood	Water Supply	Chloride	SC600	GY, HS, ME	Watershed	Low
3	Crooked Creek Near Englewood	Recreation	E. coli	SC600	GY, HS, ME	Watershed	
5	Lake Meade State Park	Water Supply	Fluoride	LM010601	ME	Lake	2023
4a	Lake Meade State Park	Recreation	Aquatic Plants	LM010601	ME	Lake	High
4a	Lake Meade State Park	Aquatic Life	Dissolved Oxygen	LM010601	ME	Lake	High
4a	Lake Meade State Park	Aquatic Life	Eutrophication	LM010601	ME	Lake	High
4a	Lake Meade State Park	Aquatic Life	pH	LM010601	ME	Lake	High

11040008
Upper Cimarron-Bluff

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Big Sandy Creek Near Ashland	Aquatic Life	Dissolved Oxygen	SC738	ME, CA	Watershed	2023
5	Big Sandy Creek Near Ashland	Water Supply	Fluoride	SC738	ME, CA	Watershed	2023
4a	Big Sandy Creek Near Ashland	Water Supply	Chloride	SC738	ME, CA	Watershed	Low
4a	Big Sandy Creek Near Ashland	Water Supply	Sulfate	SC738	ME, CA	Watershed	Low
5	Bluff Creek Near Protection	Water Supply	Chloride	SC593	CA, CM	Watershed	2023
4a	Cavalry Creek Near Protection	Recreation	E. coli	SC624	KW, CM	Watershed	Medium
4a	Cimarron River Near Protection	Water Supply	Chloride	SC592	ME, CA	Watershed	Low
5	Clark Co. SFL	Aquatic Life	Eutrophication	LM010101	CA	Lake	2023
5	Day Creek Near Sitka	Aquatic Life	Dissolved Oxygen	SC701	CA, CM	Watershed	2023
4a	Day Creek Near Sitka	Water Supply	Chloride	SC701	CA, CM	Watershed	Low
4a	Lake Coldwater	Aquatic Life	Eutrophication	LM042601	CM	Lake	Low
5	St. Jacobs Well (Big Basin W.A.)	Water Supply	Fluoride	LM060001	CA	Lake	2023

11040008
Upper Cimarron-Bluff

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	St. Jacobs Well (Big Basin W.A.)	Aquatic Life	Eutrophication	LM060001	CA	Lake	High

Kansas Lower Republican River Basin

10250016
Middle Republican

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Lovewell Lake	Aquatic Life	Eutrophication	LM015001	JW	Lake	Low
4a	Lovewell Lake	Aquatic Life	pH	LM015001	JW	Lake	Low
5	Republican River Near Hardy, Nebraska	Aquatic Life	Biology	SC231	JW, SM	Watershed	2023
5	Republican River Near Hardy, Nebraska	Water Supply	Gross Alpha	SC231	JW, SM	Watershed	2023
5	Republican River Near Hardy, Nebraska	Aquatic Life	Total Phosphorus	SC231	JW, SM	Watershed	2023
4a	Republican River Near Hardy, Nebraska	Recreation	E. coli	SC231	JW, SM	Watershed	Low
4a	Republican River Near Hardy, Nebraska	Aquatic Life	Eutrophication	SC231	JW, SM	Lake	High
5	White Rock Creek Near Burr Oak	Water Supply	Arsenic	SC508	JW, SM	Watershed	2023
5	White Rock Creek Near Burr Oak	Aquatic Life	Total Phosphorus	SC508	JW, SM	Watershed	2023
5	White Rock Creek Near Burr Oak	Aquatic Life	Total Suspended Solids	SC508	JW, SM	Watershed	2023
4a	White Rock Creek Near Burr Oak	Recreation	E. coli	SC508	JW, SM	Watershed	Low
4a	White Rock Creek Near Burr Oak	Aquatic Life	Selenium	SC508	JW, SM	Watershed	Low
4a	White Rock Creek Near Burr Oak	Water Supply	Sulfate	SC508	JW, SM	Watershed	Low

10250017
Lower Republican

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Belleville City Lake	Aquatic Life	Eutrophication	LM060701	RP	Lake	Low

10250017
Lower Republican

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Buffalo Creek Near Concordia	Water Supply	Arsenic	SC509	JW, CD	Watershed	2023
5	Buffalo Creek Near Concordia	Water Supply	Lead	SC509	JW, CD	Watershed	2023
5	Buffalo Creek Near Concordia	Aquatic Life	Selenium	SC509	JW, CD	Watershed	2023
5	Buffalo Creek Near Concordia	Water Supply	Sulfate	SC509	JW, CD	Watershed	2023
5	Buffalo Creek Near Concordia	Aquatic Life	Total Suspended Solids	SC509	JW, CD	Watershed	2023
4a	Buffalo Creek Near Concordia	Aquatic Life	Eutrophication	SC509	JW, CD	Lake	High
4a	Buffalo Creek Near Concordia	Recreation	Fecal Coli	SC509	JW, CD	Watershed	Low
4a	Buffalo Creek Near Concordia	Aquatic Life	Total Phosphorus	SC509	JW, CD	Watershed	High
5	Elm Creek Near Ames	Aquatic Life	Copper	SC709	CD	Watershed	2023
5	Elm Creek Near Ames	Water Supply	Lead	SC709	CD	Watershed	2023
4a	Elm Creek Near Ames	Aquatic Life	Eutrophication	SC709	CD	Lake	High
4a	Elm Creek Near Ames	Aquatic Life	Total Phosphorus	SC709	CD	Watershed	High
3	Elm Creek Near Ames	Recreation	E. coli	SC709	CD	Watershed	
5	Five Creek Near Clay Center	Water Supply	Sulfate	SC711	CD, CY	Watershed	2023
4a	Five Creek Near Clay Center	Aquatic Life	Eutrophication	SC711	CD, CY	Lake	High
4a	Five Creek Near Clay Center	Aquatic Life	Total Phosphorus	SC711	CD, CY	Watershed	High
4a	Jamestown W.A.	Aquatic Life	Eutrophication	LM052801	CD	Lake	Low
4a	Jamestown W.A.	Recreation	Fecal Coli	LM052801	CD	Lake	Low
4a	Jamestown W.A.	Aquatic Life	pH	LM052801	CD	Lake	Low
4a	Jamestown W.A.	Water Supply	Siltation	LM052801	CD	Lake	Low
3	Jamestown W.A.	Water Supply	Arsenic	LM052801	CD	Lake	
4a	Milford Lake	Aquatic Life	Dissolved Oxygen	LM019001	CY, RL, GE	Lake	High

10250017
Lower Republican

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Milford Lake	Aquatic Life	Eutrophication	LM019001	CY, RL, GE	Lake	High
5	Mulberry Creek Near Clifton	Aquatic Life	Copper	SC710	CD, CY	Watershed	2023
5	Mulberry Creek Near Clifton	Water Supply	Lead	SC710	CD, CY	Watershed	2023
4a	Mulberry Creek Near Clifton	Aquatic Life	Eutrophication	SC710	CD, CY	Lake	High
4a	Mulberry Creek Near Clifton	Aquatic Life	Total Phosphorus	SC710	CD, CY	Watershed	High
5	Peats Creek Near Clifton	Aquatic Life	Copper	SC649	WS	Watershed	2023
5	Peats Creek Near Clifton	Water Supply	Lead	SC649	WS	Watershed	2023
4a	Peats Creek Near Clifton	Aquatic Life	Eutrophication	SC649	WS	Lake	High
4a	Peats Creek Near Clifton	Aquatic Life	Total Phosphorus	SC649	WS	Watershed	High
5	Republican River Near Clay Center	Aquatic Life	Biology	SC503	CY	Watershed	2021
5	Republican River Near Clay Center	Aquatic Life	Total Suspended Solids	SC503	CY	Watershed	2023
5	Republican River Near Clay Center	Aquatic Life	Total Suspended Solids	SC504	RP, WS, CD, CY	Watershed	2023
4a	Republican River Near Clay Center	Recreation	E. coli	SC503	CY	Watershed	Medium
4a	Republican River Near Clay Center	Recreation	E. coli	SC504	RP, WS, CD, CY	Watershed	Medium
4a	Republican River Near Clay Center	Aquatic Life	Eutrophication	SC504	RP, WS, CD, CY	Lake	High
4a	Republican River Near Clay Center	Aquatic Life	Eutrophication	SC503	CY	Lake	High
4a	Republican River Near Clay Center	Aquatic Life	Total Phosphorus	SC503	CY	Watershed	High
4a	Republican River Near Clay Center	Aquatic Life	Total Phosphorus	SC504	RP, WS, CD, CY	Watershed	High
5	Republican River Near Rice	Aquatic Life	Biology	SC510	JW, RP, CD	Watershed	2023
5	Republican River Near Rice	Water Supply	Lead	SC510	JW, RP, CD	Watershed	2023
4a	Republican River Near Rice	Recreation	E. coli	SC510	JW, RP, CD	Watershed	Medium
4a	Republican River Near Rice	Aquatic Life	Eutrophication	SC510	JW, RP, CD	Lake	High

10250017
Lower Republican

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Republican River Near Rice	Aquatic Life	Total Phosphorus	SC510	JW, RP, CD	Watershed	High
4a	Rimrock Park Lake	Aquatic Life	Dissolved Oxygen	LM070501	GE	Lake	Medium
4a	Rimrock Park Lake	Aquatic Life	Eutrophication	LM070501	GE	Lake	Medium
5	Salt Creek Near Hollis	Water Supply	Chloride	SC650	RP	Watershed	2023
5	Salt Creek Near Hollis	Aquatic Life	Total Suspended Solids	SC650	RP	Watershed	2023
4a	Salt Creek Near Hollis	Aquatic Life	Dissolved Oxygen	SC650	RP	Watershed	High
4a	Salt Creek Near Hollis	Recreation	E. coli	SC650	RP	Watershed	High
4a	Salt Creek Near Hollis	Aquatic Life	Eutrophication	SC650	RP	Lake	High
4a	Salt Creek Near Hollis	Aquatic Life	Total Phosphorus	SC650	RP	Watershed	High
5	Wolf Creek Near Concordia	Water Supply	Arsenic	SC707	CD	Watershed	2023
5	Wolf Creek Near Concordia	Aquatic Life	Dissolved Oxygen	SC707	CD	Watershed	2023
4a	Wolf Creek Near Concordia	Aquatic Life	Eutrophication	SC707	CD	Lake	High
4a	Wolf Creek Near Concordia	Aquatic Life	Total Phosphorus	SC707	CD	Watershed	High
3	Wolf Creek Near Concordia	Recreation	E. coli	SC707	CD	Watershed	

10270101
Upper Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Kansas River Near Ogden	Aquatic Life	Total Suspended Solids	SC518	RL, GE	Watershed	2023
4a	Kansas River Near Ogden	Water Supply	Chloride	SC518	RL, GE	Watershed	High
4a	Kansas River Near Ogden	Recreation	E. coli	SC518	RL, GE	Watershed	Medium
4a	Kansas River Near Ogden	Water Supply	Sulfate	SC518	RL, GE	Watershed	Low
4a	Kansas River Near Ogden	Aquatic Life	Total Phosphorus	SC518	RL, GE	Watershed	High
4a	Ogden City Lake	Aquatic Life	Eutrophication	LM011701	RL	Lake	Low
3	Sevenmile Creek Near Ogden	Aquatic Life	Biology	SC759	RL	Watershed	

10270101
Upper Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Wildcat Creek Near Manhattan	Aquatic Life	Dissolved Oxygen	SC652	RL	Watershed	High
4a	Wildcat Creek Near Manhattan	Recreation	E. coli	SC652	RL	Watershed	High

10270102
Middle Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Alma City Lake	Aquatic Life	Eutrophication	LM050001	WB	Lake	
4a	Central Park Lake	Aquatic Life	Eutrophication	LM060901	SN	Lake	Low
4a	Cross Creek Near Rossville	Recreation	E. coli	SC551	JA, PT	Watershed	High
3	Deep Creek	Aquatic Life	Biology	SB410	RL	Watershed	
3	Deep Creek Near Manhattan	Aquatic Life	Biology	SC647	RL	Watershed	
3	Dornwood Park Lake	Aquatic Life	Eutrophication	LM062301	SN	Lake	
4a	Gage Park Lake	Aquatic Life	Eutrophication	LM061101	SN	Lake	Low
5	Halfday Creek	Aquatic Life	Biology	SB376	SN, JA	Watershed	2023
3	Illinois Creek Near Alma	Aquatic Life	Biology	SC726	WB	Watershed	
4a	Kansas River At Topeka	Recreation	Fecal Coli	SC258	PT, SN, WB	Watershed	Medium
5	Kansas River At Wamego	Aquatic Life	Biology	SC260	RI, PT, WB	Watershed	2023
5	Kansas River At Wamego	Aquatic Life	Total Suspended Solids	SC260	RI, PT, WB	Watershed	2023
4a	Kansas River At Wamego	Recreation	Fecal Coli	SC260	RI, PT, WB	Watershed	Medium
4a	Kansas River At Wamego	Aquatic Life	Total Phosphorus	SC260	RI, PT, WB	Watershed	High
5	Kansas River At Willard	Aquatic Life	Biology	SC259	PT, SN, WB	Watershed	2023
5	Kansas River At Willard	Aquatic Life	Total Suspended Solids	SC259	PT, SN, WB	Watershed	2023
4a	Kansas River At Willard	Recreation	E. coli	SC259	PT, SN, WB	Watershed	High
4a	Kansas River At Willard	Aquatic Life	Total Phosphorus	SC259	PT, SN, WB	Watershed	High
4a	Lake Shawnee	Aquatic Life	Eutrophication	LM012201	SN	Lake	High

10270102
Middle Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Lost Creek Near Belvue	Water Supply	Arsenic	SC755	PT	Watershed	2023
5	Lost Creek Near Belvue	Water Supply	Chloride	SC755	PT	Watershed	2023
5	Lost Creek Near Belvue	Aquatic Life	Selenium	SC755	PT	Watershed	2023
5	Mission Creek Near Valencia	Aquatic Life	Biology	SC648	SN, WB	Watershed	2023
5	Mission Creek Near Valencia	Recreation	E. coli	SC648	SN, WB	Watershed	2023
5	Muddy Creek Near Grantville	Recreation	E. coli	SC639	JA, JF, SN	Watershed	2023
4a	Myer's Lake	Aquatic Life	Eutrophication	LM075201	SN	Lake	Low
3	Myer's Lake	Aquatic Life	pH	LM075201	SN	Lake	
3	Pillsbury Crossing W.A.	Food Procurement	Mercury	LM020301	RL	Lake	
5	Pottawatomie Co. SFL #1	Aquatic Life	Dissolved Oxygen	LM012901	PT	Lake	2022
5	Pottawatomie Co. SFL #1	Aquatic Life	Eutrophication	LM012901	PT	Lake	2022
4a	Rock Creek Near Louisville	Recreation	E. coli	SC645	PT	Watershed	High
4a	Shunganunga Creek Near Topeka	Recreation	E. coli	SC238	SN	Watershed	High
4a	Shunganunga Creek Near Topeka	Aquatic Life	Total Phosphorus	SC238	SN	Watershed	High
3	Shunganunga Creek Near Topeka	Aquatic Life	Diazinon	SC238	SN	Watershed	
4a	Soldier Creek Near Circleville	Aquatic Life	Biology	SC299	JA, NM	Watershed	High
5	Soldier Creek Near Delia	Aquatic Life	Atrazine	SC101	NM, JA	Watershed	2023
5	Soldier Creek Near Delia	Aquatic Life	Total Suspended Solids	SC101	NM, JA	Watershed	2023
4a	Soldier Creek Near Delia	Aquatic Life	Biology	SC101	NM, JA	Watershed	High
5	Soldier Creek Near Topeka	Recreation	E. coli	SC239	JA, SN	Watershed	2023
5	Topeka Public Golf Course Lake	Aquatic Life	Eutrophication	LM050101	SN	Lake	2023
5	Vermillion Creek Near Louisville	Aquatic Life	Atrazine	SC520	PT, SN, WB	Watershed	2023

10270102
Middle Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Vermillion Creek Near Louisville	Aquatic Life	Biology	SC520	PT, SN, WB	Watershed	2023
4a	Vermillion Creek Near Louisville	Recreation	E. coli	SC520	PT, SN, WB	Watershed	High
4a	Vermillion Creek Near Onaga	Recreation	E. coli	SC681	NM, PT	Watershed	High
4a	Wamego City Lake	Aquatic Life	Eutrophication	LM062101	PT	Lake	Low
3	Wamego City Lake	Food Procurement	Mercury	LM062101	PT	Lake	
4a	Warren Park Lake	Recreation	Aquatic Plants	LM062001	SN	Lake	Low
4a	Warren Park Lake	Aquatic Life	Eutrophication	LM062001	SN	Lake	Low
3	West Branch Mill Creek Near Alma	Aquatic Life	Biology	SC506	GE, WB	Watershed	

10270103
Delaware

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Atchison Co. Park Lake	Aquatic Life	Eutrophication	LM060601	AT	Lake	2023
5	Atchison Co. Park Lake	Water Supply	Siltation	LM060601	AT	Lake	2023
5	Banner Creek Lake	Aquatic Life	Eutrophication	LM032001	JA	Lake	2023
5	Delaware River at Hwy 36	Aquatic Life	Biology	SB352	BR, NM	Watershed	2023
5	Delaware River Near Half Mound	Aquatic Life	Biology	SC554	NM, BR, JA, AT	Watershed	2021
5	Delaware River Near Half Mound	Aquatic Life	Total Phosphorus	SC554	NM, BR, JA, AT	Watershed	2023
4a	Delaware River Near Half Mound	Recreation	E. coli	SC554	NM, BR, JA, AT	Watershed	High
5	Elk Creek Near Larkinburg	Aquatic Life	Total Phosphorus	SC604	JA, PT	Watershed	2023
4a	Elk Creek Near Larkinburg	Recreation	E. coli	SC604	JA, PT	Watershed	High
5	Elkhorn Lake	Aquatic Life	Eutrophication	LM061001	JA	Lake	2023
5	Grasshopper Creek Near Muscotah	Aquatic Life	Total Phosphorus	SC603	BR, AT	Watershed	2023
4a	Grasshopper Creek Near Muscotah	Aquatic Life	Atrazine	SC603	BR, AT	Watershed	Low

10270103
Delaware

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Grasshopper Creek Near Muscotah	Recreation	E. coli	SC603	BR, AT	Watershed	High
3	Lake Jayhawk	Aquatic Life	Eutrophication	LM039701	JF	Lake	
4a	Little Lake	Aquatic Life	Eutrophication	LM062601	BR	Lake	Low
4a	Mission Lake	Aquatic Life	Atrazine	LM013601	BR	Lake	High
4a	Mission Lake	Aquatic Life	Eutrophication	LM013601	BR	Lake	High
4a	Mission Lake	Water Supply	Siltation	LM013601	BR	Lake	High
5	Nebo SFL	Aquatic Life	Eutrophication	LM061501	JA	Lake	2023
4a	Perry Lake	Aquatic Life	Eutrophication	LM029001	JA, JF	Lake	High
4a	Perry W.A. Wetland	Aquatic Life	Dissolved Oxygen	LM029041	JF	Lake	Low
4a	Perry W.A. Wetland	Aquatic Life	Eutrophication	LM029041	JF	Lake	High
5	Prairie Lake	Aquatic Life	Eutrophication	LM061901	JA	Lake	2022
3	Rock Creek Near Rock Creek	Recreation	E. coli	SC684	JA, JF	Watershed	
4a	Sabetha Watershed Lake (Niehues)	Aquatic Life	Eutrophication	LM075101	NM	Lake	Low
4a	Straight Creek Near Larkinburg	Recreation	E. coli	SC686	NM, JA	Watershed	High

10270104
Lower Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Antioch Park Lake	Food Procuremnt	DDT	LM067701	JO	Lake	2023
5	Antioch Park Lake	Food Procuremnt	Dieldrin	LM067701	JO	Lake	2023
5	Antioch Park Lake	Aquatic Life	Eutrophication	LM067701	JO	Lake	2023
5	Antioch Park Lake	Food Procuremnt	Heptachlor Epoxide	LM067701	JO	Lake	2023
4a	Antioch Park Lake	Food Procurement	Chlordane	LM067701	JO	Lake	Low
5	Baker Wetlands	Aquatic Life	Eutrophication	LM014401	DG	Wetland	2022
5	Baker Wetlands	Aquatic Life	Lead	LM014401	DG	Wetland	2023

10270104
Lower Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Baker Wetlands	Aquatic Life	pH	LM014401	DG	Wetland	2022
4a	Baker Wetlands	Aquatic Life	Dissolved Oxygen	LM014401	DG	Wetland	High
4a	Buck Creek Near Williamstown	Recreation	Fecal Coli	SC677	JF	Watershed	Medium
5	Captain Creek Near Eudora	Aquatic Life	Atrazine	SC638	DG, JO	Watershed	2023
3	Captain Creek Near Eudora	Recreation	E. coli	SC638	DG, JO	Watershed	
5	Carbondale West Lake	Aquatic Life	Eutrophication	LM060801	OS	Lake	2022
4a	Cedar Creek Near Cedar Junction	Recreation	E. coli	SC252	JO	Watershed	High
4a	Cedar Creek Near Cedar Junction	Water Supply	Nitrate	SC252	JO	Watershed	High
4a	Cedar Creek Near Cedar Junction	Aquatic Life	Total Phosphorus	SC252	JO	Watershed	High
4a	Cedar Lake	Aquatic Life	Eutrophication	LM061601	JO	Lake	High
4a	Clinton Lake	Aquatic Life	Eutrophication	LM030001	SN, DG, OS	Lake	High
4a	Coal Creek Near Sibleyville	Recreation	E. coli	SC679	DG	Watershed	Medium
5	Crooked Creek Near Winchester	Aquatic Life	Atrazine	SC683	JF	Watershed	2023
4a	Crooked Creek Near Winchester	Aquatic Life	Biology	SC683	JF	Watershed	Low
4a	Crooked Creek Near Winchester	Aquatic Life	Total Phosphorus	SC683	JF	Watershed	High
3	Crooked Creek Near Winchester	Recreation	E. coli	SC683	JF	Watershed	
5	Douglas Co. SFL	Aquatic Life	Eutrophication	LM011301	DG	Lake	2022
4a	Frisco Lake	Aquatic Life	Eutrophication	LM065201	JO	Lake	Low
4a	Gardner City Lake	Aquatic Life	Dissolved Oxygen	LM040401	JO	Lake	High
4a	Gardner City Lake	Aquatic Life	Eutrophication	LM040401	JO	Lake	High
5	Kansas River At Desoto	Aquatic Life	Total Suspended Solids	SC254	LV, JO	Watershed	2023
4a	Kansas River At Desoto	Aquatic Life	Biology	SC254	LV, JO	Watershed	Medium

10270104
Lower Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Kansas River At Desoto	Aquatic Life	Biology/Sediment	SC254	LV, JO	Watershed	Medium
4a	Kansas River At Desoto	Recreation	E. coli	SC254	LV, JO	Watershed	High
4a	Kansas River At Desoto	Aquatic Life	Total Phosphorus	SC254	LV, JO	Watershed	High
5	Kansas River At Eudora	Food Procurement	PCB	SC255	JF, LV, DG	Watershed	2023
5	Kansas River At Eudora	Aquatic Life	Total Suspended Solids	SC255	JF, LV, DG	Watershed	2023
4a	Kansas River At Eudora	Aquatic Life	Biology	SC255	JF, LV, DG	Watershed	Medium
4a	Kansas River At Eudora	Recreation	E. coli	SC255	JF, LV, DG	Watershed	High
4a	Kansas River At Eudora	Aquatic Life	Total Phosphorus	SC255	JF, LV, DG	Watershed	High
5	Kansas River At Kansas City, Kansas	Aquatic Life	Total Suspended Solids	SC203	LV, WY, JO	Watershed	2023
4a	Kansas River At Kansas City, Kansas	Aquatic Life	Biology	SC203	LV, WY, JO	Watershed	Medium
4a	Kansas River At Kansas City, Kansas	Aquatic Life	Biology/Sediment	SC203	LV, WY, JO	Watershed	Medium
4a	Kansas River At Kansas City, Kansas	Recreation	E. coli	SC203	LV, WY, JO	Watershed	High
4a	Kansas River At Kansas City, Kansas	Aquatic Life	Total Phosphorus	SC203	LV, WY, JO	Watershed	High
5	Kansas River At Lecompton	Aquatic Life	Total Suspended Solids	SC257	JF, SN, DG	Watershed	2023
4a	Kansas River At Lecompton	Aquatic Life	Biology	SC257	JF, SN, DG	Watershed	Medium
4a	Kansas River At Lecompton	Recreation	E. coli	SC257	JF, SN, DG	Watershed	High
4a	Kansas River At Lecompton	Aquatic Life	Total Phosphorus	SC257	JF, SN, DG	Watershed	High
5	Kill Creek At Desoto	Aquatic Life	Atrazine	SC253	JO	Watershed	2023
4a	Kill Creek At Desoto	Recreation	E. coli	SC253	JO	Watershed	High
4a	Kill Creek At Desoto	Aquatic Life	Total Phosphorus	SC253	JO	Watershed	High
5	Lake Quivera	Aquatic Life	Eutrophication	LM022701	JO	Lake	2023
4a	Lakeview Estates Lake	Recreation	Aquatic Plants	LM075301	SN	Lake	Low

10270104
Lower Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Lakeview Estates Lake	Aquatic Life	Eutrophication	LM075301	SN	Lake	Low
5	Leavenworth Co. SFL	Aquatic Life	Eutrophication	LM012301	LV	Lake	2022
5	Lenexa Lake	Aquatic Life	Eutrophication	LM022601	JO	Lake	2022
4a	Lone Star Lake	Aquatic Life	Eutrophication	LM011401	DG	Lake	Low
5	Mahaffie Farmstead Lake	Aquatic Life	Eutrophication	LM020401	JO	Lake	2023
4a	Mary's Lake	Aquatic Life	Dissolved Oxygen	LM061401	DG	Lake	Medium
4a	Mary's Lake	Aquatic Life	Eutrophication	LM061401	DG	Lake	Medium
4a	Mary's Lake	Aquatic Life	pH	LM061401	DG	Lake	Medium
4a	Mill Creek Near Shawnee	Aquatic Life	Biology	SC251	JO	Watershed	High
4a	Mill Creek Near Shawnee	Aquatic Life	Biology/Sediment	SC251	JO	Watershed	Medium
4a	Mill Creek Near Shawnee	Water Supply	Chloride	SC251	JO	Watershed	Low
4a	Mill Creek Near Shawnee	Recreation	E. coli	SC251	JO	Watershed	High
4a	Mill Creek Near Shawnee	Aquatic Life	Total Phosphorus	SC251	JO	Watershed	High
3	Mill Creek Near Shawnee	Aquatic Life	Diazinon	SC251	JO	Watershed	
4a	New Olathe Lake	Aquatic Life	Eutrophication	LM061301	JO	Lake	High
4a	Nine Mile Creek Near Linwood	Recreation	Fecal Coli	SC680	JF, LV, DG	Watershed	High
4a	Olathe Waterworks Lakes	Aquatic Life	Eutrophication	LM062201	JO	Lake	Low
5	Overbrook Lake	Aquatic Life	Eutrophication	LM020501	OS	Lake	2023
4a	Pierson Park Lake	Aquatic Life	Eutrophication	LM061801	WY	Lake	Low
4a	Potter's Lake	Aquatic Life	Eutrophication	LM073401	DG	Lake	Low
5	Rose's Lake	Aquatic Life	Eutrophication	LM062501	JO	Lake	2022
5	Stranger Creek Near Easton	Aquatic Life	Atrazine	SC602	AT, JF, LV	Watershed	2023
5	Stranger Creek Near Easton	Aquatic Life	Biology	SC602	AT, JF, LV	Watershed	2023
5	Stranger Creek Near Easton	Aquatic Life	Total Suspended Solids	SC602	AT, JF, LV	Watershed	2023

10270104
Lower Kansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Stranger Creek Near Easton	Recreation	E. coli	SC602	AT, JF, LV	Watershed	High
4a	Stranger Creek Near Easton	Aquatic Life	Total Phosphorus	SC602	AT, JF, LV	Watershed	High
5	Stranger Creek Near Linwood	Aquatic Life	Atrazine	SC501	LV	Watershed	2023
5	Stranger Creek Near Linwood	Aquatic Life	Biology	SC501	LV	Watershed	2023
4a	Stranger Creek Near Linwood	Recreation	E. coli	SC501	LV	Watershed	High
4a	Stranger Creek Near Linwood	Aquatic Life	Lead	SC501	LV	Watershed	Low
5	Strowbridge Reservoir	Aquatic Life	Eutrophication	LM051201	OS	Lake	2022
4a	Sunflower Park Lake	Aquatic Life	Dissolved Oxygen	LM073601	JO	Lake	Medium
4a	Sunflower Park Lake	Aquatic Life	Eutrophication	LM073601	JO	Lake	Medium
5	Turkey Creek	Aquatic Life	Ammonia	NPDES55492	JO	Facility	2023
5	Wakarusa River Near Eudora	Aquatic Life	Biology	SC500	DG	Watershed	2023
5	Wakarusa River Near Eudora	Aquatic Life	Total Suspended Solids	SC500	DG	Watershed	2023
4a	Wakarusa River Near Eudora	Recreation	E. coli	SC500	DG	Watershed	High
4a	Wakarusa River Near Eudora	Aquatic Life	Total Phosphorus	SC500	DG	Watershed	High
4a	Wakarusa River Near Topeka	Aquatic Life	Biology	SC109	SN, OS	Watershed	High
4a	Wakarusa River Near Topeka	Aquatic Life	Biology/Sediment	SC109	SN, OS	Watershed	High
4a	Wakarusa River Near Topeka	Recreation	E. coli	SC109	SN, OS	Watershed	High
4a	Washington Creek Near Lawrence	Aquatic Life	Dissolved Oxygen	SC678	DG	Watershed	High

10270205
Lower Big Blue

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Big Blue River Near Blue Rapids	Aquatic Life	Copper	SC240	MS	Watershed	2023

10270205
Lower Big Blue

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Big Blue River Near Blue Rapids	Water Supply	Lead	SC240	MS	Watershed	2023
5	Big Blue River Near Blue Rapids	Aquatic Life	pH	SC240	MS	Watershed	2023
5	Big Blue River Near Blue Rapids	Aquatic Life	Total Phosphorus	SC240	MS	Watershed	2023
5	Big Blue River Near Blue Rapids	Aquatic Life	Total Suspended Solids	SC240	MS	Watershed	2023
4a	Big Blue River Near Blue Rapids	Aquatic Life	Atrazine	SC240	MS	Watershed	High
4a	Big Blue River Near Blue Rapids	Recreation	E. coli	SC240	MS	Watershed	High
5	Big Blue River Near Oketo	Water Supply	Arsenic	SC233	MS	Watershed	2023
5	Big Blue River Near Oketo	Aquatic Life	Biology	SC233	MS	Watershed	2021
5	Big Blue River Near Oketo	Water Supply	Lead	SC233	MS	Watershed	2023
5	Big Blue River Near Oketo	Aquatic Life	pH	SC233	MS	Watershed	2023
5	Big Blue River Near Oketo	Aquatic Life	Total Phosphorus	SC233	MS	Watershed	2023
5	Big Blue River Near Oketo	Aquatic Life	Total Suspended Solids	SC233	MS	Watershed	2023
4a	Big Blue River Near Oketo	Aquatic Life	Atrazine	SC233	MS	Watershed	High
4a	Big Blue River Near Oketo	Recreation	E. coli	SC233	MS	Watershed	High
5	Black Vermillion River Near Frankfort	Aquatic Life	Biology	SC505	MS,NM	Watershed	2021
5	Black Vermillion River Near Frankfort	Water Supply	Lead	SC505	MS,NM	Watershed	2023
5	Black Vermillion River Near Frankfort	Aquatic Life	Total Phosphorus	SC505	MS,NM	Watershed	2023
4a	Black Vermillion River Near Frankfort	Aquatic Life	Atrazine	SC505	MS,NM	Watershed	High
4a	Black Vermillion River Near Frankfort	Recreation	E. coli	SC505	MS,NM	Watershed	High
4a	Centralia Lake	Recreation	Aquatic Plants	LM073701	NM	Lake	Medium
4a	Centralia Lake	Aquatic Life	Eutrophication	LM073701	NM	Lake	Medium

10270205
Lower Big Blue

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Centralia Lake	Aquatic Life	pH	LM073701	NM	Lake	Medium
3	Centralia Lake	Water Supply	Arsenic	LM073701	NM	Lake	
5	Fancy Creek Near Randolph	Water Supply	Sulfate	SC502	WS, CY, RL	Watershed	2023
4a	Fancy Creek Near Randolph	Aquatic Life	Atrazine	SC502	WS, CY, RL	Watershed	High
4a	Fancy Creek Near Randolph	Recreation	E. coli	SC502	WS, CY, RL	Watershed	Medium
5	Horseshoe Creek	Aquatic Life	Biology	SB475	MS	Watershed	2021
5	Horseshoe Creek Near Marysville	Water Supply	Sulfate	SC717	MR, CS	Watershed	2023
5	Horseshoe Creek Near Marysville	Aquatic Life	Total Phosphorus	SC717	MR, CS	Watershed	2023
4a	Horseshoe Creek Near Marysville	Aquatic Life	Atrazine	SC717	MR, CS	Watershed	High
4a	Horseshoe Creek Near Marysville	Recreation	E. coli	SC717	MR, CS	Watershed	High
5	North Elm Creek Near Oketo	Aquatic Life	Total Phosphorus	SC731	MS, NM	Watershed	2023
4a	North Elm Creek Near Oketo	Aquatic Life	Atrazine	SC731	MS, NM	Watershed	High
5	North Fork Black Vermillion River Near Vliets	Aquatic Life	Biology	SC128	MS, NM	Watershed	2021
5	Robidoux Creek near Frankfort	Aquatic Life	Total Phosphorus	SC754	MS	Watershed	2023
3	Rocky Ford W.A.	Food Procurement	Mercury	LM020601	RL	Lake	
5	Spring Creek	Aquatic Life	Biology	SB476	MS	Watershed	2021
4a	Tuttle Creek Lake	Aquatic Life	Atrazine	LM021001	MS, RL, PT	Lake	High
4a	Tuttle Creek Lake	Aquatic Life	Eutrophication	LM021001	MS, RL, PT	Lake	High
4a	Tuttle Creek Lake	Water Supply	Siltation	LM021001	MS, RL, PT	Lake	High

10270207
Lower Little Blue

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Lake Idlewild	Aquatic Life	Eutrophication	LM061201	MS	Lake	Low

10270207
Lower Little Blue

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Little Blue River Near Hollenberg	Aquatic Life	Biology	SC232	RP, WS	Watershed	2021
5	Little Blue River Near Hollenberg	Aquatic Life	pH	SC232	RP, WS	Watershed	2023
5	Little Blue River Near Hollenberg	Aquatic Life	Total Phosphorus	SC232	RP, WS	Watershed	2023
5	Little Blue River Near Hollenberg	Aquatic Life	Total Suspended Solids	SC232	RP, WS	Watershed	2023
4a	Little Blue River Near Hollenberg	Aquatic Life	Atrazine	SC232	RP, WS	Watershed	High
4a	Little Blue River Near Hollenberg	Recreation	E. coli	SC232	RP, WS	Watershed	High
5	Little Blue River Near Waterville	Water Supply	Lead	SC741	WS, MS	Watershed	2023
5	Little Blue River Near Waterville	Aquatic Life	Total Phosphorus	SC741	WS, MS	Watershed	2023
5	Little Blue River Near Waterville	Aquatic Life	Total Suspended Solids	SC741	WS, MS	Watershed	2023
4a	Little Blue River Near Waterville	Aquatic Life	Atrazine	SC741	WS, MS	Watershed	High
4a	Little Blue River Near Waterville	Recreation	E. coli	SC741	WS, MS	Watershed	High
5	Mill Creek Near Hanover	Water Supply	Lead	SC507	RP, WS	Watershed	2023
5	Mill Creek Near Hanover	Aquatic Life	Total Phosphorus	SC507	RP, WS	Watershed	2023
5	Mill Creek Near Hanover	Aquatic Life	Total Suspended Solids	SC507	RP, WS	Watershed	2023
4a	Mill Creek Near Hanover	Aquatic Life	Atrazine	SC507	RP, WS	Watershed	High
4a	Mill Creek Near Hanover	Recreation	E. coli	SC507	RP, WS	Watershed	High
5	Rose Creek Near Narka	Water Supply	Arsenic	SC712	RP	Watershed	2023
5	Rose Creek Near Narka	Water Supply	Lead	SC712	RP	Watershed	2023
5	Rose Creek Near Narka	Aquatic Life	Total Phosphorus	SC712	RP	Watershed	2023
4a	Rose Creek Near Narka	Aquatic Life	Atrazine	SC712	RP	Watershed	High
3	Rose Creek Near Narka	Recreation	E. coli	SC712	RP	Watershed	

10270207
Lower Little Blue

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Washington Co. SFL	Aquatic Life	Eutrophication	LM010901	WS	Lake	2023
4a	Washington Co. SFL	Recreation	Aquatic Plants	LM010901	WS	Lake	Low
4a	Washington Co. SFL	Aquatic Life	Dissolved Oxygen	LM010901	WS	Lake	Low
5	Washington W.A.	Aquatic Life	Lead	LM010941	WS	Lake	2023
4a	Washington W.A.	Aquatic Life	Eutrophication	LM010941	WS	Lake	Low
4a	Washington W.A.	Water Supply	Siltation	LM010941	WS	Lake	Low
3	Washington W.A.	Aquatic Life	Dissolved Oxygen	LM010941	WS	Lake	

Lower Arkansas River Basin

11030009
Rattlesnake

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Kiowa Co. SFL	Aquatic Life	Eutrophication	LM042801	KW	Lake	
5	Quivira Big Salt Marsh	Aquatic Life	Ammonia	LM050601	SF	Lake	2023
4a	Quivira Big Salt Marsh	Water Supply	Chloride	LM050601	SF	Lake	Low
4a	Quivira Big Salt Marsh	Aquatic Life	Eutrophication	LM050601	SF	Lake	High
4a	Quivira Big Salt Marsh	Aquatic Life	pH	LM050601	SF	Lake	High
4a	Quivira Big Salt Marsh	Water Supply	Siltation	LM050601	SF	Lake	High
4a	Quivira Little Salt Marsh	Water Supply	Chloride	LM050201	SF	Lake	Low
4a	Quivira Little Salt Marsh	Aquatic Life	Eutrophication	LM050201	SF	Lake	High
4a	Quivira Little Salt Marsh	Aquatic Life	pH	LM050201	SF	Lake	High
4a	Quivira Little Salt Marsh	Water Supply	Siltation	LM050201	SF	Lake	High
4a	Rattlesnake Creek Near Hudson	Water Supply	Chloride	SC660	SF, ED, KW	Watershed	Low

11030010
Gar-Peace

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Arkansas River At Wichita	Water Supply	Chloride	SC758	SG	Watershed	High

11030010
Gar-Peace

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Arkansas River At Wichita	Aquatic Life	Total Phosphorus	SC758	SG	Watershed	High
5	Arkansas River Near Hutchinson	Aquatic Life	Selenium	SC523	RC, RN	Watershed	2023
4a	Arkansas River Near Hutchinson	Aquatic Life	Biology	SC523	RC, RN	Watershed	Medium
4a	Arkansas River Near Hutchinson	Water Supply	Chloride	SC523	RC, RN	Watershed	Medium
4a	Arkansas River Near Hutchinson	Aquatic Life	Total Phosphorus	SC523	RC, RN	Watershed	High
4a	Arkansas River Near Maize	Aquatic Life	Biology	SC536	RN, SG	Watershed	Medium
4a	Arkansas River Near Maize	Water Supply	Chloride	SC536	RN, SG	Watershed	Medium
4a	Arkansas River Near Maize	Aquatic Life	Total Phosphorus	SC536	RN, SG	Watershed	High
5	Arkansas River Near Yoder	Aquatic Life	Selenium	SC524	RN	Watershed	2023
4a	Arkansas River Near Yoder	Aquatic Life	Biology	SC524	RN	Watershed	Medium
4a	Arkansas River Near Yoder	Water Supply	Chloride	SC524	RN	Watershed	Medium
4a	Arkansas River Near Yoder	Aquatic Life	Total Phosphorus	SC524	RN	Watershed	High
4a	Carey Park Lake	Aquatic Life	Eutrophication	LM063001	RN	Lake	Low
4a	Peace Creek Near Sterling	Water Supply	Chloride	SC658	SF, RN, PR	Watershed	Low
4a	Peace Creek Near Sterling	Recreation	E. coli	SC658	SF, RN, PR	Watershed	Medium
4a	Peace Creek Near Sterling	Aquatic Life	pH	SC658	SF, RN, PR	Watershed	Medium
5	Salt Creek Near Hutchinson	Recreation	E. coli	SC659	RN	Watershed	2023
4a	Salt Creek Near Hutchinson	Water Supply	Chloride	SC659	RN	Watershed	Medium
4a	Salt Creek Near Hutchinson	Aquatic Life	pH	SC659	RN	Watershed	Medium

11030011
Cow Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Barton Lake	Aquatic Life	Eutrophication	LM072701	BT	Lake	2023
5	Cheyenne Bottoms	Water Supply	Siltation	LM050401	BT	Lake	2023

11030011
Cow Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Cheyenne Bottoms	Aquatic Life	Dissolved Oxygen	LM050401	BT	Lake	High
4a	Cheyenne Bottoms	Aquatic Life	Eutrophication	LM050401	BT	Lake	High
5	Cow Creek Near Hutchinson	Food Procurement	PCB	SC287	RN	Watershed	2023
5	Cow Creek Near Hutchinson	Aquatic Life	Selenium	SC287	RN	Watershed	2023
4a	Cow Creek Near Hutchinson	Aquatic Life	Biology	SC287	RN	Watershed	Medium
4a	Cow Creek Near Hutchinson	Water Supply	Chloride	SC287	RN	Watershed	Medium
4a	Cow Creek Near Hutchinson	Recreation	E. coli	SC287	RN	Watershed	High
5	Cow Creek Near Lyons	Water Supply	Arsenic	SC657	EW, BT, RC	Watershed	2023
5	Cow Creek Near Lyons	Aquatic Life	Total Phosphorus	SC657	EW, BT, RC	Watershed	2023
5	Cow Creek Near Lyons	Aquatic Life	Total Suspended Solids	SC657	EW, BT, RC	Watershed	2023
4a	Cow Creek Near Lyons	Water Supply	Chloride	SC657	EW, BT, RC	Watershed	Medium
4a	Cow Creek Near Lyons	Recreation	Fecal Coli	SC657	EW, BT, RC	Watershed	High
5	Cow Creek Near Willowbrook	Aquatic Life	Selenium	SC522	RC, RN	Watershed	2023
5	Cow Creek Near Willowbrook	Aquatic Life	Total Phosphorus	SC522	RC, RN	Watershed	2023
5	Cow Creek Near Willowbrook	Aquatic Life	Total Suspended Solids	SC522	RC, RN	Watershed	2023
4a	Cow Creek Near Willowbrook	Water Supply	Chloride	SC522	RC, RN	Watershed	Medium
4a	Cow Creek Near Willowbrook	Recreation	E. coli	SC522	RC, RN	Watershed	High
5	Little Cow Creek Near Lyons	Aquatic Life	Total Phosphorus	SC656	EW, RC	Watershed	2023
4a	Little Cow Creek Near Lyons	Water Supply	Chloride	SC656	EW, RC	Watershed	Medium
4a	Little Cow Creek Near Lyons	Aquatic Life	Dissolved Oxygen	SC656	EW, RC	Watershed	High
4a	Little Cow Creek Near Lyons	Recreation	E. coli	SC656	EW, RC	Watershed	High
3	Little Cow Creek Near Lyons	Aquatic Life	Diazinon	SC656	EW, RC	Watershed	
5	Sterling City Lake	Aquatic Life	Eutrophication	LM064801	RC	Lake	2023

11030012
Little Arkansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Black Kettle Creek Near Halstead	Water Supply	Arsenic	SC705	MP, HV	Watershed	2023
5	Black Kettle Creek Near Halstead	Aquatic Life	Copper	SC705	MP, HV	Watershed	2023
5	Black Kettle Creek Near Halstead	Aquatic Life	Dissolved Oxygen	SC705	MP, HV	Watershed	2023
5	Black Kettle Creek Near Halstead	Aquatic Life	Total Phosphorus	SC705	MP, HV	Watershed	2020
4a	Black Kettle Creek Near Halstead	Aquatic Life	Biology	SC705	MP, HV	Watershed	High
4a	Black Kettle Creek Near Halstead	Aquatic Life	Biology/Sediment	SC705	MP, HV	Watershed	High
4a	Black Kettle Creek Near Halstead	Aquatic Life	Total Suspended Solids	SC705	MP, HV	Watershed	High
5	Buhler City Lake	Aquatic Life	Eutrophication	LM050701	RN	Lake	2023
4a	Dillon Park Lakes	Aquatic Life	Eutrophication	LM063101	RN	Lake	Medium
4a	Dillon Park Lakes	Aquatic Life	pH	LM063101	RN	Lake	Medium
5	Emma Creek Near Sedgwick	Water Supply	Arsenic	SC534	MP, MN, HV	Watershed	2023
5	Emma Creek Near Sedgwick	Aquatic Life	Dissolved Oxygen	SC534	MP, MN, HV	Watershed	2023
5	Emma Creek Near Sedgwick	Aquatic Life	Total Phosphorus	SC534	MP, MN, HV	Watershed	2020
4b	Emma Creek Near Sedgwick	Aquatic Life	Atrazine	SC534	MP, MN, HV	Watershed	Low
4a	Emma Creek Near Sedgwick	Aquatic Life	Biology	SC534	MP, MN, HV	Watershed	High
4a	Emma Creek Near Sedgwick	Aquatic Life	Biology/Sediment	SC534	MP, MN, HV	Watershed	High
4a	Emma Creek Near Sedgwick	Recreation	E. coli	SC534	MP, MN, HV	Watershed	High
4a	Harvey Co. Camp Hawk Lake	Aquatic Life	Eutrophication	LM063401	HV	Lake	Low
4a	Harvey Co. Camp Hawk Lake	Water Supply	Siltation	LM063401	HV	Lake	Low
4a	Harvey Co. West Park Lake	Aquatic Life	Eutrophication	LM049001	HV	Lake	Low
3	Harvey Co. West Park Lake	Aquatic Life	Dissolved Oxygen	LM049001	HV	Lake	
3	Inman Lake	Aquatic Life	Copper	LM050301	MP	Lake	

11030012
Little Arkansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Inman Lake	Aquatic Life	Lead	LM050301	MP	Lake	
3	Inman Lake	Water Supply	Siltation	LM050301	MP	Lake	
5	Kisiwa Creek Near Halstead	Aquatic Life	Atrazine	SC703	HV, RN	Watershed	2023
5	Kisiwa Creek Near Halstead	Aquatic Life	Dissolved Oxygen	SC703	HV, RN	Watershed	2023
5	Kisiwa Creek Near Halstead	Aquatic Life	Total Phosphorus	SC703	HV, RN	Watershed	2020
4a	Kisiwa Creek Near Halstead	Aquatic Life	Biology	SC703	HV, RN	Watershed	High
4a	Kisiwa Creek Near Halstead	Aquatic Life	Biology/Sediment	SC703	HV, RN	Watershed	High
4a	Kisiwa Creek Near Halstead	Aquatic Life	Total Suspended Solids	SC703	HV, RN	Watershed	High
5	Little Arkansas River At Alta Mills	Water Supply	Arsenic	SC246	MP, RC, RN	Watershed	2023
5	Little Arkansas River At Alta Mills	Aquatic Life	Atrazine	SC246	MP, RC, RN	Watershed	2023
5	Little Arkansas River At Alta Mills	Aquatic Life	Selenium	SC246	MP, RC, RN	Watershed	2023
5	Little Arkansas River At Alta Mills	Aquatic Life	Total Phosphorus	SC246	MP, RC, RN	Watershed	2020
4a	Little Arkansas River At Alta Mills	Aquatic Life	Biology	SC246	MP, RC, RN	Watershed	High
4a	Little Arkansas River At Alta Mills	Aquatic Life	Biology/Sediment	SC246	MP, RC, RN	Watershed	High
4a	Little Arkansas River At Alta Mills	Water Supply	Chloride	SC246	MP, RC, RN	Watershed	Medium
4a	Little Arkansas River At Alta Mills	Recreation	E. coli	SC246	MP, RC, RN	Watershed	High
4a	Little Arkansas River At Alta Mills	Aquatic Life	Total Suspended Solids	SC246	MP, RC, RN	Watershed	High
5	Little Arkansas River At Valley Center	Aquatic Life	Atrazine	SC282	HV, SG	Watershed	2023
5	Little Arkansas River At Valley Center	Aquatic Life	Total Phosphorus	SC282	HV, SG	Watershed	2020
4a	Little Arkansas River At Valley Center	Aquatic Life	Biology	SC282	HV, SG	Watershed	High
4a	Little Arkansas River At Valley Center	Aquatic Life	Biology/Sediment	SC282	HV, SG	Watershed	High

11030012
Little Arkansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Little Arkansas River At Valley Center	Recreation	E. coli	SC282	HV, SG	Watershed	High
4a	Little Arkansas River At Valley Center	Aquatic Life	Total Suspended Solids	SC282	HV, SG	Watershed	High
5	Little Arkansas River At Wichita	Aquatic Life	Atrazine	SC728	SG, SU	Watershed	2023
5	Little Arkansas River At Wichita	Food Procurement	Mercury	SC728	SG, SU	Watershed	2023
5	Little Arkansas River At Wichita	Food Procurement	PCB	SC728	SG, SU	Watershed	2023
4a	Little Arkansas River At Wichita	Aquatic Life	Biology	SC728	SG, SU	Watershed	High
4a	Little Arkansas River At Wichita	Aquatic Life	Biology/Sediment	SC728	SG, SU	Watershed	High
4a	Little Arkansas River At Wichita	Recreation	E. coli	SC728	SG, SU	Watershed	High
4a	Little Arkansas River At Wichita	Aquatic Life	Total Phosphorus	SC728	SG, SU	Watershed	High
4a	Little Arkansas River At Wichita	Aquatic Life	Total Suspended Solids	SC728	SG, SU	Watershed	High
5	McPherson Wetlands	Aquatic Life	Eutrophication	LM014701	MP	Wetland	2023
4a	Mingenback Lake	Aquatic Life	Dissolved Oxygen	LM064701	MP	Lake	Medium
4a	Mingenback Lake	Aquatic Life	Eutrophication	LM064701	MP	Lake	Medium
3	Mingenback Lake	Water Supply	Siltation	LM064701	MP	Lake	
4a	Newton City Park Lake	Aquatic Life	Eutrophication	LM064201	HV	Lake	High
4b	Sand Creek Near Sedgwick	Aquatic Life	Atrazine	SC535	MN, HV	Watershed	Low
4a	Sand Creek Near Sedgwick	Aquatic Life	Biology	SC535	MN, HV	Watershed	High
4a	Sand Creek Near Sedgwick	Aquatic Life	Biology/Sediment	SC535	MN, HV	Watershed	High
4a	Sand Creek Near Sedgwick	Aquatic Life	Dissolved Oxygen	SC535	MN, HV	Watershed	Medium
4a	Sand Creek Near Sedgwick	Recreation	E. coli	SC535	MN, HV	Watershed	High
4a	Sand Creek Near Sedgwick	Water Supply	Nitrate	SC535	MN, HV	Watershed	High
4a	Sand Creek Near Sedgwick	Aquatic Life	Total Phosphorus	SC535	MN, HV	Watershed	High

11030012
Little Arkansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Turkey Creek Near Alta Mills	Water Supply	Arsenic	SC533	MP, RC, RN	Watershed	2023
5	Turkey Creek Near Alta Mills	Aquatic Life	Selenium	SC533	MP, RC, RN	Watershed	2023
4b	Turkey Creek Near Alta Mills	Aquatic Life	Atrazine	SC533	MP, RC, RN	Watershed	Low
4a	Turkey Creek Near Alta Mills	Aquatic Life	Biology	SC533	MP, RC, RN	Watershed	High
4a	Turkey Creek Near Alta Mills	Aquatic Life	Biology/Sediment	SC533	MP, RC, RN	Watershed	High
4a	Turkey Creek Near Alta Mills	Water Supply	Chloride	SC533	MP, RC, RN	Watershed	Medium
4a	Turkey Creek Near Alta Mills	Aquatic Life	Dissolved Oxygen	SC533	MP, RC, RN	Watershed	High
4a	Turkey Creek Near Alta Mills	Recreation	E. coli	SC533	MP, RC, RN	Watershed	High
4a	Turkey Creek Near Alta Mills	Aquatic Life	Total Phosphorus	SC533	MP, RC, RN	Watershed	High
4a	Turkey Creek Near Alta Mills	Aquatic Life	Total Suspended Solids	SC533	MP, RC, RN	Watershed	High

11030013
Middle Arkansas-Slate

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Arkansas River At Derby	Food Procurement	PCB	SC281	SG	Watershed	2023
4a	Arkansas River At Derby	Aquatic Life	Biology	SC281	SG	Watershed	Medium
4a	Arkansas River At Derby	Water Supply	Chloride	SC281	SG	Watershed	Medium
4a	Arkansas River At Derby	Recreation	E. coli	SC281	SG	Watershed	High
4a	Arkansas River At Derby	Water Supply	Nitrate	SC281	SG	Watershed	High
4a	Arkansas River At Derby	Aquatic Life	Total Phosphorus	SC281	SG	Watershed	High
5	Arkansas River At Oxford	Aquatic Life	Total Suspended Solids	SC527	SG, SU, CL	Watershed	2023
4a	Arkansas River At Oxford	Water Supply	Chloride	SC527	SG, SU, CL	Watershed	Medium
4a	Arkansas River At Oxford	Recreation	E. coli	SC527	SG, SU, CL	Watershed	High

11030013
Middle Arkansas-Slate

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Arkansas River At Oxford	Aquatic Life	pH	SC527	SG, SU, CL	Watershed	High
4a	Arkansas River At Oxford	Aquatic Life	Total Phosphorus	SC527	SG, SU, CL	Watershed	High
4a	Arkansas River At Wichita	Aquatic Life	Biology	SC729	SG, SU	Watershed	Low
4a	Arkansas River At Wichita	Water Supply	Chloride	SC729	SG, SU	Watershed	Medium
4a	Arkansas River At Wichita	Recreation	E. coli	SC729	SG, SU	Watershed	High
4a	Arkansas River At Wichita	Aquatic Life	Total Phosphorus	SC729	SG, SU	Watershed	High
5	Arkansas River Near Arkansas City	Aquatic Life	Total Suspended Solids	SC218	SU, CL	Watershed	2023
4a	Arkansas River Near Arkansas City	Aquatic Life	Biology	SC218	SU, CL	Watershed	Medium
4a	Arkansas River Near Arkansas City	Water Supply	Chloride	SC218	SU, CL	Watershed	Medium
4a	Arkansas River Near Arkansas City	Aquatic Life	pH	SC218	SU, CL	Watershed	High
4a	Arkansas River Near Arkansas City	Aquatic Life	Total Phosphorus	SC218	SU, CL	Watershed	High
3	Arkansas River Near Arkansas City	Recreation	E. coli	SC218	SU, CL	Watershed	
4a	Cadillac Lake (Pracht Wetland)	Aquatic Life	Eutrophication	LM054101	SG	Lake	Low
5	Chisholm Creek Park Lake	Aquatic Life	Eutrophication	LM064601	SG	Lake	2023
5	Colwich City Lake	Aquatic Life	Eutrophication	LM017501	SG	Lake	2023
5	Cowskin Creek At Wichita	Aquatic Life	Total Phosphorus	SC730	SG, SU	Watershed	2020
4a	Cowskin Creek At Wichita	Aquatic Life	Biology	SC730	SG, SU	Watershed	High
4a	Cowskin Creek At Wichita	Recreation	E. coli	SC730	SG, SU	Watershed	High
5	Cowskin Creek In Wichita-Valley Center Floodway	Aquatic Life	Total Phosphorus	SC288	SG	Watershed	2020
4a	Cowskin Creek In Wichita-Valley Center Floodway	Aquatic Life	Biology	SC288	SG	Watershed	High
4a	Cowskin Creek In Wichita-Valley Center Floodway	Recreation	E. coli	SC288	SG	Watershed	High

11030013
Middle Arkansas-Slate

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Cowskin Creek Near Belle Plaine	Recreation	E. coli	SC702	SG, SU	Watershed	2023
5	Cowskin Creek Near Belle Plaine	Aquatic Life	Total Phosphorus	SC702	SG, SU	Watershed	2020
5	Cowskin Creek Near Belle Plaine	Aquatic Life	Total Suspended Solids	SC702	SG, SU	Watershed	2023
5	Eagle Lake (Belaire Lake)	Aquatic Life	Eutrophication	LM022101	SG	Lake	2023
5	Emery Park Lake	Aquatic Life	Eutrophication	LM063201	SG	Lake	2023
5	Hargis Lake	Aquatic Life	Eutrophication	LM039901	SU	Lake	2023
5	Harrison Park Lake	Aquatic Life	Eutrophication	LM022301	SG	Lake	2023
4a	Horseshoe Lake	Aquatic Life	Eutrophication	LM063501	SG	Lake	Low
4a	Kid's Lake	Aquatic Life	Eutrophication	LM063601	SG	Lake	Low
5	Moss Lake	Aquatic Life	Eutrophication	LM064101	SG	Lake	2023
5	Riggs Park Lake	Aquatic Life	Eutrophication	LM022401	SG	Lake	2023
5	Slate Creek Near Wellington	Water Supply	Arsenic	SC528	SU	Watershed	2023
5	Slate Creek Near Wellington	Aquatic Life	Biology	SC528	SU	Watershed	2023
5	Slate Creek Near Wellington	Aquatic Life	Total Phosphorus	SC528	SU	Watershed	2020
5	Slate Creek Near Wellington	Aquatic Life	Total Suspended Solids	SC528	SU	Watershed	2023
4a	Slate Creek Near Wellington	Recreation	E. coli	SC528	SU	Watershed	High
4a	Slate Creek Near Wellington	Water Supply	Sulfate	SC528	SU	Watershed	Low
4a	Slate Creek W.A.	Water Supply	Chloride	LM014201	SU	Lake	Medium
4a	Slate Creek W.A.	Aquatic Life	Eutrophication	LM014201	SU	Lake	Medium
4a	Slate Creek W.A.	Aquatic Life	pH	LM014201	SU	Lake	Medium
4a	Slate Creek W.A.	Water Supply	Siltation	LM014201	SU	Lake	Medium
4a	Slate Creek W.A.	Water Supply	Sulfate	LM014201	SU	Lake	Low
3	Vic's Lake	Aquatic Life	Eutrophication	LM064301	SG	Lake	

11030013
Middle Arkansas-Slate

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Watson Park Lake	Aquatic Life	Eutrophication	LM064401	SG	Lake	Low
3	Windmill Lake	Aquatic Life	Eutrophication	LM064501	SG	Lake	

11030014
North Fork Ninnescah

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Cheney Lake	Aquatic Life	Eutrophication	LM017001	RN	Lake	High
4a	Cheney Lake	Water Supply	Siltation	LM017001	RN	Lake	High
3	Cheney Lake	Aquatic Life	pH	LM017001	RN	Lake	

11030015
South Fork Ninnescah

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Kingman Co. SFL	Aquatic Life	Eutrophication	LM010401	KM	Lake	2023
4a	Kingman Co. SFL	Recreation	Aquatic Plants	LM010401	KM	Lake	Medium
4a	Kingman Co. SFL	Aquatic Life	Dissolved Oxygen	LM010401	KM	Lake	Medium
4a	Kingman Co. SFL	Aquatic Life	pH	LM010401	KM	Lake	Medium
3	Lemon Park Lake	Aquatic Life	Eutrophication	LM063901	PR	Lake	
5	Pratt Co. Lake	Aquatic Life	pH	LM064001	PR	Lake	2023
4a	Pratt Co. Lake	Aquatic Life	Eutrophication	LM064001	PR	Lake	High
5	South Fork Ninnescah River Near Murdock	Aquatic Life	Temperature	SC036	PR, KM	Watershed	2023
4a	South Fork Ninnescah River Near Murdock	Water Supply	Chloride	SC036	PR, KM	Watershed	Medium
5	Texas Lake W.A.	Aquatic Life	Dissolved Oxygen	LM053001	PR	Lake	2023

11030016
Ninnescah

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Lake Afton	Aquatic Life	Eutrophication	LM049201	SG	Lake	High
4a	Ninnescah River Near Belle Plaine	Water Supply	Chloride	SC280	SG, KM, SU	Watershed	Medium

11030016
Ninnescah

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Ninnescah River Near Belle Plaine	Aquatic Life	Biology/Sediment	SC280	SG, KM, SU	Watershed	
3	Ninnescah River Near Belle Plaine	Recreation	E. coli	SC280	SG, KM, SU	Watershed	

11060001
Kaw Lake

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Beaver Creek Near Maple City	Recreation	E. coli	SC664	CL	Watershed	
5	Cowley Co. SFL	Aquatic Life	Eutrophication	LM013401	CL	Lake	2023
3	Grouse Creek Near Cambridge	Aquatic Life	Biology	SC761	CL	Watershed	
3	Grouse Creek Near Silverdale	Aquatic Life	Biology	SC531	CL	Watershed	
3	Grouse Creek Near Silverdale	Recreation	E. coli	SC531	CL	Watershed	

11060002
Upper Salt Fork Arkansas

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Mule Creek Near Aetna	Recreation	Fecal Coli	SC622	KW, BA, CM	Watershed	Medium
5	Salt Fork Arkansas River Near Hardtner	Aquatic Life	Temperature	SC591	BA, CM	Watershed	2023
4a	Salt Fork Arkansas River Near Hardtner	Water Supply	Chloride	SC591	BA, CM	Watershed	Low

11060003
Medicine Lodge

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Barber Co. SFL	Water Supply	Sulfate	LM013101	BA	Lake	2023
4a	Barber Co. SFL	Aquatic Life	Dissolved Oxygen	LM013101	BA	Lake	Low
3	Elm Creek Near Medicine Lodge	Recreation	E. coli	SC590	PR, BA	Watershed	
3	Little Mule Creek Near Kiowa	Water Supply	Arsenic	SC621	BA	Watershed	
4a	Medicine Lodge River Near Belvidere	Recreation	Fecal Coli	SC588	KW	Watershed	High

11060003
Medicine Lodge

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Medicine Lodge River Near Medicine Lodge	Recreation	Fecal Coli	SC589	PR, KW, BA	Watershed	High
4a	Medicine Lodge River Near Medicine Lodge	Water Supply	Sulfate	SC589	PR, KW, BA	Watershed	Low

11060005
Chikaskia

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Anthony City Lake	Aquatic Life	Dissolved Oxygen	LM048801	HP	Lake	High
4a	Anthony City Lake	Aquatic Life	Eutrophication	LM048801	HP	Lake	High
4a	Anthony City Lake	Aquatic Life	pH	LM048801	HP	Lake	High
4a	Anthony City Lake	Water Supply	Siltation	LM048801	HP	Lake	High
5	Bluff Creek Near Bluff City	Aquatic Life	Total Phosphorus	SC618	HP	Watershed	2023
4a	Bluff Creek Near Bluff City	Recreation	E. coli	SC618	HP	Watershed	High
4a	Bluff Creek Near Bluff City	Aquatic Life	Selenium	SC618	HP	Watershed	Low
5	Bluff Creek Near Caldwell	Water Supply	Arsenic	SC530	HP	Watershed	2023
4a	Bluff Creek Near Caldwell	Recreation	E. coli	SC530	HP	Watershed	High
4a	Chikaskia River Near Corbin	Recreation	E. coli	SC529	SU	Watershed	High
5	Fall Creek Near Caldwell	Water Supply	Arsenic	SC662	SU	Watershed	2023
4a	Fall Creek Near Caldwell	Recreation	Fecal Coli	SC662	SU	Watershed	High
5	Isabel W.A.	Aquatic Life	Copper	LM014301	PR	Lake	2023
5	Isabel W.A.	Aquatic Life	Dissolved Oxygen	LM014301	PR	Lake	2023
4a	Isabel W.A.	Aquatic Life	Eutrophication	LM014301	PR	Lake	Low
4a	Isabel W.A.	Aquatic Life	pH	LM014301	PR	Lake	Low
5	Shoofly Creek Near Hunnewell	Aquatic Life	Total Phosphorus	SC663	SU	Watershed	2023
3	Shoofly Creek Near Hunnewell	Recreation	E. coli	SC663	SU	Watershed	
4a	Wellington Lake	Aquatic Life	Selenium	LM042201	SU	Lake	Low

11060005
Chikaskia

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Wellington Lake	Water Supply	Siltation	LM042201	SU	Lake	Medium
5	Wellington New City Lake	Aquatic Life	Eutrophication	LM042301	SU	Lake	2023

Marais des Cygnes River Basin

10290101
Upper Marais Des Cygnes

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	110 Mile Creek Near Scranton	Aquatic Life	Atrazine	SC633	OS, FR	Watershed	2023
4a	110 Mile Creek Near Scranton	Aquatic Life	Dissolved Oxygen	SC633	OS, FR	Watershed	High
4a	Cedar Creek Lake	Aquatic Life	Eutrophication	LM040701	AN	Lake	High
4a	Cedar Creek Lake	Water Supply	Siltation	LM040701	AN	Lake	High
4a	Crystal Lake	Aquatic Life	Eutrophication	LM064901	AN	Lake	Medium
5	Dragoon Creek Near Burlingame	Aquatic Life	Atrazine	SC577	WB, OS	Watershed	2023
3	Dragoon Creek Near Burlingame	Recreation	E. coli	SC577	WB, OS	Watershed	
5	Garnett North Lake	Aquatic Life	Eutrophication	LM040601	AN	Lake	2022
3	Lebo City Lake	Aquatic Life	Copper	LM041201	CF	Lake	
3	Lebo City Lake	Aquatic Life	Eutrophication	LM041201	CF	Lake	
4a	Lebo City Park Lake	Aquatic Life	Eutrophication	LM065601	CF	Lake	Low
4a	Marais Des Cygnes River Near Ottawa	Recreation	E. coli	SC270	DG, FR	Watershed	High
3	Marais Des Cygnes River Near Quenemo	Recreation	E. coli	SC720	OS, CF	Watershed	
4a	Marais Des Cygnes River Near Reading	Recreation	E. coli	SC742	WB, LY	Watershed	High
3	Marais Des Cygnes River Near Richter	Recreation	E. coli	SC555	OS, FR	Watershed	
3	Melvern Lake	Aquatic Life	Eutrophication	LM027001	OS	Lake	
4a	One Hundred Forty Two Mile Creek Near Reading	Aquatic Life	Dissolved Oxygen	SC579	LY	Watershed	High

10290101
Upper Marais Des Cygnes

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	One Hundred Forty Two Mile Creek Near Reading	Recreation	Fecal Coli	SC579	LY	Watershed	High
4a	Osage City Reservoir	Aquatic Life	Eutrophication	LM066101	OS	Lake	Low
5	Osawatomie City Lake	Aquatic Life	Eutrophication	LM066201	MI	Lake	2023
4a	Ottawa Creek Near Ottawa	Aquatic Life	Dissolved Oxygen	SC616	DG, FR	Watershed	High
3	Ottawa Creek Near Ottawa	Recreation	E. coli	SC616	DG, FR	Watershed	
4a	Pomona Lake	Aquatic Life	Eutrophication	LM028001	OS	Lake	High
4a	Pomona Lake	Water Supply	Siltation	LM028001	OS	Lake	High
5	Pottawatomie Creek Near Osawatomie	Aquatic Life	Biology	SC556	FR, AN	Watershed	2022
4a	Pottawatomie Creek Near Osawatomie	Aquatic Life	Dissolved Oxygen	SC556	FR, AN	Watershed	High
3	Pottawatomie Creek Near Osawatomie	Recreation	E. coli	SC556	FR, AN	Watershed	
5	Richmond City Lake	Aquatic Life	Dissolved Oxygen	LM046801	FR	Lake	2022
5	Richmond City Lake	Aquatic Life	Eutrophication	LM046801	FR	Lake	2022
5	Salt Creek	Recreation	E. coli	NPDES24821	OS	Facility	2023
5	Salt Creek Near Lyndon	Recreation	E. coli	SC578	OS, FR	Watershed	2023
4a	Salt Creek Near Lyndon	Aquatic Life	Atrazine	SC578	OS, FR	Watershed	Low
4a	Salt Creek Near Lyndon	Aquatic Life	Dissolved Oxygen	SC578	OS, FR	Watershed	Low
4a	Spring Creek Park Lake	Recreation	Aquatic Plants	LM066801	DG	Lake	Low
4a	Spring Creek Park Lake	Aquatic Life	Eutrophication	LM066801	DG	Lake	Low
5	Switzler Creek Near Burlingame	Aquatic Life	Atrazine	SC687	OS	Watershed	2023
4a	Switzler Creek Near Burlingame	Aquatic Life	Dissolved Oxygen	SC687	OS	Watershed	High
5	Westphalia Lake	Water Supply	Siltation	LM066901	AN	Lake	2023

10290102
Lower Marais Des Cygnes

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Big Sugar Creek Near Trading Post	Aquatic Life	Dissolved Oxygen	SC558	AN, LN	Watershed	Medium
3	Big Sugar Creek Near Trading Post	Recreation	E. coli	SC558	AN, LN	Watershed	
5	Bull Creek Near Henson	Recreation	E. coli	SC557	MI	Watershed	2023
5	Critzer Lake	Aquatic Life	Eutrophication	LM051301	LN	Lake	2023
4a	Edgerton City Lake	Aquatic Life	Atrazine	LM065001	JO	Lake	Medium
4a	Edgerton City Lake	Aquatic Life	Eutrophication	LM065001	JO	Lake	Medium
4a	Hillsdale Lake	Aquatic Life	Eutrophication	LM035001	JO, MI	Lake	High
3	La Cygne Lake	Aquatic Life	Eutrophication	LM044002	MI, LN	Lake	
4a	Louisburg SFL	Aquatic Life	Eutrophication	LM043801	MI	Lake	High
3	Marais Des Cygnes Near Trading Post	Aquatic Life	Biology	SC745	LN	Watershed	
3	Marais Des Cygnes Near Trading Post	Recreation	E. coli	SC206	MI, LN	Watershed	
3	Marais Des Cygnes Near Trading Post	Recreation	E. coli	SC745	LN	Watershed	
5	Marais Des Cygnes River Near Henson	Aquatic Life	Atrazine	SC743	FR, MI	Watershed	2023
5	Marais Des Cygnes W.A.	Water Supply	Arsenic	LM053201	LN	Lake	2023
4a	Marais Des Cygnes W.A.	Aquatic Life	Dissolved Oxygen	LM053201	LN	Lake	High
4a	Marais Des Cygnes W.A.	Aquatic Life	Eutrophication	LM053201	LN	Lake	High
4a	Marais Des Cygnes W.A.	Aquatic Life	pH	LM053201	LN	Lake	High
4a	Marais Des Cygnes W.A.	Water Supply	Siltation	LM053201	LN	Lake	High
3	Marais Des Cygnes W.A.	Aquatic Life	Atrazine	LM053201	LN	Lake	
4a	Miami Co. SFL	Aquatic Life	Eutrophication	LM043601	MI	Lake	Medium
4a	Miami Co. SFL	Aquatic Life	pH	LM043601	MI	Lake	Medium
4a	Middle Creek Near New Lancaster	Aquatic Life	Dissolved Oxygen	SC697	MI	Watershed	High

10290102
Lower Marais Des Cygnes

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Middle Creek Near New Lancaster	Recreation	E. coli	SC697	MI	Watershed	
5	Miola Lake	Aquatic Life	Eutrophication	LM051001	MI	Lake	2023
4a	Mound City Lake	Recreation	Aquatic Plants	LM051401	LN	Lake	Medium
4a	Mound City Lake	Aquatic Life	Dissolved Oxygen	LM051401	LN	Lake	Medium
4a	Mound City Lake	Aquatic Life	Eutrophication	LM051401	LN	Lake	Medium
4a	Mound City Lake	Aquatic Life	pH	LM051401	LN	Lake	Medium
3	Paola City Lake	Aquatic Life	Eutrophication	LM073201	MI	Lake	
5	Pleasanton Lake #1	Aquatic Life	Eutrophication	LM066401	LN	Lake	2023
5	Pleasanton Lake #2	Aquatic Life	Eutrophication	LM066501	LN	Lake	2023
4a	Pleasanton Reservoir	Aquatic Life	Eutrophication	LM044201	LN	Lake	High
5	Spring Hill City Lake	Aquatic Life	Eutrophication	LM073501	JO	Lake	2023

10290103
Little Osage

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Little Osage River Near Fulton	Aquatic Life	Biology	SC207	AN, LN, AL, BB	Watershed	2023
5	Little Osage River Near Fulton	Aquatic Life	Dissolved Oxygen	SC207	AN, LN, AL, BB	Watershed	2023
4a	Little Osage River Near Fulton	Recreation	E. coli	SC207	AN, LN, AL, BB	Watershed	Medium
4a	Prescott City Lake	Aquatic Life	Eutrophication	LM066601	LN	Lake	Low

10290104
Marmaton

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Bone Creek Lake	Aquatic Life	Eutrophication	LM043901	CR	Lake	2023
4a	Bourbon Co. SFL	Aquatic Life	Dissolved Oxygen	LM013301	BB	Lake	Medium
4a	Bourbon Co. SFL	Aquatic Life	Eutrophication	LM013301	BB	Lake	Medium
4a	Bourbon Co. SFL	Aquatic Life	pH	LM013301	BB	Lake	Medium

10290104
Marmaton

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Bronson City Lake	Aquatic Life	Eutrophication	LM046201	BB	Lake	Medium
5	Drywood Creek Near Garland	Aquatic Life	Selenium	SC617	BB, CR	Watershed	2023
4a	Drywood Creek Near Garland	Aquatic Life	Dissolved Oxygen	SC617	BB, CR	Watershed	Low
3	Drywood Creek Near Garland	Recreation	E. coli	SC617	BB, CR	Watershed	
4a	Elm Creek Lake	Aquatic Life	Eutrophication	LM044801	BB	Lake	Low
5	Gunn Park East Lake	Aquatic Life	Eutrophication	LM065401	BB	Lake	2023
5	Gunn Park West Lake	Aquatic Life	Eutrophication	LM065501	BB	Lake	2023
4a	Lake Crawford State Park #2	Aquatic Life	Eutrophication	LM011101	CR	Lake	High
5	Marmaton River	Aquatic Life	Biology	SB324	BB	Watershed	2023
5	Marmaton River Near Fort Scott	Recreation	E. coli	SC208	BB	Watershed	2023
4a	Marmaton River Near Fort Scott	Aquatic Life	Biology	SC208	BB	Watershed	High
4a	Marmaton River Near Fort Scott	Aquatic Life	Dissolved Oxygen	SC208	BB	Watershed	High
4a	Marmaton River Near Fort Scott	Aquatic Life	Dissolved Oxygen	SC559	AL, BB	Watershed	High
3	Marmaton River Near Fort Scott	Aquatic Life	Biology	SC559	AL, BB	Watershed	
5	Rock Creek Lake	Aquatic Life	Dissolved Oxygen	LM045201	BB	Lake	2023
4a	Rock Creek Lake	Aquatic Life	Eutrophication	LM045201	BB	Lake	High

Missouri River Basin

10240005
Tarkio-Wolf

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Brown Co. SFL	Recreation	Aquatic Plants	LM010301	BR	Lake	Medium
4a	Brown Co. SFL	Aquatic Life	Dissolved Oxygen	LM010301	BR	Lake	Medium
4a	Brown Co. SFL	Aquatic Life	Eutrophication	LM010301	BR	Lake	Medium

10240005
Tarkio-Wolf

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Brown Co. SFL	Aquatic Life	pH	LM010301	BR	Lake	Medium
4a	Hiawatha City Lake	Aquatic Life	Atrazine	LM011601	BR	Lake	Medium
4a	Hiawatha City Lake	Aquatic Life	Eutrophication	LM011601	BR	Lake	Medium
3	Mosquito Creek Near Troy	Recreation	E. coli	SC722	DP	Watershed	
4a	Troy Fair Lake	Recreation	Aquatic Plants	LM073801	DP	Lake	Low
4a	Troy Fair Lake	Aquatic Life	Eutrophication	LM073801	DP	Lake	Low
5	Wolf River Near Sparks	Aquatic Life	Atrazine	SC201	BR, DP	Watershed	2023
4a	Wolf River Near Sparks	Aquatic Life	Biology	SC201	BR, DP	Watershed	High
4a	Wolf River Near Sparks	Recreation	E. coli	SC201	BR, DP	Watershed	High

10240007
South Fork Big Nemaha

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Nemaha Co. SFL/W.A.	Aquatic Life	Eutrophication	LM010801	NM	Lake	
5	Pole Creek Near St. Benedict	Aquatic Life	Total Phosphorus	SC756	NM	Watershed	2023
4a	Pole Creek Near St. Benedict	Aquatic Life	Atrazine	SC756	NM	Watershed	Medium
3	Pole Creek Near St. Benedict	Aquatic Life	Total Suspended Solids	SC756	NM	Watershed	
5	Sabetha City Lake	Aquatic Life	Atrazine	LM011501	NM	Lake	2023
4a	Sabetha City Lake	Aquatic Life	Eutrophication	LM011501	NM	Lake	Low
5	South Fork Nemaha River Near Bern	Water Supply	Arsenic	SC234	NM, JA	Watershed	2023
5	South Fork Nemaha River Near Bern	Aquatic Life	Atrazine	SC234	NM, JA	Watershed	2023
5	South Fork Nemaha River Near Bern	Water Supply	Lead	SC234	NM, JA	Watershed	2023
5	South Fork Nemaha River Near Bern	Aquatic Life	Total Phosphorus	SC234	NM, JA	Watershed	2023
4a	South Fork Nemaha River Near Bern	Aquatic Life	Biology	SC234	NM, JA	Watershed	High

10240007
South Fork Big Nemaha

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	South Fork Nemaha River Near Bern	Recreation	E. coli	SC234	NM, JA	Watershed	High
5	South Fork Nemaha River Near Seneca	Recreation	E. coli	SC682	NM, PT	Watershed	2023
4a	South Fork Nemaha River Near Seneca	Aquatic Life	Selenium	SC682	NM, PT	Watershed	Low
3	South Fork Nemaha River Near Seneca	Aquatic Life	Atrazine	SC682	NM, PT	Watershed	
5	Turkey Creek Near Bern	Water Supply	Lead	SC601	MS, NM	Watershed	2023
5	Turkey Creek Near Bern	Aquatic Life	Total Phosphorus	SC601	MS, NM	Watershed	2023
4a	Turkey Creek Near Bern	Aquatic Life	Atrazine	SC601	MS, NM	Watershed	Medium
4a	Turkey Creek Near Bern	Recreation	Fecal Coli	SC601	MS, NM	Watershed	Low

10240008
Big Nemaha

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Pony Creek Lake	Aquatic Life	Eutrophication	LM073001	BR	Lake	High
5	Pony Creek Near Reserve	Aquatic Life	Atrazine	SC291	NM, BR	Watershed	2023
3	Pony Creek Near Reserve	Recreation	E. coli	SC291	NM, BR	Watershed	
5	Roys Creek Near Reserve	Aquatic Life	Atrazine	SC552	BR, DP	Watershed	2023
3	Roys Creek Near Reserve	Water Supply	Nitrate	SC552	BR, DP	Watershed	
5	Walnut Creek Near Reserve	Water Supply	Arsenic	SC292	BR, DP	Watershed	2023
5	Walnut Creek Near Reserve	Aquatic Life	Atrazine	SC292	BR, DP	Watershed	2023
5	Walnut Creek Near Reserve	Aquatic Life	Total Phosphorus	SC292	BR, DP	Watershed	2023
5	Walnut Creek Near Reserve	Aquatic Life	Total Suspended Solids	SC292	BR, DP	Watershed	2023
4a	Walnut Creek Near Reserve	Recreation	Fecal Coli	SC292	BR, DP	Watershed	High

10240011
Independence-Sugar

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Atchison Co. SFL	Aquatic Life	Atrazine	LM012601	AT	Lake	2023

10240011
Independence-Sugar

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Atchison Co. SFL	Recreation	Aquatic Plants	LM012601	AT	Lake	Low
4a	Atchison Co. SFL	Aquatic Life	Dissolved Oxygen	LM012601	AT	Lake	Low
4a	Atchison Co. SFL	Aquatic Life	Eutrophication	LM012601	AT	Lake	Medium
4a	Atchison Co. SFL	Aquatic Life	pH	LM012601	AT	Lake	Medium
4a	Atchison Co. SFL	Water Supply	Siltation	LM012601	AT	Lake	High
4a	Big Eleven Lake	Aquatic Life	Eutrophication	LM067101	WY	Lake	Low
3	Independence Creek Near Atchison	Recreation	E. coli	SC553	DP, AT	Watershed	
4a	Jerry's Lake	Aquatic Life	Eutrophication	LM067801	LV	Lake	Low
5	Lake Warnock (Atchison City Lake)	Aquatic Life	Eutrophication	LM039801	AT	Lake	2023
4a	Lansing City Lake	Aquatic Life	Eutrophication	LM067201	LV	Lake	Low
4a	Lansing City Lake	Aquatic Life	pH	LM067201	LV	Lake	Low
3	Lansing City Lake	Aquatic Life	Copper	LM067201	LV	Lake	
5	Merrit Lake	Aquatic Life	Eutrophication	LM020801	LV	Lake	2023
5	Smith Lake	Aquatic Life	Eutrophication	LM020701	LV	Lake	2023
4a	Wyandotte Co. Lake	Aquatic Life	Eutrophication	LM042401	WY	Lake	High

10300101
Lower Missouri-Crooked

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Blue River Near Stanley	Food Procurement	Mercury	SC205	JO	Watershed	2023
4a	Blue River Near Stanley	Aquatic Life	Biology	SC205	JO	Watershed	Medium
4a	Blue River Near Stanley	Recreation	E. coli	SC205	JO	Watershed	Medium
3	Blue River Near Stanley	Aquatic Life	Diazinon	SC205	JO	Watershed	
5	Heritage Park Lake	Aquatic Life	Eutrophication	LM062401	JO	Lake	2023
5	Indian Creek Near Leawood	Aquatic Life	Biology	SC204	JO	Watershed	2023
5	Indian Creek Near Leawood	Water Supply	Chloride	SC204	JO	Watershed	2023

10300101
Lower Missouri-Crooked

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Indian Creek Near Leawood	Aquatic Life	Total Phosphorus	SC204	JO	Watershed	2023
4a	Indian Creek Near Leawood	Recreation	E. coli	SC204	JO	Watershed	Medium
3	Indian Creek Near Leawood	Aquatic Life	Diazinon	SC204	JO	Watershed	
4a	South Lake Park	Aquatic Life	Eutrophication	LM067501	JO	Lake	Low
3	Stohl Park Lake	Aquatic Life	Lead	LM062801	JO	Lake	

Neosho River Basin

11070201
Neosho Headwaters

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Allen Creek Near Emporia	Aquatic Life	Dissolved Oxygen	SC628	LY	Watershed	Medium
4a	Council Grove Lake	Aquatic Life	Eutrophication	LM022001	MR	Lake	High
4a	Council Grove Lake	Water Supply	Siltation	LM022001	MR	Lake	High
5	Eagle Creek Near Olpe	Aquatic Life	Atrazine	SC634	LY	Watershed	2023
4a	Eagle Creek Near Olpe	Aquatic Life	Dissolved Oxygen	SC634	LY	Watershed	High
5	Flint Hills N.W.R.	Water Supply	Siltation	LM072401	CF	Lake	2023
3	Four Mile Creek Near Council Grove	Aquatic Life	Biology	SC630	MR	Watershed	
4a	John Redmond Lake	Aquatic Life	Eutrophication	LM026001	LY, CF	Lake	Medium
4a	John Redmond Lake	Water Supply	Siltation	LM026001	LY, CF	Lake	Medium
3	John Redmond Lake	Aquatic Life	Dissolved Oxygen	LM026001	LY, CF	Lake	
4a	Jones Park Lake	Aquatic Life	Eutrophication	LM068701	LY	Lake	Low
4a	Lake Kahola	Aquatic Life	Eutrophication	LM043401	MR	Lake	Medium
5	Munkers Creek Near Council Grove	Aquatic Life	Dissolved Oxygen	SC631	WB, MR, LY	Watershed	2023
5	Neosho River At Neosho Rapids	Water Supply	Lead	SC273	LY	Watershed	2023
4a	Neosho River At Neosho Rapids	Aquatic Life	Total Phosphorus	SC273	LY	Watershed	High

11070201
Neosho Headwaters

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Neosho River At Neosho Rapids	Recreation	E. coli	SC273	LY	Watershed	
4a	Neosho River At Parkerville	Recreation	Fecal Coli	SC675	MR	Watershed	Medium
3	Neosho River Near Americus	Recreation	E. coli	SC581	MR, LY	Watershed	
4a	Neosho River Near Parkerville	Aquatic Life	Total Phosphorus	SC637	MR	Watershed	High
4a	Olpe City Lake	Aquatic Life	Eutrophication	LM041001	LY	Lake	High
4a	Olpe City Lake	Water Supply	Siltation	LM041001	LY	Lake	High

11070202
Upper Cottonwood

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Clear Creek Near Marion	Water Supply	Sulfate	SC690	MR, MN	Watershed	Low
3	Clear Creek Near Marion	Aquatic Life	Alachlor	SC690	MR, MN	Watershed	
3	Clear Creek Near Marion	Aquatic Life	Atrazine	SC690	MR, MN	Watershed	
4a	Doyle Creek Near Florence	Water Supply	Sulfate	SC120	HV	Watershed	Low
4a	French Creek Near Hillsboro	Aquatic Life	Dissolved Oxygen	SC676	MN	Watershed	Medium
5	Hillsboro City Lake	Aquatic Life	Eutrophication	LM020901	MN	Lake	2023
4a	Marion Co. Lake	Aquatic Life	Dissolved Oxygen	LM012101	MN	Lake	Medium
4a	Marion Co. Lake	Aquatic Life	Eutrophication	LM012101	MN	Lake	Medium
4a	Marion Lake	Aquatic Life	Eutrophication	LM020001	MN	Lake	High
5	Mud Creek Near Marion	Aquatic Life	Atrazine	SC691	MN	Watershed	2023
4a	Mud Creek Near Marion	Recreation	E. coli	SC691	MN	Watershed	High
5	North Cottonwood River Near Durham	Water Supply	Sulfate	SC636	MP, MN, HV	Watershed	2023
5	North Cottonwood River Near Durham	Aquatic Life	Total Phosphorus	SC636	MP, MN, HV	Watershed	2023
5	South Cottonwood River Near Canada	Aquatic Life	Atrazine	SC635	MN, CS	Watershed	2023

11070202
Upper Cottonwood

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	South Cottonwood River Near Canada	Aquatic Life	Total Phosphorus	SC635	MN, CS	Watershed	2023

11070203
Lower Cottonwood

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Bloody Creek Near Saffordville	Water Supply	Sulfate	SC689	CS	Watershed	2023
3	Bloody Creek Near Saffordville	Recreation	E. coli	SC689	CS	Watershed	
5	Cottonwood River Near Elmdale	Aquatic Life	Atrazine	SC627	MN, CS	Watershed	2023
5	Cottonwood River Near Elmdale	Aquatic Life	Total Suspended Solids	SC627	MN, CS	Watershed	2023
4a	Cottonwood River Near Elmdale	Water Supply	Sulfate	SC627	MN, CS	Watershed	Low
4a	Cottonwood River Near Emporia	Aquatic Life	Total Phosphorus	SC274	LY, CS	Watershed	High
3	Cottonwood River Near Emporia	Aquatic Life	Biology	SC274	LY, CS	Watershed	
5	Cottonwood River Near Plymouth	Aquatic Life	Total Suspended Solids	SC275	CS	Watershed	2023
3	Diamond Creek Near Strong City	Recreation	E. coli	SC625	MR, CS	Watershed	
4a	Fox Creek Near Strong City	Aquatic Life	Biology	SC718	CS	Watershed	Medium
3	Middle Creek Near Elmdale	Recreation	E. coli	SC626	MN, CS	Watershed	
4a	Palmer Creek Near Strong City	Aquatic Life	Biology	SC719	CS	Watershed	Medium
5	Peter Pan Lake	Aquatic Life	Eutrophication	LM068901	LY	Lake	2023
3	Rock Creek near Bazaar	Aquatic Life	Total Suspended Solids	SC760	CS	Watershed	
4a	South Fork Cottonwood River Near Bazaar	Aquatic Life	Biology	SC582	CS	Watershed	Medium

11070204
Upper Neosho

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Big Creek Near Chanute	Aquatic Life	Dissolved Oxygen	SC611	AL, NO	Watershed	2023
3	Big Creek Near Chanute	Recreation	E. coli	SC611	AL, NO	Watershed	
4a	Chanute Santa Fe Lake	Aquatic Life	Dissolved Oxygen	LM044401	NO	Lake	Medium
4a	Chanute Santa Fe Lake	Aquatic Life	Eutrophication	LM044401	NO	Lake	Medium
4a	Chanute Santa Fe Lake	Aquatic Life	pH	LM044401	NO	Lake	Medium
5	Circle Lake	Aquatic Life	Eutrophication	LM021101	WO	Lake	2023
4a	Deer Creek Near Iola	Recreation	Fecal Coli	SC609	AN, AL	Watershed	Medium
4a	Gridley City Lake	Aquatic Life	Dissolved Oxygen	LM045601	CF	Lake	Medium
4a	Gridley City Lake	Aquatic Life	Eutrophication	LM045601	CF	Lake	Medium
5	Leonard's Lake	Aquatic Life	Eutrophication	LM021301	WO	Lake	2023
5	Long Creek Near Le Roy	Aquatic Life	Atrazine	SC695	CF	Watershed	2023
5	Long Creek Near Le Roy	Aquatic Life	Dissolved Oxygen	SC695	CF	Watershed	2023
5	Neosho Falls City Lake	Aquatic Life	Eutrophication	LM021401	WO	Lake	2023
4a	Turkey Creek Near Le Roy	Recreation	E. coli	SC614	CF, WO	Watershed	High
3	Wolf Creek Lake	Aquatic Life	Selenium	LM039601	CF	Lake	
3	Yates Center Reservoir	Aquatic Life	Eutrophication	LM069201	WO	Lake	

11070205
Middle Neosho

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Altamont City Main Lake (#1)	Aquatic Life	Eutrophication	LM068001	LB	Lake	Low
4a	Altamont City West Lake (#3)	Aquatic Life	Eutrophication	LM068201	LB	Lake	Low
4a	Bachelor Creek Near Labette	Aquatic Life	Dissolved Oxygen	SC698	LB	Watershed	High
4a	Bachelor Creek Near Labette	Aquatic Life	Total Phosphorus	SC698	LB	Watershed	High
4a	Bartlett City Lake	Aquatic Life	Eutrophication	LM045401	LB	Lake	Low

11070205
Middle Neosho

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Canville Creek Near Shaw	Aquatic Life	Dissolved Oxygen	SC612	AL, NO	Watershed	Medium
5	Cherry Creek Near Faulkner	Aquatic Life	Atrazine	SC605	CK	Watershed	2023
5	Cherry Creek Near Faulkner	Water Supply	Sulfate	SC605	CK	Watershed	2023
4a	Cherry Creek Near Faulkner	Aquatic Life	Dissolved Oxygen	SC605	CK	Watershed	High
3	Cherry Creek Near Faulkner	Recreation	E. coli	SC605	CK	Watershed	
5	Flat Rock Creek Near St. Paul	Aquatic Life	Atrazine	SC613	BB, NO, CR	Watershed	2023
4a	Labette Creek Near Chetopa	Aquatic Life	Total Phosphorus	SC571	LB	Watershed	High
3	Labette Creek Near Chetopa	Recreation	E. coli	SC571	LB	Watershed	
5	Labette Creek Near Labette	Aquatic Life	Biology	SC564	NO, LB	Watershed	2023
5	Labette Creek Near Labette	Aquatic Life	Diazinon	SC564	NO, LB	Watershed	2023
4a	Labette Creek Near Labette	Aquatic Life	Dissolved Oxygen	SC564	NO, LB	Watershed	High
4a	Labette Creek Near Labette	Aquatic Life	Total Phosphorus	SC564	NO, LB	Watershed	High
3	Labette Creek Near Labette	Recreation	E. coli	SC564	NO, LB	Watershed	
5	Lightning Creek Near Oswego	Aquatic Life	Atrazine	SC565	CR, CK	Watershed	2023
3	Lightning Creek Near Oswego	Recreation	E. coli	SC565	CR, CK	Watershed	
5	Mined Land Lake WA	Water Supply	Siltation	LM038841	CK	Lake	2023
4a	Mined Land Lake WA	Aquatic Life	Dissolved Oxygen	LM038841	CK	Lake	Low
4a	Mined Land Lake WA	Water Supply	Sulfate	LM038841	CK	Lake	Low
4a	Mined Land Lake 12	Water Supply	Sulfate	LM035901	CK	Lake	Low
5	Mined Land Lake 14	Aquatic Life	Eutrophication	LM036101	CK	Lake	2023
4a	Mined Land Lake 17	Water Supply	Sulfate	LM048201	CK	Lake	Low
5	Mined Land Lake 19	Aquatic Life	Eutrophication	LM036501	CK	Lake	2023
4a	Mined Land Lake 22	Water Supply	Sulfate	LM036801	CK	Lake	Low

11070205
Middle Neosho

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Mined Land Lake 23	Water Supply	Sulfate	LM036901	CK	Lake	Low
5	Mined Land Lake 24	Aquatic Life	Eutrophication	LM037001	CK	Lake	2023
5	Mined Land Lake 25	Aquatic Life	Eutrophication	LM037101	CK	Lake	2023
5	Mined Land Lake 26	Aquatic Life	Eutrophication	LM037201	CK	Lake	2023
4a	Mined Land Lake 27	Water Supply	Sulfate	LM037301	CK	Lake	Low
4a	Mined Land Lake 30	Water Supply	Sulfate	LM037601	CK	Lake	Low
5	Mined Land Lake 31	Aquatic Life	Eutrophication	LM037701	CK	Lake	2023
5	Mined Land Lake 34	Aquatic Life	Eutrophication	LM038001	CK	Lake	2023
5	Mined Land Lake 35	Aquatic Life	Eutrophication	LM038101	CK	Lake	2023
5	Mined Land Lake 36	Aquatic Life	Eutrophication	LM038201	CK	Lake	2023
5	Mined Land Lake 40	Aquatic Life	Eutrophication	LM038601	CK	Lake	2023
5	Mined Land Lake 41	Aquatic Life	Eutrophication	LM038701	CK	Lake	2023
4a	Mined Land Lake 44	Water Supply	Sulfate	LM048401	CK	Lake	Low
4a	Neosho Co. SFL	Aquatic Life	Dissolved Oxygen	LM044601	NO	Lake	Medium
4a	Neosho Co. SFL	Aquatic Life	Eutrophication	LM044601	NO	Lake	Medium
4a	Neosho Co. SFL	Aquatic Life	pH	LM044601	NO	Lake	Medium
5	Neosho River near Chetopa	Aquatic Life	Biology	SC214	LB	Watershed	2023
4a	Neosho River near Chetopa	Aquatic Life	Total Phosphorus	SC214	LB	Watershed	High
4a	Neosho W.A.	Aquatic Life	Eutrophication	LM053401	NO	Lake	Medium
4a	Neosho W.A.	Aquatic Life	Lead	LM053401	NO	Lake	Low
4a	Neosho W.A.	Aquatic Life	pH	LM053401	NO	Lake	Medium
4a	Neosho W.A.	Water Supply	Siltation	LM053401	NO	Lake	Medium
3	Neosho W.A.	Aquatic Life	Atrazine	LM053401	NO	Lake	
4a	Parsons Lake	Aquatic Life	Eutrophication	LM041401	NO	Lake	Medium

11070205
Middle Neosho

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Parsons Lake	Water Supply	Siltation	LM041401	NO	Lake	Medium

11070206
Lake O' The Cherokees

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Tar Creek At Pitcher, Oklahoma	Aquatic Life	Cadmium	SC110	CK	Watershed	Low
4a	Tar Creek At Pitcher, Oklahoma	Aquatic Life	Lead	SC110	CK	Watershed	Low
4a	Tar Creek At Pitcher, Oklahoma	Aquatic Life	Zinc	SC110	CK	Watershed	Low

11070207
Spring

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Cow Creek Near Lawton	Water Supply	Sulfate	SC567	CR, CK	Watershed	Low
4a	Cow Creek Near Lawton	Aquatic Life	Total Phosphorus	SC567	CR, CK	Watershed	High
5	Mined Land Lake 01	Aquatic Life	Eutrophication	LM035101	CR	Lake	2023
3	Mined Land Lake 04	Aquatic Life	pH	LM035401	CR	Lake	
3	Mined Land Lake 04	Water Supply	Sulfate	LM035401	CR	Lake	
5	Mined Land Lake 06	Aquatic Life	Eutrophication	LM047601	CR	Lake	2023
4a	Mined Land Lake 06	Water Supply	Sulfate	LM047601	CR	Lake	Low
4a	Mined Land Lake 07	Water Supply	Sulfate	LM047801	CR	Lake	Low
5	Mined Land Lake 08	Aquatic Life	Eutrophication	LM035501	CR	Lake	2023
5	Mined Land Lake 09	Aquatic Life	Eutrophication	LM035601	CK	Lake	2023
4a	Pittsburg College Lake	Aquatic Life	Eutrophication	LM073301	CR	Lake	Low
4a	Pittsburg College Lake	Aquatic Life	pH	LM073301	CR	Lake	Low
4a	Playter's Lake	Aquatic Life	Eutrophication	LM069001	CR	Lake	Low
5	Shawnee Creek Near Crestline	Aquatic Life	Atrazine	SC569	CK	Watershed	2023
4a	Shawnee Creek Near Crestline	Aquatic Life	Cadmium	SC569	CK	Watershed	Low

11070207
Spring

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Shawnee Creek Near Crestline	Aquatic Life	Dissolved Oxygen	SC569	CK	Watershed	High
4a	Shawnee Creek Near Crestline	Aquatic Life	Lead	SC569	CK	Watershed	Low
4a	Shoal Creek Near Galena	Aquatic Life	Biology	SC212	CK	Watershed	High
4a	Shoal Creek Near Galena	Aquatic Life	Cadmium	SC212	CK	Watershed	Low
4a	Shoal Creek Near Galena	Aquatic Life	Lead	SC212	CK	Watershed	Low
4a	Shoal Creek Near Galena	Aquatic Life	Total Phosphorus	SC212	CK	Watershed	High
5	Short Creek Near Galena	Water Supply	Fluoride	SC570	CK	Watershed	2023
5	Short Creek Near Galena	Aquatic Life	Selenium	SC570	CK	Watershed	2023
4a	Short Creek Near Galena	Aquatic Life	Cadmium	SC570	CK	Watershed	Low
4a	Short Creek Near Galena	Aquatic Life	Copper	SC570	CK	Watershed	Low
4a	Short Creek Near Galena	Aquatic Life	Lead	SC570	CK	Watershed	Low
4a	Short Creek Near Galena	Aquatic Life	Total Phosphorus	SC570	CK	Watershed	High
4a	Short Creek Near Galena	Aquatic Life	Zinc	SC570	CK	Watershed	Low
4a	Spring River Near Baxter Springs	Aquatic Life	Biology	SC213	CK	Watershed	High
4a	Spring River Near Baxter Springs	Aquatic Life	Cadmium	SC213	CK	Watershed	Low
4a	Spring River Near Baxter Springs	Aquatic Life	Lead	SC213	CK	Watershed	Low
4a	Spring River Near Baxter Springs	Aquatic Life	Zinc	SC213	CK	Watershed	Low
4a	Spring River Near Crestline	Aquatic Life	Biology	SC568	CK	Watershed	High
3	Spring River Near Crestline	Recreation	E. coli	SC568	CK	Watershed	
5	Turkey Creek Near Joplin, Missouri	Aquatic Life	Total Phosphorus	SC211	MISSOURI	Watershed	
4a	Turkey Creek Near Joplin, Missouri	Aquatic Life	Cadmium	SC211	MISSOURI	Watershed	Low
4a	Turkey Creek Near Joplin, Missouri	Aquatic Life	Copper	SC211	MISSOURI	Watershed	Low

11070207
Spring

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Turkey Creek Near Joplin, Missouri	Aquatic Life	Lead	SC211	MISSOURI	Watershed	Low
4a	Turkey Creek Near Joplin, Missouri	Aquatic Life	Zinc	SC211	MISSOURI	Watershed	Low
4a	Willow Creek Near Baxter Springs	Aquatic Life	Copper	SC747	CK	Watershed	Low
4a	Willow Creek Near Baxter Springs	Aquatic Life	Zinc	SC747	CK	Watershed	Low

Smoky Hill- Saline River Basin

10260001
Smoky Hill Headwaters

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Willow Creek Near Weskan	Aquatic Life	Dissolved Oxygen	SC724	WA	Watershed	2023
5	Willow Creek Near Weskan	Water Supply	Fluoride	SC724	WA	Watershed	2023

10260002
North Fork Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Smoky Hill Garden Lake	Aquatic Life	Eutrophication	LM070101	SH	Lake	Low
3	Smoky Hill Garden Lake	Water Supply	Fluoride	LM070101	SH	Lake	

10260003
Upper Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Cedar Bluff Lake	Aquatic Life	Eutrophication	LM013001	TR, NS	Lake	Medium
4a	Cedar Bluff Lake	Water Supply	Sulfate	LM013001	TR, NS	Lake	Low
5	Smoky Hill River At Elkader	Water Supply	Arsenic	SC224	LG, WA, WH	Watershed	2023
5	Smoky Hill River At Elkader	Aquatic Life	Cadmium	SC224	LG, WA, WH	Watershed	2023
5	Smoky Hill River At Elkader	Aquatic Life	Total Suspended Solids	SC224	LG, WA, WH	Watershed	2023
4a	Smoky Hill River At Elkader	Water Supply	Fluoride	SC224	LG, WA, WH	Watershed	Low
4a	Smoky Hill River At Elkader	Aquatic Life	Selenium	SC224	LG, WA, WH	Watershed	Low

10260003
Upper Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Smoky Hill River At Elkader	Water Supply	Sulfate	SC224	LG, WA, WH	Watershed	Low
5	Smoky Hill River Near Gove	Water Supply	Fluoride	SC739	LG, GO, SC, LE	Watershed	2023
5	Smoky Hill River Near Gove	Water Supply	Gross Alpha	SC739	LG, GO, SC, LE	Watershed	2023
4a	Smoky Hill River Near Gove	Aquatic Life	Dissolved Oxygen	SC739	LG, GO, SC, LE	Watershed	Medium
4a	Smoky Hill River Near Gove	Aquatic Life	Selenium	SC739	LG, GO, SC, LE	Watershed	Low
4a	Smoky Hill River Near Gove	Water Supply	Sulfate	SC739	LG, GO, SC, LE	Watershed	Low
5	Smoky Hill River Near Trego	Water Supply	Arsenic	SC550	LG, GO, TR	Watershed	2023
5	Smoky Hill River Near Trego	Recreation	E. coli	SC550	LG, GO, TR	Watershed	2023
4a	Smoky Hill River Near Trego	Aquatic Life	Selenium	SC550	LG, GO, TR	Watershed	Low
4a	Smoky Hill River Near Trego	Water Supply	Sulfate	SC550	LG, GO, TR	Watershed	Low
3	Smoky Hill River Near Trego	Aquatic Life	Chromium	SC550	LG, GO, TR	Watershed	

10260004
Ladder Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Lake Scott State Park	Water Supply	Fluoride	LM011201	SC	Lake	2023
4a	Lake Scott State Park	Recreation	Aquatic Plants	LM011201	SC	Lake	High
4a	Lake Scott State Park	Aquatic Life	Eutrophication	LM011201	SC	Lake	High
4a	Lake Scott State Park	Aquatic Life	pH	LM011201	SC	Lake	High

10260006
Middle Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Beaver Creek Near Dorrance	Water Supply	Chloride	SC734	RS, BT	Watershed	Low
4a	Beaver Creek Near Dorrance	Water Supply	Sulfate	SC734	RS, BT	Watershed	Low
5	Coal Creek Near Wilson	Aquatic Life	Dissolved Oxygen	SC733	RS, BT	Watershed	2023
5	Coal Creek Near Wilson	Aquatic Life	Selenium	SC733	RS, BT	Watershed	2023

10260006
Middle Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Coal Creek Near Wilson	Aquatic Life	Total Suspended Solids	SC733	RS, BT	Watershed	2023
4a	Coal Creek Near Wilson	Water Supply	Chloride	SC733	RS, BT	Watershed	Low
4a	Coal Creek Near Wilson	Water Supply	Sulfate	SC733	RS, BT	Watershed	Low
5	Fossil Creek Near Russell	Water Supply	Arsenic	SC713	RS	Watershed	2023
5	Fossil Creek Near Russell	Aquatic Life	Selenium	SC713	RS	Watershed	2023
5	Fossil Creek Near Russell	Aquatic Life	Total Phosphorus	SC713	RS	Watershed	2023
4a	Fossil Creek Near Russell	Water Supply	Chloride	SC713	RS	Watershed	Low
4a	Fossil Creek Near Russell	Water Supply	Sulfate	SC713	RS	Watershed	Low
4a	Fossil Lake	Aquatic Life	Eutrophication	LM052601	RS	Lake	Low
4a	Fossil Lake	Water Supply	Siltation	LM052601	RS	Lake	Low
4a	Kanopolis Lake	Water Supply	Chloride	LM016001	EW	Lake	Low
4a	Kanopolis Lake	Aquatic Life	Eutrophication	LM016001	EW	Lake	High
4a	Kanopolis Lake	Water Supply	Sulfate	LM016001	EW	Lake	Low
5	Landon Creek Near Russell	Water Supply	Lead	SC714	RS, BT	Watershed	2023
5	Landon Creek Near Russell	Aquatic Life	Selenium	SC714	RS, BT	Watershed	2023
4a	Landon Creek Near Russell	Water Supply	Chloride	SC714	RS, BT	Watershed	Low
4a	Landon Creek Near Russell	Water Supply	Sulfate	SC714	RS, BT	Watershed	Low
5	Sellens Creek Near Russell	Aquatic Life	Selenium	SC736	RS, BT	Watershed	2023
3	Sellens Creek Near Russell	Aquatic Life	Atrazine	SC736	RS, BT	Watershed	
5	Smoky Hill River At Ellsworth	Aquatic Life	Biology	SC269	EW	Watershed	2023
5	Smoky Hill River At Ellsworth	Aquatic Life	Selenium	SC269	EW	Watershed	2023
4a	Smoky Hill River At Ellsworth	Water Supply	Chloride	SC269	EW	Watershed	Low
4a	Smoky Hill River At Ellsworth	Water Supply	Sulfate	SC269	EW	Watershed	Low

10260006
Middle Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Smoky Hill River Near Russell	Aquatic Life	Selenium	SC007	RS, EL, RH	Watershed	2023
5	Smoky Hill River Near Russell	Aquatic Life	Total Phosphorus	SC007	RS, EL, RH	Watershed	2023
4a	Smoky Hill River Near Russell	Water Supply	Chloride	SC007	RS, EL, RH	Watershed	Low
4a	Smoky Hill River Near Russell	Water Supply	Sulfate	SC007	RS, EL, RH	Watershed	Low
5	Smoky Hill River Near Schoenchen	Water Supply	Gross Alpha	SC539	EL, TR	Watershed	2023
5	Smoky Hill River Near Schoenchen	Aquatic Life	Selenium	SC539	EL, TR	Watershed	2023
4a	Smoky Hill River Near Schoenchen	Water Supply	Sulfate	SC539	EL, TR	Watershed	Low
5	Smoky Hill River Near Wilson	Aquatic Life	Selenium	SC723	BT	Watershed	2023
4a	Smoky Hill River Near Wilson	Water Supply	Chloride	SC723	BT	Watershed	Low
4a	Smoky Hill River Near Wilson	Water Supply	Sulfate	SC723	BT	Watershed	Low

10260007
Big Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Big Creek Near Hays	Aquatic Life	Selenium	SC541	GO, EL, TR	Watershed	2023
4a	Big Creek Near Hays	Aquatic Life	Total Phosphorus	SC541	GO, EL, TR	Watershed	High
3	Big Creek Near Hays	Recreation	E. coli	SC541	GO, EL, TR	Watershed	
5	Big Creek Near Munjor	Aquatic Life	Selenium	SC540	EL, TR	Watershed	2023
5	Big Creek Near Munjor	Water Supply	Sulfate	SC540	EL, TR	Watershed	2023
4a	Big Creek Near Munjor	Recreation	E. coli	SC540	EL, TR	Watershed	Low
4a	Big Creek Near Munjor	Water Supply	Nitrate	SC540	EL, TR	Watershed	High
4a	Big Creek Near Munjor	Aquatic Life	Total Phosphorus	SC540	EL, TR	Watershed	High
4a	Big Creek Near Munjor	Aquatic Life	Total Suspended Solids	SC540	EL, TR	Watershed	Low

10260007
Big Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Big Creek near Russell	Aquatic Life	Biology	SC752	RS, EL	Watershed	2023
5	Big Creek near Russell	Water Supply	Chloride	SC752	RS, EL	Watershed	2023
4a	Big Creek near Russell	Aquatic Life	Total Phosphorus	SC752	RS, EL	Watershed	High
4a	Big Creek near Russell	Aquatic Life	Total Suspended Solids	SC752	RS, EL	Watershed	Low
4a	Big Creek Oxbow	Aquatic Life	Eutrophication	LM070301	EL	Lake	Low
4a	Ellis City Lake	Aquatic Life	Eutrophication	LM069601	EL	Lake	Low
5	North Fork Big Creek Near Walker	Aquatic Life	Selenium	SC715	EL	Watershed	2023
4a	North Fork Big Creek Near Walker	Water Supply	Chloride	SC715	EL	Watershed	Low
4a	North Fork Big Creek Near Walker	Aquatic Life	Total Phosphorus	SC715	EL	Watershed	High

10260008
Lower Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Carry Creek Near Lyona	Water Supply	Sulfate	SC708	DK	Watershed	Low
5	Chapman Creek Near Sutphen	Aquatic Life	Total Suspended Solids	SC515	CY, OT, DK	Watershed	2023
4a	Chapman Creek Near Sutphen	Water Supply	Sulfate	SC515	CY, OT, DK	Watershed	Low
4a	Geary Co. SFL	Aquatic Life	Eutrophication	LM043201	GE	Lake	Medium
4a	Gypsum Creek Near Solomon	Water Supply	Sulfate	SC641	SA, MP	Watershed	Low
4a	Herington City Lake	Aquatic Life	Eutrophication	LM069701	DK	Lake	Low
3	Herington City Lake	Water Supply	Arsenic	LM069701	DK	Lake	
4a	Herington City Park Lake	Aquatic Life	Eutrophication	LM072801	DK	Lake	Low
5	Herington Reservoir	Water Supply	Siltation	LM047201	DK	Lake	2023
4a	Herington Reservoir	Aquatic Life	Atrazine	LM047201	DK	Lake	Medium
4a	Herington Reservoir	Aquatic Life	Dissolved Oxygen	LM047201	DK	Lake	High

10260008
Lower Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Herington Reservoir	Aquatic Life	Eutrophication	LM047201	DK	Lake	High
3	Herington Reservoir	Water Supply	Arsenic	LM047201	DK	Lake	
5	Holland Creek Near Sand Springs	Recreation	E. coli	SC642	DK	Watershed	2023
5	Holland Creek Near Sand Springs	Aquatic Life	Selenium	SC642	DK	Watershed	2023
4a	Holland Creek Near Sand Springs	Aquatic Life	Dissolved Oxygen	SC642	DK	Watershed	High
4a	Holland Creek Near Sand Springs	Water Supply	Sulfate	SC642	DK	Watershed	Low
4a	Lakewood Park Lake	Aquatic Life	Eutrophication	LM069801	SA	Lake	Low
3	Lakewood Park Lake	Aquatic Life	Lead	LM069801	SA	Lake	
3	Lakewood Park Lake	Water Supply	Siltation	LM069801	SA	Lake	
4a	McPherson Co. SFL	Recreation	Aquatic Plants	LM013501	MP	Lake	Medium
4a	McPherson Co. SFL	Aquatic Life	Dissolved Oxygen	LM013501	MP	Lake	Medium
4a	McPherson Co. SFL	Aquatic Life	Eutrophication	LM013501	MP	Lake	Medium
4a	McPherson Co. SFL	Aquatic Life	pH	LM013501	MP	Lake	Medium
4a	Mud Creek Near Abilene	Water Supply	Sulfate	SC643	DK	Watershed	Low
4a	Mud Creek Near Abilene	Aquatic Life	Total Phosphorus	SC643	DK	Watershed	High
4a	Sharps Creek Near Freemount	Aquatic Life	Total Phosphorus	SC749	MP, RC	Watershed	High
5	Smoky Hill River At Enterprise	Water Supply	Gross Alpha	SC265	DK, SA	Watershed	2023
4a	Smoky Hill River At Enterprise	Aquatic Life	Biology	SC265	DK, SA	Watershed	Medium
4a	Smoky Hill River At Enterprise	Water Supply	Chloride	SC265	DK, SA	Watershed	Low
4a	Smoky Hill River At Enterprise	Water Supply	Sulfate	SC265	DK, SA	Watershed	Low
4a	Smoky Hill River At Enterprise	Aquatic Life	Total Phosphorus	SC265	DK, SA	Watershed	High

10260008
Lower Smoky Hill

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Smoky Hill River At Enterprise	Aquatic Life	Total Suspended Solids	SC265	DK, SA	Watershed	Low
5	Smoky Hill River At Junction City	Aquatic Life	Biology	SC264	GE, DK	Watershed	2021
4a	Smoky Hill River At Junction City	Water Supply	Chloride	SC264	GE, DK	Watershed	Low
4a	Smoky Hill River At Junction City	Water Supply	Sulfate	SC264	GE, DK	Watershed	Low
4a	Smoky Hill River At Junction City	Aquatic Life	Total Phosphorus	SC264	GE, DK	Watershed	High
4a	Smoky Hill River At Junction City	Aquatic Life	Total Suspended Solids	SC264	GE, DK	Watershed	Low
3	Smoky Hill River At Junction City	Recreation	E. coli	SC264	GE, DK	Watershed	
4a	Smoky Hill River Near Mentor	Recreation	E. coli	SC514	SA, EW, MP	Watershed	High
4a	Smoky Hill River Near Mentor	Aquatic Life	Total Suspended Solids	SC514	SA, EW, MP	Watershed	Low
4a	Smoky Hill River Near Salina	Aquatic Life	Biology	SC268	SA, MP	Watershed	Medium
4a	Smoky Hill River Near Salina	Aquatic Life	Total Phosphorus	SC268	SA, MP	Watershed	High
4a	Smoky Hill River Near Salina	Aquatic Life	Total Suspended Solids	SC268	SA, MP	Watershed	Low
4a	Turkey Creek Near Abilene	Water Supply	Sulfate	SC644	DK, MN	Watershed	Low

10260009
Upper Saline

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Paradise Creek Near Waldo	Water Supply	Arsenic	SC538	OB, RO, RS	Watershed	2023
5	Paradise Creek Near Waldo	Aquatic Life	Dissolved Oxygen	SC538	OB, RO, RS	Watershed	2023
5	Paradise Creek Near Waldo	Aquatic Life	Total Suspended Solids	SC538	OB, RO, RS	Watershed	2023
4a	Paradise Creek Near Waldo	Water Supply	Chloride	SC538	OB, RO, RS	Watershed	Low
4a	Paradise Creek Near Waldo	Aquatic Life	Selenium	SC538	OB, RO, RS	Watershed	Low
4a	Paradise Creek Near Waldo	Water Supply	Sulfate	SC538	OB, RO, RS	Watershed	Low

10260009
Upper Saline

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Plainville Township Lake	Aquatic Life	Eutrophication	LM070001	RO	Lake	Low
5	Saline River Near Hays	Water Supply	Arsenic	SC548	TH, RO, SD, GH, EL, TR	Watershed	2023
5	Saline River Near Hays	Aquatic Life	Dissolved Oxygen	SC548	TH, RO, SD, GH, EL, TR	Watershed	2023
4a	Saline River Near Hays	Aquatic Life	Selenium	SC548	TH, RO, SD, GH, EL, TR	Watershed	Low
4a	Saline River Near Hays	Water Supply	Sulfate	SC548	TH, RO, SD, GH, EL, TR	Watershed	Low
3	Saline River Near Hays	Recreation	E. coli	SC548	TH, RO, SD, GH, EL, TR	Watershed	
4a	Saline River Near Russell	Water Supply	Chloride	SC011	RO, RS, EL	Watershed	Low
4a	Saline River Near Russell	Aquatic Life	Selenium	SC011	RO, RS, EL	Watershed	Low
4a	Saline River Near Russell	Water Supply	Sulfate	SC011	RO, RS, EL	Watershed	Low
4a	Sheridan W.A.	Recreation	Fecal Coli	LM014501	SD	Lake	Low
4a	Sheridan W.A.	Aquatic Life	pH	LM014501	SD	Lake	Low
4a	Wilson Lake	Water Supply	Chloride	LM014001	RS	Lake	Low
4a	Wilson Lake	Water Supply	Sulfate	LM014001	RS	Lake	Low

10260010
Lower Saline

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Bullfoot Creek Near Lincoln	Water Supply	Sulfate	SC672	LC, EW	Watershed	Low
3	Bullfoot Creek Near Lincoln	Recreation	E. coli	SC672	LC, EW	Watershed	
4a	Elkhorn Creek Near Lincoln	Water Supply	Sulfate	SC671	LC, EW	Watershed	Low
5	Mulberry Creek Near Salina	Aquatic Life	Copper	SC640	SA, EW, MP	Watershed	2023
5	Mulberry Creek Near Salina	Water Supply	Lead	SC640	SA, EW, MP	Watershed	2023
4a	Mulberry Creek Near Salina	Aquatic Life	Total Phosphorus	SC640	SA, EW, MP	Watershed	High
3	Saline Co. SFL	Water Supply	Siltation	LM013701	SA	Lake	
5	Saline River Near Beverly	Water Supply	Lead	SC513	LC	Watershed	2023

10260010
Lower Saline

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Saline River Near Beverly	Aquatic Life	Selenium	SC513	LC	Watershed	2023
5	Saline River Near Beverly	Aquatic Life	Total Suspended Solids	SC513	LC	Watershed	2023
4a	Saline River Near Beverly	Water Supply	Chloride	SC513	LC	Watershed	Low
4a	Saline River Near Beverly	Water Supply	Sulfate	SC513	LC	Watershed	Low
5	Saline River Near New Cambria	Aquatic Life	Biology	SC267	OT, LC,SA	Watershed	2023
5	Saline River Near New Cambria	Aquatic Life	Total Suspended Solids	SC267	OT, LC,SA	Watershed	2023
4a	Saline River Near New Cambria	Water Supply	Chloride	SC267	OT, LC,SA	Watershed	Low
4a	Saline River Near New Cambria	Water Supply	Sulfate	SC267	OT, LC,SA	Watershed	Low
4a	Saline River Near New Cambria	Aquatic Life	Total Phosphorus	SC267	OT, LC,SA	Watershed	High
3	Saline River Near New Cambria	Recreation	E. coli	SC267	OT, LC,SA	Watershed	
5	Spillman Creek Near Lincoln	Water Supply	Arsenic	SC673	MC, LC	Watershed	2023
5	Spillman Creek Near Lincoln	Aquatic Life	Atrazine	SC673	MC, LC	Watershed	2023
5	Spillman Creek Near Lincoln	Aquatic Life	Total Phosphorus	SC673	MC, LC	Watershed	2023
5	Spillman Creek Near Lincoln	Aquatic Life	Total Suspended Solids	SC673	MC, LC	Watershed	2023
4a	Spillman Creek Near Lincoln	Aquatic Life	Dissolved Oxygen	SC673	MC, LC	Watershed	High
5	Wolf Creek Near Sylvan Grove	Aquatic Life	Dissolved Oxygen	SC537	OB, RS	Watershed	2023
5	Wolf Creek Near Sylvan Grove	Aquatic Life	Total Suspended Solids	SC537	OB, RS	Watershed	2023
4a	Wolf Creek Near Sylvan Grove	Water Supply	Chloride	SC537	OB, RS	Watershed	Low
4a	Wolf Creek Near Sylvan Grove	Aquatic Life	Selenium	SC537	OB, RS	Watershed	Low
4a	Wolf Creek Near Sylvan Grove	Water Supply	Sulfate	SC537	OB, RS	Watershed	Low

Solomon River Basin

10250016
Middle Republican

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Lake Jewell	Aquatic Life	Eutrophication	LM062901	JW	Lake	2023

10260011
Upper North Fork Solomon

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Bow Creek Near Stockton	Water Supply	Arsenic	SC545	PL, RO, SD, GH	Watershed	2023
5	Bow Creek Near Stockton	Aquatic Life	Atrazine	SC545	PL, RO, SD, GH	Watershed	2023
5	Bow Creek Near Stockton	Aquatic Life	Total Phosphorus	SC545	PL, RO, SD, GH	Watershed	2023
4a	Bow Creek Near Stockton	Aquatic Life	Selenium	SC545	PL, RO, SD, GH	Watershed	Low
4a	Kirwin Lake	Aquatic Life	Dissolved Oxygen	LM011001	PL, RO	Lake	Medium
4a	Kirwin Lake	Aquatic Life	Eutrophication	LM011001	PL, RO	Lake	Medium
4a	Logan City Lake	Aquatic Life	Eutrophication	LM069301	PL	Lake	Low
5	North Fork Solomon River Near Glade	Water Supply	Arsenic	SC546	PL, NT, TH, SD	Watershed	2023
5	North Fork Solomon River Near Glade	Aquatic Life	Total Phosphorus	SC546	PL, NT, TH, SD	Watershed	2023
4a	North Fork Solomon River Near Glade	Aquatic Life	Selenium	SC546	PL, NT, TH, SD	Watershed	Low
4a	North Fork Solomon River Near Glade	Water Supply	Sulfate	SC546	PL, NT, TH, SD	Watershed	Low

10260012
Lower North Fork Solomon

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Beaver Creek Near Gaylord	Water Supply	Arsenic	SC670	SM	Watershed	2023
5	Beaver Creek Near Gaylord	Aquatic Life	Dissolved Oxygen	SC670	SM	Watershed	2023
5	Beaver Creek Near Gaylord	Aquatic Life	Total Phosphorus	SC670	SM	Watershed	2023
4a	Beaver Creek Near Gaylord	Aquatic Life	Selenium	SC670	SM	Watershed	Low
4a	Beaver Creek Near Gaylord	Water Supply	Sulfate	SC670	SM	Watershed	Low

10260012
Lower North Fork Solomon

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Cedar Creek near Cedar	Water Supply	Arsenic	SC753	SM	Watershed	2023
5	Cedar Creek near Cedar	Aquatic Life	Selenium	SC753	SM	Watershed	2023
5	Cedar Creek near Cedar	Aquatic Life	Total Phosphorus	SC753	SM	Watershed	2023
5	Deer Creek Near Kirwin	Water Supply	Arsenic	SC721	PL	Watershed	2023
5	Deer Creek Near Kirwin	Aquatic Life	Total Phosphorus	SC721	PL	Watershed	2023
4a	Deer Creek Near Kirwin	Aquatic Life	Selenium	SC721	PL	Watershed	Low
4a	Deer Creek Near Kirwin	Water Supply	Sulfate	SC721	PL	Watershed	Low
5	North Fork Solomon River At Portis	Water Supply	Arsenic	SC014	SM, PL	Watershed	2023
5	North Fork Solomon River At Portis	Aquatic Life	Biology	SC014	SM, PL	Watershed	2023
5	North Fork Solomon River At Portis	Aquatic Life	Total Phosphorus	SC014	SM, PL	Watershed	2023
5	North Fork Solomon River At Portis	Aquatic Life	Total Suspended Solids	SC014	SM, PL	Watershed	2023
4a	North Fork Solomon River At Portis	Recreation	E. coli	SC014	SM, PL	Watershed	Low
4a	North Fork Solomon River At Portis	Aquatic Life	Selenium	SC014	SM, PL	Watershed	Low
4a	North Fork Solomon River At Portis	Water Supply	Sulfate	SC014	SM, PL	Watershed	Low
5	Oak Creek Near Cawker City	Water Supply	Arsenic	SC544	JW, SM	Watershed	2023
5	Oak Creek Near Cawker City	Aquatic Life	Dissolved Oxygen	SC544	JW, SM	Watershed	2023
5	Oak Creek Near Cawker City	Aquatic Life	Total Phosphorus	SC544	JW, SM	Watershed	2023
4a	Oak Creek Near Cawker City	Aquatic Life	Selenium	SC544	JW, SM	Watershed	Low
4a	Oak Creek Near Cawker City	Water Supply	Sulfate	SC544	JW, SM	Watershed	Low
5	Twelve Mile Creek Near Downs	Aquatic Life	Total Phosphorus	SC674	SM, OB	Watershed	2023
4a	Twelve Mile Creek Near Downs	Water Supply	Sulfate	SC674	SM, OB	Watershed	Low

10260013
Upper South Fork Solomon

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Antelope Lake	Aquatic Life	Eutrophication	LM069501	GH	Lake	2023
4a	Sheridan Co. SFL	Aquatic Life	Dissolved Oxygen	LM069401	SD	Lake	Medium
4a	Sheridan Co. SFL	Aquatic Life	Eutrophication	LM069401	SD	Lake	Medium
4a	South Fork Solomon River Near Damar	Aquatic Life	Selenium	SC547	TH, SD, GH	Watershed	Low
4a	South Fork Solomon River Near Damar	Water Supply	Sulfate	SC547	TH, SD, GH	Watershed	Low
5	Webster Lake	Water Supply	Siltation	LM012001	RO	Lake	2023
4a	Webster Lake	Aquatic Life	Eutrophication	LM012001	RO	Lake	Medium
4a	Webster Lake	Water Supply	Sulfate	LM012001	RO	Lake	Low
3	Webster Lake	Water Supply	Arsenic	LM012001	RO	Lake	
3	Webster Lake	Aquatic Life	Selenium	LM012001	RO	Lake	

10260014
Lower South Fork Solomon

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Carr Creek Near Cawker City	Aquatic Life	Total Phosphorus	SC669	OB, MC	Watershed	2023
5	Carr Creek Near Cawker City	Aquatic Life	Total Suspended Solids	SC669	OB, MC	Watershed	2023
4a	Carr Creek Near Cawker City	Aquatic Life	Selenium	SC669	OB, MC	Watershed	Low
4a	Carr Creek Near Cawker City	Water Supply	Sulfate	SC669	OB, MC	Watershed	Low
4a	Covert Creek Near Osborne	Aquatic Life	Selenium	SC666	OB	Watershed	Low
4a	Covert Creek Near Osborne	Water Supply	Sulfate	SC666	OB	Watershed	Low
4a	Kill Creek Near Bloomington	Aquatic Life	Selenium	SC665	OB	Watershed	Low
4a	Kill Creek Near Bloomington	Water Supply	Sulfate	SC665	OB	Watershed	Low
4a	Rooks Co. SFL	Aquatic Life	Dissolved Oxygen	LM011901	RO	Lake	Medium
4a	Rooks Co. SFL	Aquatic Life	Eutrophication	LM011901	RO	Lake	Medium

10260014
Lower South Fork Solomon

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	South Fork Solomon River Near Osborne	Aquatic Life	Total Phosphorus	SC543	OB	Watershed	2023
5	South Fork Solomon River Near Osborne	Aquatic Life	Total Suspended Solids	SC543	OB	Watershed	2023
4a	South Fork Solomon River Near Osborne	Aquatic Life	Biology	SC542	OB, RO, RS	Watershed	Medium
4a	South Fork Solomon River Near Osborne	Aquatic Life	Biology	SC543	OB	Watershed	Medium
4a	South Fork Solomon River Near Osborne	Recreation	E. coli	SC543	OB	Watershed	Low
4a	South Fork Solomon River Near Osborne	Recreation	E. coli	SC542	OB, RO, RS	Watershed	Low
4a	South Fork Solomon River Near Osborne	Aquatic Life	Selenium	SC542	OB, RO, RS	Watershed	Low
4a	South Fork Solomon River Near Osborne	Aquatic Life	Selenium	SC543	OB	Watershed	Low
4a	South Fork Solomon River Near Osborne	Water Supply	Sulfate	SC542	OB, RO, RS	Watershed	Low
4a	South Fork Solomon River Near Osborne	Water Supply	Sulfate	SC543	OB	Watershed	Low
5	South Fork Solomon River Near Woodston	Water Supply	Arsenic	SC737	RO	Watershed	2023
5	South Fork Solomon River Near Woodston	Aquatic Life	Dissolved Oxygen	SC737	RO	Watershed	2023
4a	South Fork Solomon River Near Woodston	Aquatic Life	Selenium	SC737	RO	Watershed	Low
4a	South Fork Solomon River Near Woodston	Water Supply	Sulfate	SC737	RO	Watershed	Low
5	Twin Creek Near Corinth	Aquatic Life	Total Phosphorus	SC668	OB	Watershed	2023
4a	Twin Creek Near Corinth	Aquatic Life	Dissolved Oxygen	SC668	OB	Watershed	Medium
4a	Twin Creek Near Corinth	Aquatic Life	Selenium	SC668	OB	Watershed	Low
4a	Twin Creek Near Corinth	Water Supply	Sulfate	SC668	OB	Watershed	Low

10260015
Solomon River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Jewell Co. SFL	Aquatic Life	Eutrophication	LM012801	JW	Lake	2023
5	Jewell Co. SFL	Water Supply	Siltation	LM012801	JW	Lake	2023
5	Limestone Creek Near Glen Elder	Aquatic Life	Atrazine	SC667	JW	Watershed	2023
5	Limestone Creek Near Glen Elder	Aquatic Life	Total Phosphorus	SC667	JW	Watershed	2023
4a	Limestone Creek Near Glen Elder	Aquatic Life	Dissolved Oxygen	SC667	JW	Watershed	High
4a	Limestone Creek Near Glen Elder	Aquatic Life	Selenium	SC667	JW	Watershed	Low
4a	Limestone Creek Near Glen Elder	Water Supply	Sulfate	SC667	JW	Watershed	Low
4a	Ottawa Co. SFL	Recreation	Aquatic Plants	LM014101	OT	Lake	Medium
4a	Ottawa Co. SFL	Aquatic Life	Dissolved Oxygen	LM014101	OT	Lake	Medium
4a	Ottawa Co. SFL	Aquatic Life	Eutrophication	LM014101	OT	Lake	Medium
5	Pipe Creek Near Minneapolis	Aquatic Life	Dissolved Oxygen	SC651	CD, OT, SA	Watershed	2023
5	Salt Creek Near Minneapolis	Water Supply	Arsenic	SC512	MC, OT, LC	Watershed	2023
5	Salt Creek Near Minneapolis	Aquatic Life	Dissolved Oxygen	SC512	MC, OT, LC	Watershed	2023
5	Salt Creek Near Minneapolis	Aquatic Life	Total Phosphorus	SC512	MC, OT, LC	Watershed	2023
5	Salt Creek Near Minneapolis	Aquatic Life	Total Suspended Solids	SC512	MC, OT, LC	Watershed	2023
4a	Salt Creek Near Minneapolis	Water Supply	Chloride	SC512	MC, OT, LC	Watershed	Low
4a	Salt Creek Near Minneapolis	Water Supply	Sulfate	SC512	MC, OT, LC	Watershed	Low
3	Solomon River at Beloit	Aquatic Life	Atrazine	PWS2012301	MC	Watershed	
5	Solomon River At Niles	Water Supply	Arsenic	SC266	CD, OT, SA	Watershed	2023
5	Solomon River At Niles	Aquatic Life	Atrazine	SC266	CD, OT, SA	Watershed	2023
5	Solomon River At Niles	Aquatic Life	Biology	SC266	CD, OT, SA	Watershed	2023
5	Solomon River At Niles	Aquatic Life	Total Phosphorus	SC266	CD, OT, SA	Watershed	2023

10260015
Solomon River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Solomon River At Niles	Water Supply	Chloride	SC266	CD, OT, SA	Watershed	Low
4a	Solomon River At Niles	Water Supply	Sulfate	SC266	CD, OT, SA	Watershed	Low
4a	Solomon River At Niles	Aquatic Life	Total Suspended Solids	SC266	CD, OT, SA	Watershed	Low
5	Solomon River Near Glasco	Water Supply	Gross Alpha	SC511	JW, CD, MC	Watershed	2023
5	Solomon River Near Glasco	Water Supply	Lead	SC511	JW, CD, MC	Watershed	2023
5	Solomon River Near Glasco	Aquatic Life	Selenium	SC511	JW, CD, MC	Watershed	2023
5	Solomon River Near Glasco	Aquatic Life	Total Phosphorus	SC511	JW, CD, MC	Watershed	2023
5	Solomon River Near Glasco	Aquatic Life	Total Suspended Solids	SC511	JW, CD, MC	Watershed	2023
4a	Solomon River Near Glasco	Water Supply	Chloride	SC511	JW, CD, MC	Watershed	Low
4a	Solomon River Near Glasco	Water Supply	Sulfate	SC511	JW, CD, MC	Watershed	Low
4a	Waconda Lake	Aquatic Life	Eutrophication	LM018001	OB, MC	Lake	Medium
4a	Waconda Lake	Water Supply	Sulfate	LM018001	OB, MC	Lake	Low

Upper Arkansas River Basin

10260014
Lower South Fork Solomon

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Carr Creek Near Cawker City	Aquatic Life	Atrazine	SC669	OB, MC	Watershed	

11030001
Middle Arkansas-Lake McKinney

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Arkansas River At Coolidge	Water Supply	Fluoride	SC223	HM	Watershed	2023
5	Arkansas River At Coolidge	Water Supply	Gross Alpha	SC223	HM	Watershed	2023
5	Arkansas River At Coolidge	Aquatic Life	Total Suspended Solids	SC223	HM	Watershed	2023
4a	Arkansas River At Coolidge	Water Supply	Boron	SC223	HM	Watershed	Medium
4a	Arkansas River At Coolidge	Aquatic Life	Selenium	SC223	HM	Watershed	Low

11030001
Middle Arkansas-Lake McKinney

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Arkansas River At Coolidge	Water Supply	Sulfate	SC223	HM	Watershed	Medium
5	Arkansas River Near Deerfield	Water Supply	Fluoride	SC598	KE, HM	Watershed	2023
5	Arkansas River Near Deerfield	Water Supply	Gross Alpha	SC598	KE, HM	Watershed	2023
5	Arkansas River Near Deerfield	Aquatic Life	Total Suspended Solids	SC598	KE, HM	Watershed	2023
4a	Arkansas River Near Deerfield	Water Supply	Boron	SC598	KE, HM	Watershed	Medium
4a	Arkansas River Near Deerfield	Aquatic Life	Selenium	SC598	KE, HM	Watershed	Low
4a	Arkansas River Near Deerfield	Water Supply	Sulfate	SC598	KE, HM	Watershed	Medium
3	Beymer Lake	Water Supply	Fluoride	LM071001	JO	Lake	
3	Beymer Lake	Aquatic Life	Selenium	LM071001	JO	Lake	
5	Hamilton Co. SFL	Aquatic Life	Dissolved Oxygen	LM016101	HM	Lake	2023
4a	Hamilton Co. SFL	Recreation	Aquatic Plants	LM016101	HM	Lake	Low
4a	Hamilton Co. SFL	Water Supply	Chloride	LM016101	HM	Lake	Low
4a	Hamilton Co. SFL	Aquatic Life	Eutrophication	LM016101	HM	Lake	Low
4a	Hamilton Co. SFL	Water Supply	Siltation	LM016101	HM	Lake	Low
4a	Hamilton Co. SFL	Water Supply	Sulfate	LM016101	HM	Lake	Low
4a	Hamilton W.A.	Water Supply	Chloride	LM016141	HM	Lake	Low
4a	Hamilton W.A.	Aquatic Life	Dissolved Oxygen	LM016141	HM	Lake	Low
4a	Hamilton W.A.	Aquatic Life	Eutrophication	LM016141	HM	Lake	Low
4a	Hamilton W.A.	Water Supply	Siltation	LM016141	HM	Lake	Low
4a	Hamilton W.A.	Water Supply	Sulfate	LM016141	HM	Lake	Low

11030003
Arkansas-Dodge City

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4c	Arkansas River At Pierceville	Aquatic Life	Total Phosphorus	SC286	FI, KE	Watershed	High

11030003
Arkansas-Dodge City

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4c	Arkansas River At Pierceville	Aquatic Life	Total Suspended Solids	SC286	FI, KE	Watershed	Low
4a	Arkansas River At Pierceville	Water Supply	Boron	SC286	FI, KE	Watershed	Medium
4a	Arkansas River At Pierceville	Recreation	Fecal Coli	SC286	FI, KE	Watershed	High
4a	Arkansas River At Pierceville	Aquatic Life	pH	SC286	FI, KE	Watershed	Medium
4a	Arkansas River At Pierceville	Aquatic Life	Selenium	SC286	FI, KE	Watershed	Low
4a	Arkansas River At Pierceville	Water Supply	Sulfate	SC286	FI, KE	Watershed	Medium
4a	Lake Charles	Aquatic Life	Eutrophication	LM071101	FO	Lake	Low

11030004
Arkansas-Pickerel

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Arkansas River Near Dundee	Aquatic Life	Atrazine	SC584	PN, ED, FO	Watershed	2023
5	Arkansas River Near Dundee	Aquatic Life	Selenium	SC584	PN, ED, FO	Watershed	2023
4a	Arkansas River Near Dundee	Recreation	E. coli	SC584	PN, ED, FO	Watershed	High
4a	Arkansas River Near Dundee	Water Supply	Sulfate	SC584	PN, ED, FO	Watershed	Medium
5	Arkansas River Near Ford	Aquatic Life	Dissolved Oxygen	SC594	GY, FO, HS	Watershed	2023
5	Arkansas River Near Ford	Water Supply	Fluoride	SC594	GY, FO, HS	Watershed	2023
5	Arkansas River Near Ford	Water Supply	Gross Alpha	SC594	GY, FO, HS	Watershed	2023
5	Arkansas River Near Ford	Aquatic Life	Selenium	SC594	GY, FO, HS	Watershed	2023
5	Arkansas River Near Ford	Aquatic Life	Total Phosphorus	SC594	GY, FO, HS	Watershed	2023
4a	Arkansas River Near Ford	Recreation	E. coli	SC594	GY, FO, HS	Watershed	High
4a	Arkansas River Near Ford	Water Supply	Sulfate	SC594	GY, FO, HS	Watershed	Medium
5	Arkansas River Near Great Bend	Aquatic Life	Atrazine	SC284	BT, SF	Watershed	2023
5	Arkansas River Near Great Bend	Water Supply	Gross Alpha	SC284	BT, SF	Watershed	2023

11030004
Arkansas-Pickerel

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Arkansas River Near Great Bend	Aquatic Life	Selenium	SC284	BT, SF	Watershed	2023
5	Arkansas River Near Great Bend	Aquatic Life	Total Phosphorus	SC284	BT, SF	Watershed	2023
4a	Arkansas River Near Great Bend	Aquatic Life	Biology	SC284	BT, SF	Watershed	Medium
4a	Arkansas River Near Great Bend	Recreation	Fecal Coli	SC284	BT, SF	Watershed	High
4a	Arkansas River Near Great Bend	Water Supply	Sulfate	SC284	BT, SF	Watershed	Medium
5	Arkansas River Near Kinsley	Aquatic Life	Dissolved Oxygen	SC587	ED, FO	Watershed	2023
5	Arkansas River Near Kinsley	Aquatic Life	Selenium	SC587	ED, FO	Watershed	2023
4a	Arkansas River Near Kinsley	Recreation	E. coli	SC587	ED, FO	Watershed	High
4a	Arkansas River Near Kinsley	Water Supply	Fluoride	SC587	ED, FO	Watershed	Medium
5	Mulberry Creek Near Ford	Aquatic Life	Total Suspended Solids	SC700	FO	Watershed	2023
4a	Mulberry Creek Near Ford	Aquatic Life	Dissolved Oxygen	SC700	FO	Watershed	Low

11030005
Pawnee

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Concannon SFL	Water Supply	Boron	LM053601	FI	Lake	2023
5	Concannon SFL	Water Supply	Fluoride	LM053601	FI	Lake	2023
5	Concannon SFL	Water Supply	Sulfate	LM053601	FI	Lake	2023
4a	Concannon SFL	Aquatic Life	Eutrophication	LM053601	FI	Lake	Low
3	Concannon SFL	Water Supply	Arsenic	LM053601	FI	Lake	
5	Pawnee River Near Burdett	Aquatic Life	Total Phosphorus	SC586	NX, FI, HG	Watershed	2023
5	Pawnee River Near Burdett	Aquatic Life	Total Suspended Solids	SC586	NX, FI, HG	Watershed	2023
4a	Pawnee River Near Burdett	Aquatic Life	Atrazine	SC586	NX, FI, HG	Watershed	Medium
4a	Pawnee River Near Burdett	Aquatic Life	Dissolved Oxygen	SC586	NX, FI, HG	Watershed	Low

11030005
Pawnee

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Pawnee River Near Burdett	Recreation	E. coli	SC586	NX, FI, HG	Watershed	High
4a	Pawnee River Near Burdett	Aquatic Life	Lead	SC586	NX, FI, HG	Watershed	Low
5	Pawnee River Near Larned	Aquatic Life	Total Phosphorus	SC585	PN	Watershed	2023
4a	Pawnee River Near Larned	Aquatic Life	Atrazine	SC585	PN	Watershed	Medium
4a	Pawnee River Near Larned	Aquatic Life	Dissolved Oxygen	SC585	PN	Watershed	Low
4a	Pawnee River Near Larned	Recreation	Fecal Coli	SC585	PN	Watershed	High
4a	Pawnee River Near Larned	Aquatic Life	Lead	SC585	PN	Watershed	Low

11030006
Buckner

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Boy Scout Lake	Aquatic Life	Eutrophication	LM070601	HG	Lake	
4a	Ford Co. Lake	Aquatic Life	Dissolved Oxygen	LM070801	FO	Lake	High
4a	Ford Co. Lake	Aquatic Life	Eutrophication	LM070801	FO	Lake	High
4a	Ford Co. Lake	Aquatic Life	pH	LM070801	FO	Lake	High
5	Hain SFL	Aquatic Life	Eutrophication	LM070901	FO	Lake	2023
5	Hodgeman Co. SFL/W.A.	Aquatic Life	Eutrophication	LM074201	HG	Lake	2023
5	Horsethief Canyon Lake	Aquatic Life	Eutrophication	LM055001	HG	Lake	2023
4a	Jetmore Lake	Recreation	Aquatic Plants	LM073901	HG	Lake	Low
4a	Jetmore Lake	Aquatic Life	Eutrophication	LM073901	HG	Lake	Low

11030007
Upper Walnut Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Walnut Creek At Ness City	Water Supply	Arsenic	SC595	SC, LE, NS	Watershed	2023
4a	Walnut Creek At Ness City	Aquatic Life	Selenium	SC595	SC, LE, NS	Watershed	Low
4a	Walnut Creek At Ness City	Water Supply	Sulfate	SC595	SC, LE, NS	Watershed	Low

11030008
Lower Walnut Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Goodman SFL	Aquatic Life	Eutrophication	LM052401	NS	Lake	2023
5	Goodman SFL	Water Supply	Sulfate	LM052401	NS	Lake	2023
3	Goodman SFL	Aquatic Life	Selenium	LM052401	NS	Lake	
4a	Memorial Park Lake	Aquatic Life	Eutrophication	LM071501	BT	Lake	Low
4a	Stone Lake	Aquatic Life	Eutrophication	LM074001	BT	Lake	Low
5	Walnut Creek Near Alexander	Water Supply	Arsenic	SC596	LE, NS	Watershed	2023
4a	Walnut Creek Near Alexander	Aquatic Life	Dissolved Oxygen	SC596	LE, NS	Watershed	Low
4a	Walnut Creek Near Alexander	Aquatic Life	Selenium	SC596	LE, NS	Watershed	Low
4a	Walnut Creek Near Alexander	Water Supply	Sulfate	SC596	LE, NS	Watershed	Low
5	Walnut Creek Near Heizer	Water Supply	Arsenic	SC597	RH, BT	Watershed	2023
5	Walnut Creek Near Heizer	Aquatic Life	Total Phosphorus	SC597	RH, BT	Watershed	2023
5	Walnut Creek Near Heizer	Aquatic Life	Total Suspended Solids	SC597	RH, BT	Watershed	2023
4a	Walnut Creek Near Heizer	Aquatic Life	Dissolved Oxygen	SC597	RH, BT	Watershed	Low
4a	Walnut Creek Near Heizer	Aquatic Life	Selenium	SC597	RH, BT	Watershed	Low
4a	Walnut Creek Near Heizer	Water Supply	Sulfate	SC597	RH, BT	Watershed	Low
3	Walnut Creek Near Heizer	Aquatic Life	Atrazine	SC597	RH, BT	Watershed	
3	Walnut Creek Near Heizer	Recreation	E. coli	SC597	RH, BT	Watershed	

Upper Republican River Basin

10250001
Arikaree

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Arikaree River Near Haigler, Nebraska	Water Supply	Arsenic	SC226	CN	Watershed	2023
5	Arikaree River Near Haigler, Nebraska	Aquatic Life	Dissolved Oxygen	SC226	CN	Watershed	2023

10250001
Arikaree

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Arikaree River Near Haigler, Nebraska	Water Supply	Fluoride	SC226	CN	Watershed	Low
4a	Arikaree River Near Haigler, Nebraska	Aquatic Life	Selenium	SC226	CN	Watershed	Low
3	Arikaree River Near Haigler, Nebraska	Recreation	E. coli	SC226	CN	Watershed	

10250003
South Fork Republican

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Saint Francis W.A.	Aquatic Life	Copper	LM071401	CN	Lake	
3	Saint Francis W.A.	Aquatic Life	Eutrophication	LM071401	CN	Lake	
5	South Fork Republican River Near Benkelman, Nebraska	Water Supply	Arsenic	SC227	CN	Watershed	2023
4a	South Fork Republican River Near Benkelman, Nebraska	Water Supply	Fluoride	SC227	CN	Watershed	Low
5	South Fork Republican River Near St. Francis	Water Supply	Gross Alpha	SC225	CN	Watershed	2023
4a	South Fork Republican River Near St. Francis	Water Supply	Fluoride	SC225	CN	Watershed	Low
3	South Fork Republican River Near St. Francis	Aquatic Life	Biology	SC225	CN	Watershed	

10250011
Lower Sappa

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Sappa Creek Near Beaver City, Nebraska	Water Supply	Arsenic	SC229	RA, DC, NT, SH, TH	Watershed	2023
5	Sappa Creek Near Beaver City, Nebraska	Aquatic Life	Dissolved Oxygen	SC229	RA, DC, NT, SH, TH	Watershed	2023
5	Sappa Creek Near Beaver City, Nebraska	Aquatic Life	Selenium	SC229	RA, DC, NT, SH, TH	Watershed	2023
5	Sappa Creek Near Beaver City, Nebraska	Aquatic Life	Total Phosphorus	SC229	RA, DC, NT, SH, TH	Watershed	2023

10250012
South Fork Beaver

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Atwood Township Lake	Aquatic Life	Eutrophication	LM071201	RA	Lake	
3	Atwood Township Lake	Water Supply	Fluoride	LM071201	RA	Lake	
3	Atwood Township Lake	Water Supply	Sulfate	LM071201	RA	Lake	

10250014
Beaver Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Beaver Creek At Cedar Bluffs	Aquatic Life	Dissolved Oxygen	SC228	CN, RA, DC, SH	Watershed	Low
4a	Beaver Creek At Cedar Bluffs	Water Supply	Fluoride	SC228	CN, RA, DC, SH	Watershed	Low
3	Beaver Creek At Cedar Bluffs	Aquatic Life	Total Phosphorus	SC228	CN, RA, DC, SH	Watershed	

10250015
Prairie Dog Creek

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Colby City Lake	Aquatic Life	Eutrophication	LM071301	TH	Lake	Low
3	Colby City Lake	Aquatic Life	Lead	LM071301	TH	Lake	
4a	Norton Lake (Sebelius Lake)	Aquatic Life	Dissolved Oxygen	LM010001	NT	Lake	Low
4a	Norton Lake (Sebelius Lake)	Aquatic Life	Eutrophication	LM010001	NT	Lake	High
4a	Norton Lake (Sebelius Lake)	Aquatic Life	pH	LM010001	NT	Lake	Low
5	Prairie Dog Creek Near Dellvale	Water Supply	Arsenic	SC549	DC, TH	Watershed	2023
5	Prairie Dog Creek Near Dellvale	Aquatic Life	Dissolved Oxygen	SC549	DC, TH	Watershed	2023
4a	Prairie Dog Creek Near Dellvale	Aquatic Life	Total Phosphorus	SC549	DC, TH	Watershed	High
5	Prairie Dog Creek Near Woodruff	Water Supply	Arsenic	SC230	PL, NT	Watershed	2023
5	Prairie Dog Creek Near Woodruff	Aquatic Life	Total Phosphorus	SC230	PL, NT	Watershed	2023
4a	Prairie Dog Creek Near Woodruff	Aquatic Life	Dissolved Oxygen	SC230	PL, NT	Watershed	High

Verdigris River Basin

11070101
Upper Verdigris

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Chetopa Creek Near Neodesha	Aquatic Life	Dissolved Oxygen	SC696	WL, NO	Watershed	Medium
4a	Chetopa Creek Near Neodesha	Recreation	Fecal Coli	SC696	WL, NO	Watershed	Medium
4a	Eureka Lake	Aquatic Life	Eutrophication	LM040201	GW	Lake	Medium
4a	Eureka Lake	Water Supply	Siltation	LM040201	GW	Lake	Medium
5	New Yates Center Lake	Aquatic Life	Eutrophication	LM053801	WO	Lake	2023
5	Toronto Lake	Aquatic Life	Lead	LM024001	GW, WO	Lake	2023
4a	Toronto Lake	Aquatic Life	Dissolved Oxygen	LM024001	GW, WO	Lake	High
4a	Toronto Lake	Aquatic Life	Eutrophication	LM024001	GW, WO	Lake	High
4a	Toronto Lake	Water Supply	Siltation	LM024001	GW, WO	Lake	High
5	Verdigris River Near Virgil	Recreation	E. coli	SC289	LY, CS, GW	Watershed	2023
4a	Wilson Co. SFL	Aquatic Life	Dissolved Oxygen	LM015101	WL	Lake	Medium
4a	Wilson Co. SFL	Aquatic Life	Eutrophication	LM015101	WL	Lake	Medium
5	Woodson W.A.	Water Supply	Siltation	LM011841	WO	Lake	2023
4a	Woodson W.A.	Aquatic Life	Dissolved Oxygen	LM011841	WO	Lake	Medium
4a	Woodson W.A.	Aquatic Life	Eutrophication	LM011841	WO	Lake	Medium
4a	Woodson W.A.	Recreation	Fecal Coli	LM011841	WO	Lake	Medium

11070102
Fall River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Fall River Lake	Aquatic Life	Dissolved Oxygen	LM023001	GW	Lake	High
4a	Fall River Lake	Aquatic Life	Eutrophication	LM023001	GW	Lake	Low
4a	Fall River Lake	Water Supply	Siltation	LM023001	GW	Lake	High
4a	Fall River Near Climax	Recreation	Fecal Coli	SC575	GW, BU	Watershed	High
3	Otter Creek Near Climax	Aquatic Life	Biology	SC574	GW	Watershed	

11070102
Fall River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
3	Severy City Lake	Aquatic Life	Eutrophication	LM072101	GW	Lake	

11070103
Middle Verdigris

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Big Hill Creek Near Avian	Aquatic Life	Dissolved Oxygen	SC607	MG, LB	Watershed	Medium
4a	Big Hill Creek Near Avian	Recreation	E. coli	SC607	MG, LB	Watershed	Medium
4a	Big Hill Lake	Aquatic Life	Eutrophication	LM031001	NO, LB	Lake	High
3	Drum Creek Near Independence	Recreation	E. coli	SC699	NO, MG	Watershed	
4a	La Claire Lake	Aquatic Life	Eutrophication	LM072901	MG	Lake	Low
4a	Lake Tanko (Cherryvale City Lake)	Aquatic Life	Eutrophication	LM071601	MG	Lake	Low
4a	Montgomery Co. SFL	Aquatic Life	Dissolved Oxygen	LM010701	MG	Lake	Medium
4a	Montgomery Co. SFL	Aquatic Life	Eutrophication	LM010701	MG	Lake	Medium
4a	Montgomery Co. SFL	Aquatic Life	pH	LM010701	MG	Lake	Medium
4a	Onion Creek Near Coffeyville	Aquatic Life	Dissolved Oxygen	SC608	MG	Watershed	Medium
4a	Pumpkin Creek Near Coffeyville	Aquatic Life	Dissolved Oxygen	SC606	LB	Watershed	Medium
3	Pumpkin Creek Near Coffeyville	Recreation	E. coli	SC606	LB	Watershed	
5	Verdigris River Near Coffeyville	Aquatic Life	Selenium	SC215	MG	Watershed	2023
4a	Verdigris River Near Coffeyville	Aquatic Life	Biology	SC215	MG	Watershed	Medium
4a	Verdigris River Near Coffeyville	Recreation	Fecal Coli	SC215	MG	Watershed	Medium
4a	Verdigris River Near Independence	Aquatic Life	Biology	SC563	MG	Watershed	Medium
4a	Verdigris River Near Independence	Recreation	Fecal Coli	SC563	MG	Watershed	Medium
5	Verdigris River Near Sycamore	Aquatic Life	Biology	SC105	WL, MG	Watershed	2023

11070103
Middle Verdigris

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Verdigris River Near Sycamore	Water Supply	Lead	SC105	WL, MG	Watershed	2023
3	Verdigris River Near Sycamore	Recreation	E. coli	SC105	WL, MG	Watershed	

11070104
Elk River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Elk City Lake	Aquatic Life	Eutrophication	LM025001	EK, MG, CQ	Lake	Medium
4a	Elk City Lake	Water Supply	Siltation	LM025001	EK, MG, CQ	Lake	Medium
5	Elk River Near Elk City	Water Supply	Lead	SC573	EK, MG	Watershed	2023
4a	Elk River Near Howard	Recreation	Fecal Coli	SC693	EK, MG	Watershed	Medium
5	Moline Reservoir	Aquatic Life	Eutrophication	LM071901	EK	Lake	2023
5	Polk Daniels Lake (Elk Co. SFL)	Aquatic Life	Eutrophication	LM012701	EK	Lake	2023

11070106
Caney River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
5	Little Caney River Near Caney	Water Supply	Nitrate	SC572	MG, CQ	Watershed	2023
5	Middle Caney Creek Near Sedan	Aquatic Life	Dissolved Oxygen	SC694	CQ	Watershed	2023
5	Sedan City North Lake	Aquatic Life	Eutrophication	LM048601	CQ	Lake	2023

Walnut River Basin

11030017
Upper Walnut River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Augusta City Lake	Aquatic Life	Eutrophication	LM040001	BU	Lake	High
4a	Augusta Santa Fe Lake	Aquatic Life	Dissolved Oxygen	LM041601	BU	Lake	Medium
4a	Augusta Santa Fe Lake	Aquatic Life	Eutrophication	LM041601	BU	Lake	Medium
4a	Augusta Santa Fe Lake	Water Supply	Siltation	LM041601	BU	Lake	Medium

11030017
Upper Walnut River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	El Dorado Lake	Aquatic Life	Eutrophication	LM033001	BU	Lake	High
4a	El Dorado Lake	Water Supply	Siltation	LM033001	BU	Lake	High
4a	Harvey Co. East Lake	Aquatic Life	Eutrophication	LM052001	HV	Lake	Medium
3	Harvey Co. East Lake	Aquatic Life	Atrazine	LM052001	HV	Lake	
5	Walnut River Near El Dorado	Aquatic Life	Selenium	SC279	BU	Watershed	2023
4a	Walnut River Near El Dorado	Aquatic Life	Dissolved Oxygen	SC279	BU	Watershed	High
4a	Walnut River Near El Dorado	Recreation	E. coli	SC279	BU	Watershed	High
4a	Walnut River Near El Dorado	Aquatic Life	Total Phosphorus	SC279	BU	Watershed	High
3	Walnut River Near El Dorado	Aquatic Life	Biology	SC279	BU	Watershed	
5	Whitewater River At Towanda	Water Supply	Arsenic	SC038	HV, BU, SG	Watershed	2023
5	Whitewater River At Towanda	Aquatic Life	Biology	SC038	HV, BU, SG	Watershed	2023
4a	Whitewater River At Towanda	Recreation	E. coli	SC038	HV, BU, SG	Watershed	High
4a	Whitewater River At Towanda	Aquatic Life	Total Phosphorus	SC038	HV, BU, SG	Watershed	High

11030018
Lower Walnut River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Butler Co. SFL	Aquatic Life	Eutrophication	LM049401	BU	Lake	Medium
4a	Eight Mile Creek Near Douglas	Water Supply	Sulfate	SC704	BU	Watershed	Low
4a	Eight Mile Creek Near Douglas	Aquatic Life	Total Phosphorus	SC704	BU	Watershed	High
3	Eight Mile Creek Near Douglas	Recreation	E. coli	SC704	BU	Watershed	
4a	Four Mile Creek Near Gordon	Water Supply	Sulfate	SC744	BU, SG	Watershed	Low

11030018
Lower Walnut River

Cat.	Stream/Lake	Impaired Use	Impairment	Station	Counties	Body Type	Priority
4a	Four Mile Creek Near Gordon	Aquatic Life	Total Phosphorus	SC744	BU, SG	Watershed	High
4a	Little Walnut River Near Douglas	Recreation	E. coli	SC655	BU	Watershed	High
4a	Rock Creek Near Rock	Recreation	E. coli	SC654	BU, CL	Watershed	High
3	Timber Creek Near Winfield	Recreation	E. coli	SC653	CL	Watershed	
4a	Walnut River At Gordon	Aquatic Life	Biology	SC106	BU	Watershed	Medium
4a	Walnut River At Gordon	Water Supply	Sulfate	SC106	BU	Watershed	Low
4a	Walnut River At Gordon	Aquatic Life	Total Phosphorus	SC106	BU	Watershed	High
4a	Walnut River Near Hackney	Aquatic Life	Biology	SC532	BU, CL	Watershed	Medium
3	Walnut River Near Hackney	Recreation	E. coli	SC532	BU, CL	Watershed	
4a	Winfield City Lake	Aquatic Life	Eutrophication	LM050801	CL	Lake	High
4a	Winfield Park Lagoon	Aquatic Life	Eutrophication	LM072301	CL	Lake	Low