

Introduction

Kansas has developed a robust monitoring and assessment program to track trends and conditions in surface waters to achieve the objectives of the *Kansas Water Plan (KWP)* and to maintain state primacy for administration of federal water quality programs. Classified streams included in the monitoring program are shown on Figure WS-05. The KDHE has primary responsibility for surface water chemical and biological monitoring and assessment. In addition to KDHE statewide monitoring and assessment programs, many other entities including federal, state and local agencies and consultants have conducted focused assessments and reports on specific geographic areas or water quality concerns. Information provided in this section is mostly limited to state agency programs.

Water quality monitoring and assessment operations in Kansas are administered primarily by KDHE and are used to determine impaired water status. KDHE maintains several ongoing programs that collectively fulfill the environmental surveillance and reporting requirements of the Clean Water Act (CWA) and provide the technical data needed to identify and respond to existing and emerging water pollution problems.

KDHE monitoring operations currently focus on the condition of the state's surface water resources and involve two different but complementary conceptual approaches. The first approach involves a targeted survey design that focuses on selected stream reaches, lakes and wetlands. The second approach involves a probabilistic survey design that assesses randomly chosen representatives from a

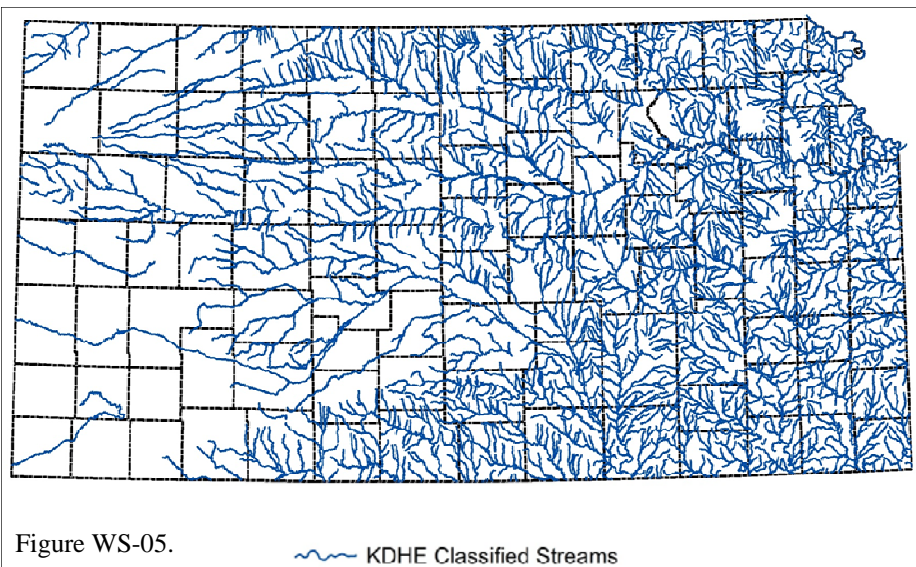
given class of water bodies (e.g., wadeable streams, small lakes) and extrapolates the monitoring results to the entire population of water bodies in that class.

Targeted Stream Chemistry and Biological Monitoring Programs

KDHE [targeted stream chemistry monitoring network](#) consists of 329 sampling stations and generates physical, chemical, radiological and microbiological data useful in the characterization of pollutant loadings from more than 97% of the state's contributing drainage area. Information derived from this network is applied in the development of TMDLs for water quality limited streams and in the

formulation of water quality based permit limits for facilities discharging treated effluent to the waters of the state. Another program, the [targeted stream biological monitoring program](#), evaluates the pollution tolerance of benthic macroinvertebrate assemblages at approximately 180 locations in the state. Information from this program enhances the ability of KDHE to detect water pollution problems, identify contaminants of concern and develop TMDLs and wastewater treatment plant permits.

Combining targeted biological and chemical sampling provides a more complete picture of ecological status than either type of information can provide alone. While stream chemistry measurements provide a snapshot of chemical conditions at the moment they are collected, macroinvertebrates have life spans ranging from weeks to as much as 100 years.



Summary of Surface Water Conditions in Kansas

The Kansas 2012 303(d) list identifies 524 station/pollutant combinations of water quality impairment on lakes, wetlands and stream systems (watersheds), encompassing 2,610 stream segments, and needing the development of TMDL plans to address the identified pollutants. The 2012 list also identifies 403 station/pollutant combinations of waters that were previously cited as impaired in prior lists but are now meeting water quality standards, with 117 of these new in 2012. In addition the 2012 list identifies 76 lake-related water quality impairments and 1,311 stream-related water quality impairments in Kansas. Waters listed on the 303(d) list are individually targeted for TMDL development according to a priority ranking established by KDHE and approved by the EPA.

The assemblage and structure of the macro-invertebrate community, including freshwater mussels, can provide a time-integrated measure of environmental conditions ranging from months to decades.

The KDWPT manages a [Stream Survey and Monitoring Program](#). Although this program has no regulatory or enforcement authority, the goal of the program is to assess biological communities present within Kansas streams. Sampling generally occurs from late spring to summer, and each year focuses on a river basin of interest. KDHE refers to these data when analyzing biologic communities for [303\(d\)/TMDL](#) development for biology impairments.

Lake and Wetland Monitoring Program

In addition to stream monitoring, KDHE routinely surveys 119 publicly owned (or publicly accessible) lakes and wetlands. Physicochemical and biological data generated by this program are applied in the development of TMDLs and water quality based permit limits, the resolution of harmful algal blooms and algal related taste and odor problems, the characterization of lake trophic conditions and the tracking and prediction of long term trends in surface water quality.

Associated with the Lake and Wetland Monitoring Program is the [Harmful Algae Bloom](#) (HAB) program. Excessive nutrient loading can lead to development of eutrophic conditions within water bodies. As excess nutrients accumulate in water bodies, certain environmental conditions can be present which promote the growth of cyanobacteria and other toxin-producing organisms resulting in HABs. Some toxins produced by cyanobacteria and other organisms can be harmless, but others can be harmful to human and animal health. For public water bodies, KDHE issues a Public Health Advisory or Public Health Warning depending on the concentration of toxins or number of cyanobacteria cells present in water quality samples.

Fish Contaminant and Fish Consumption Advisory Programs

Working with other state and federal agencies, KDHE also collects and analyzes fish tissue samples from streams and lakes throughout Kansas. [Targeted fish tissue monitoring](#) efforts are limited annually to about 28 water bodies, including heavily fished reservoirs and certain streams with known water quality problems and existing fish consumption advisories. Based on data, KDHE in partnership with KDWPT issues fish tissue consumption advisories which identify fish or other aquatic life that should be eaten in limited quantities or avoided altogether. Advisories are

formulated using EPA risk assessment methods which account for contaminant level and length of exposure.

Compliance Monitoring Program

KDHE also maintains a statewide compliance monitoring program for evaluating the performance of discharging wastewater treatment plants and other discharging facilities. Samples of treated effluent are collected from about 20 facilities in any given year and subsequently analyzed to assess compliance with permit requirements. The program also provides an independent means of evaluating the accuracy and completeness of self-monitoring and reporting information provided by holders of National Pollutant Discharge Elimination System (NPDES) permits. Parameters selected for analysis vary among discharging facilities in accordance with effluent limitations and monitoring requirements specified in individual discharge permits.

Use Attainability Analysis

KDHE conducts use attainability analyses (UAAs) to determine the classification status and attainable uses of individual water body segments receiving wastewater discharges and nonpoint source runoff. UAAs include collection of geographic, geomorphic, hydrologic, chemical and biologic data. Approved use designations are codified in the Kansas surface water register and adopted by reference in the [Kansas surface water quality standards](#). The level of water quality protection afforded by the standards varies among classified water bodies in accordance with these use designations and associated water quality criteria.

Stream Probabilistic Monitoring

The [stream probabilistic monitoring](#) network is predicated on a random, but spatially balanced, site selection process. Data on surface water chemistry, macroinvertebrate community composition, phytoplankton community composition and instream physical habitat are obtained from 35 to 50 randomly selected sites annually, and a new set of sites is selected for monitoring each year. A similar approach is used to assess contaminant levels in fish inhabiting wadeable streams and small, publicly managed lakes. On average, fish tissue samples are obtained annually from about 15 randomly selected stream reaches and 15 randomly selected lakes. Data from the various probabilistic monitoring programs are applied by KDHE in statewide water quality assessments and in the screening of the entire state for water bodies warranting inclusion in targeted sampling activities.

Groundwater Quality Monitoring Program

Kansas no longer maintains a statewide groundwater quality monitoring program and funding for the renewal of such an effort appears unlikely in the near future. However, an earlier monitoring program (suspended in 2002 due to budgetary constraints) evaluated groundwater quality at more than 200 sites in Kansas. Individual wells in the monitoring network were sampled on a two-year rotational basis, with approximately half of these wells being sampled in any given year. 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.

Special Investigations

KDHE also engages in a variety of short-term water quality investigations supportive of special regulatory initiatives or implemented in response to water quality emergencies such as contaminant spills, sewage bypasses, HABs or major fish kills.

Collaborative Monitoring Programs

Other organizations routinely assist KDHE with monitoring. These include EPA Region 7, KDWPT, the USACE, NPDES permit recipients, USGS, KGS, KBS and KWO.

Volunteer Monitoring Programs

Additionally, KDHE works with other state and federal agencies and private organizations to support volunteer water quality monitoring programs, largely through the provision of grants and technical expertise. Although these programs serve an important educational function, volunteer monitoring data currently are not applied by KDHE in a formal diagnostic or regulatory context owing to quality assurance limitations. Most volunteer water quality monitoring programs in Kansas support broad environmental education objectives.

Overview of Water Quality Assessment Programs

303(d) List, Water Quality Limited Surface Waters and Total Maximum Daily Loads

Section 303(d) of the CWA requires that states develop a list of water bodies needing additional efforts beyond existing controls to achieve or maintain water quality standards assigned to them. The 303(d) list identifies waters which require TMDLs due to technology-based effluent limitations, more stringent state or local effluent limita-

tions and other pollution control requirements such as Best Management Practices (BMPs) are not attained. TMDLs are quantitative objectives and strategies needed to meet water quality standards.

Water Quality Assessment 305(b) Report

Since 2008, the biennial 305(b) report has been incorporated within a larger document known as the Kansas Integrated Water Quality Assessment (IWQA). The 305(b)-related portion of the IWQA assesses the state's overall water quality condition using information obtained from the aforementioned monitoring programs. Reporting efforts have focused primarily on the condition of classified streams, lakes and wetlands in Kansas.

Kansas Integrated Water Quality Assessment (IWQA)

An updated version of the IWQA is published by KDHE every two years, pursuant to the reporting requirements of the federal CWA. Sections 305(b) and 314(a) of the CWA require a biennial assessment of surface water quality conditions, whereas section 303(d) calls for the development and maintenance of a list of water bodies failing to meet established water quality standards. Such water bodies are regarded collectively as "impaired waters" and states are required under the CWA to take actions that improve the condition of impaired waters. These actions often include the development and implementation of TMDLs, water quality-based permit requirements and/or nonpoint source pollution control measures. The IWQA also contains information on upcoming water quality planning, monitoring, permitting and pollution abatement initiatives in Kansas.

Water Quality Standards

Data applied in the 305(b) and 314(a) related assessments are derived from the previously described KDHE monitoring programs. Assessment criteria vary among sampling locations depending on the designated uses of the monitored water bodies. Measured water quality conditions are compared with applicable numeric and narrative criteria set forth in the state water quality standards or in federal guidance documents. Water bodies are classified by KDHE as fully supportive, partially supportive or non-supportive of each designated use. The overall level of use support is calculated for the state's entire population of monitored streams, lakes and wetlands and presented along with other relevant information in the IWQA. In the most recent (2010) IWQA, the monitored water body population accounted for nearly 70% of the state's total classified stream mileage and 90% of the state's total classified lake and wetland acreage.

Watershed Restoration and Protection Strategies

Interested stakeholders form local leadership teams, assess watersheds and develop Watershed Restoration and Protection Strategy (WRAPS) plans to restore and protect them. WRAPS groups draw upon available water quality information and may supplement existing data with targeted assessments to guide planning and implementation activities. Many have had Soil and Water Assessment Tool (SWAT) modeling applied to their watersheds.

Water Quality Based Effluent Limitations

Prior to the issuance of any permit that authorizes a facility to discharge effluent to the waters of the state, KDHE must certify, in writing, that the planned release of effluent will not result in violations of Kansas surface water quality standards, other applicable state laws or any federally promulgated water quality standards ([CWA §401\(a\)\(1\); 40 CFR 124.53](#)). A review of the discharge's potential impact on the quality of the receiving surface water is conducted by KDHE. Currently, about 1,040 municipal, industrial, commercial and federal facilities in Kansas are authorized by KDHE to release treated effluent to the waters of the state.

Nonpoint Source Pollution Management Report

KDHE prepares a report each year describing the state's Nonpoint Source Pollution management objectives, projects implemented during the previous year in support of these objectives and documented improvements in water quality attributable to nonpoint pollution control efforts.

Additional Reports

A variety of additional reports, special publications and peer-reviewed journal articles are generated by KDHE to disseminate water quality information to the broader scientific community, elected officials, regulated entities and the general public.