

Improving the State's Water Quality

Background & Issue

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. The Kansas Department of Health and Environment (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. The 2018 Integrated Water Quality Assessment can be found [here](#). The KDHE



Monitoring and Analysis Unit monitors water quality conditions in streams and publicly owned lakes and wetlands throughout Kansas. The 2018 KDHE list of impaired waters identified:

- **84% of state's assessed stream miles are impaired for one of these uses - aquatic Life, contact recreation or food procurement**
- **96% of the state's assessed lakes are impaired for one of these uses - aquatic life, contact recreation or food procurement**
- **1% of the state's assessed wetlands supported aquatic life and recreational uses**

Programs administered by the Unit are designed to meet the environmental surveillance and reporting requirements of the Clean Water Act and other [applicable federal and state laws](#). Information obtained through these efforts is applied in the development of the state's biennial water quality assessment and list of water quality-limited surface waters. Water quality data also are applied in the formulation of total maximum daily loads ([TMDLs](#)) for 303(d)-listed water bodies. The Monitoring and Analysis Unit works with other KDHE programs to identify potential risks to natural resources resulting from the unauthorized release of pollutants to the waters of the state. For more information, see the KDHE [Bureau of Environmental Remediation](#) website. The [2019-2028 Kansas Water Quality Monitoring and Assessment Strategy](#) is a good tool to use when reviewing regulatory expectation, budgetary realities and technological and methodological advances in environmental surveillance.

The Kansas Department of Wildlife, Parks and Tourism (KDWP) manages a Stream Survey and Monitoring Program with multiple crews collecting valuable data, information can be found [here](#). 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.

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 usually obtained from 30-50 waterbodies across the state, including heavily fished reservoirs and certain streams with known water quality problems and existing fish consumption advisories. Based on these 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 United States Environmental Protection Agency (EPA) risk assessment methods which account for contaminant level and length of exposure, current limits can be found [here](#).

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. More information can be found about the WRAPS program [here](#).

Currently there are 36 KS WRAPS watershed plans that include costs associated with BMP implementation, technical assistance, additional project coordination and education. If plan expenses are totaled for all WRAPS Projects and extended through the length (years) of each watershed plan, the total amount needed to address the water quality impairments identified in WRAPS plans is approximately \$624,844,203.00.

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 KSWQS, other applicable state laws, or any federally promulgated water quality standards found [here](#). A review of the discharge's potential impact on the quality of the receiving surface water is conducted by KDHE. Currently, about 1,501 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 (NPS) management objectives, projects implemented during the previous year in support of these objectives, and documented improvements in water quality attributable to NPS pollution control efforts. The most current report can be found [here](#).

General Water Quality

Surface Water

The Kansas 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. Waters listed on the 303(d) list are individually targeted for TMDL development according to a priority ranking established by KDHE and approved by EPA.

Groundwater

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 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. The Kansas Water Office is currently funding a study in the Missouri Region Planning area to evaluate groundwater quality with the Kansas Geological Survey (KGS) conducting the work. More information about the on-going study can be found [here](#). Nitrate is the most common inorganic contaminant in Kansas groundwater. Previous studies have found that about 30% of domestic wells in Kansas have nitrate levels greater than the Maximum Contaminant Level (MCL) for public drinking water. (KGS study)

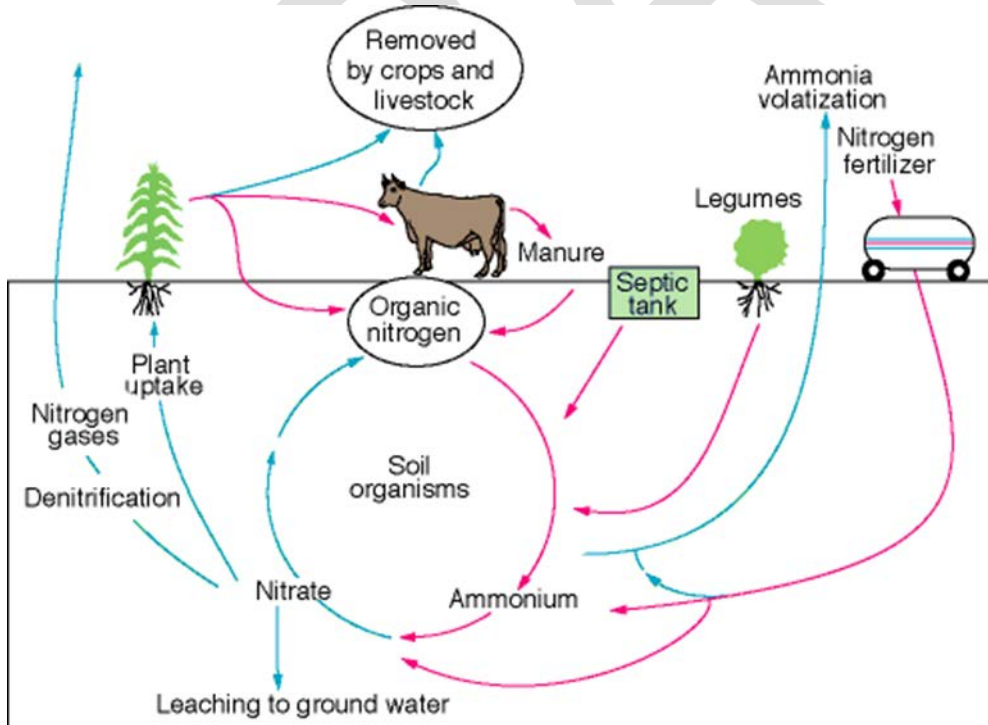


Figure 1. Source KGS – Nitrate in groundwater

Water Reuse

There are reuse projects taking place statewide, some with large amounts of water being reused. For example, the Spirit Corporation in Wichita is treating 2-3 million gallons of water/day for reuse. Most of the reuse water across the state is applied to ball fields, golf courses or agriculture fields. The technology is there to treat water from toilet to tap however there is still a big “yuck” factor and the cost. [Here](#) is a presentation from the 2017 Governor’s Water Conference outlining of issues with water reuse. Water reuse is noted in the *Vision* under the lower quality water section.

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. These can be found by searching [here](#).

Recommended Actions and Strategies – Water Quality
Policy or Program Recommendations
<ul style="list-style-type: none">• RAC Goals addressing water quality/reuse (EW, NEO, MO, RH, GBP, CIM)• Continue to support KDHE in Water Quality management• KWF Policy Comment recommendation – Public comment received• KDHE nutrient reduction work group• Current Research Appropriations (Bathymetric Surveys, Kansas River Alluvium, Streambank Stabilization and Real-Time Flood Mapping)
Implementation Actions
<ul style="list-style-type: none">• Follow RAC Action Items (list out or provide link to Regional WP sections)• Continue to work closely with USGS, KGS, and KDHE on appropriate actions• Encourage more adoption of soil health implementation• Encourage and promote municipalities & PWS water reuse efforts• Promote more water quality off-site mitigation and carbon sequestration partnerships• Encourage Communities to play a bigger role water quality initiative with support from local Conservation Districts
Data, Research, and Studies
<ul style="list-style-type: none">• Facilitate/support data collection of groundwater and surface water quality• GMD 5 study with Kansas State University (KSU) concerning nitrate levels in private wells with assistance from DOC-CD and KDHE
Funding and Resource Needs
<ul style="list-style-type: none">• Partnerships with private companies or other entities to aid in BMP implementation• Use of State Water Plan funds to secure data/information

Section 1. Aquatic Nuisance Species (ANS)

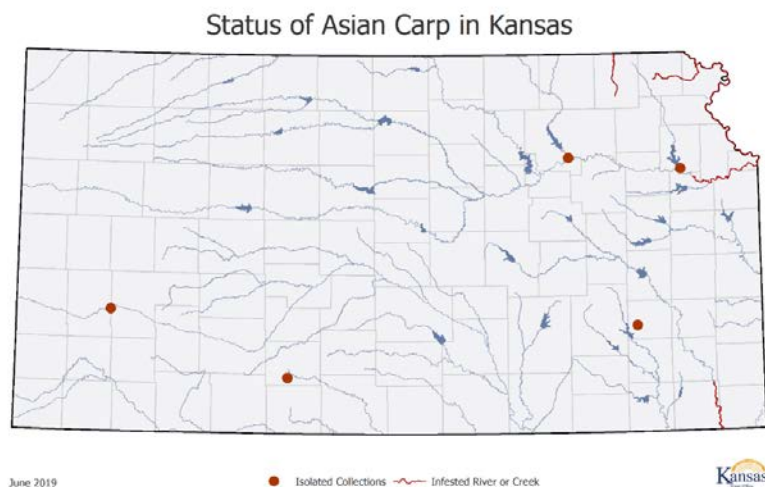
Aquatic Nuisance Species are a source of significant ecological and socio-economic problems throughout North America. Kansas’s aquatic ecosystems have already been invaded by ANS such as zebra mussels, Asian carp, and Eurasian watermilfoil. There is little doubt that these and other ANS pose a serious, and growing, threat to Kansas water resources. The federal definition of ANS is a nonindigenous species that

threaten the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural or recreational activities dependent on such waters. Plainly stated, ANS are non-native species that threaten the water resources of Kansas. Zebra mussels are considered a priority ANS in Kansas; they were first detected in North America in 1988 and have subsequently spread to, and negatively impacted, waterbodies across much of the Eastern and Midwestern portions of the country. They were first found in Kansas in 2003 at El Dorado Reservoir and now infest more than 30 Kansas waters. Another priority species, Asian carp, first appeared in Kansas in 1987 and now constitute the majority of the fish community in the Missouri River and its tributaries, including the Kansas River up to the Bowersock Dam, and also occupy the Neosho River.

Currently there are more than 30 water bodies in Kansas and their exiting streams that are infested with zebra mussels, see Figure 1. Miles of rivers, including the Missouri, Kansas, Wakarusa, Neosho and related tributaries, are infested by Asian Carp, see Figure 2. Multiple impoundments are also infested with invasive plants such as Eurasian watermilfoil, curly-leaf pondweed, and phragmites. These species are known to reduce or clog water intakes, reduce property values, cause declines in native species, decrease spawning habitat, and reduce useable recreational areas on lakes.

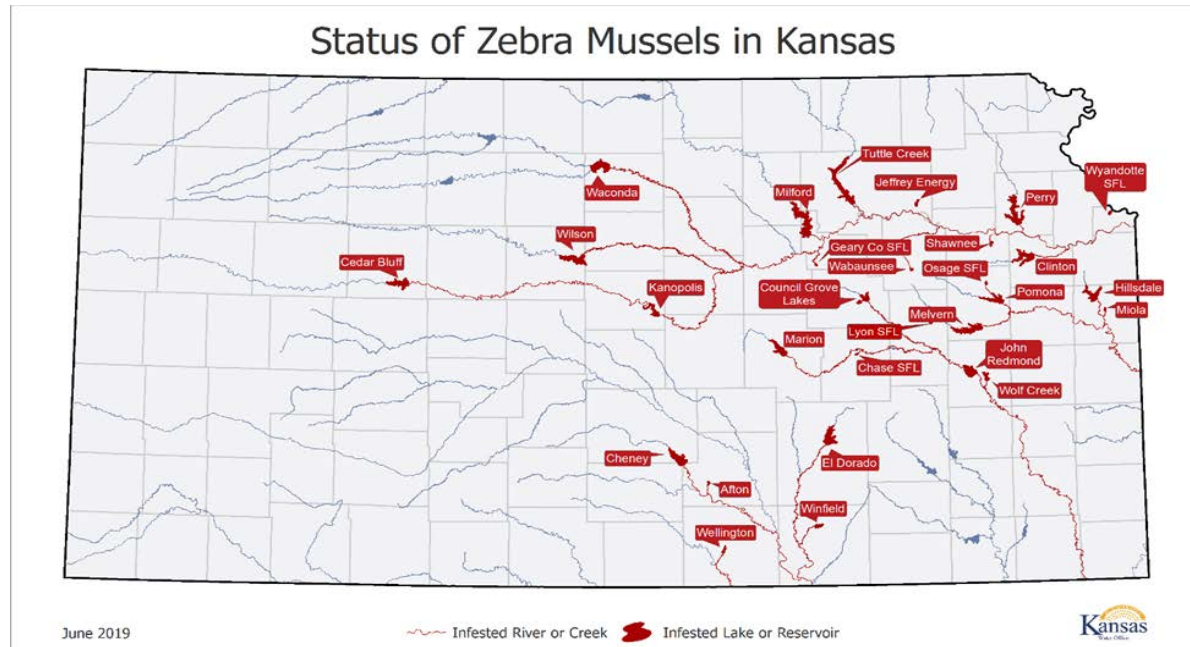


Figure 2. Asian Carp (Chris Steffen, KDWPT)



Moving water, mud, animals, or vegetation between waterbodies risks spreading ANS. Examples of this include interbasin water transfers, boats/trailers, bait buckets, fires suppression equipment, construction equipment, irrigation systems, pet releases, and raw water line repair. Other ANS of concern include: Quagga Mussel, a close relative of the zebra mussel, but which is more problematic since it does not require hard substrates to grow on; Snakehead, an apex predator fish, which is currently spreading from Arkansas throughout the Mississippi River basin and likely to be found in Kansas in the future; Black Carp, whose diet consists largely of mussels (many of which are already imperiled species), which are currently known to occur in the Missouri River in the state of Missouri and have no barrier preventing their spread into Kansas; and multiple species of crayfish that are likely to negatively impact native crayfish populations: Red Swamp Crayfish which have recently become established in Kansas and Rusty Crayfish, which while not yet known to occur in Kansas, have been detected in all of our neighboring states. Invasive species are not stopped by state boundaries so there are multiple states working in collaboration to address these species, more information is located [here](#).

Status of Zebra Mussels in Kansas

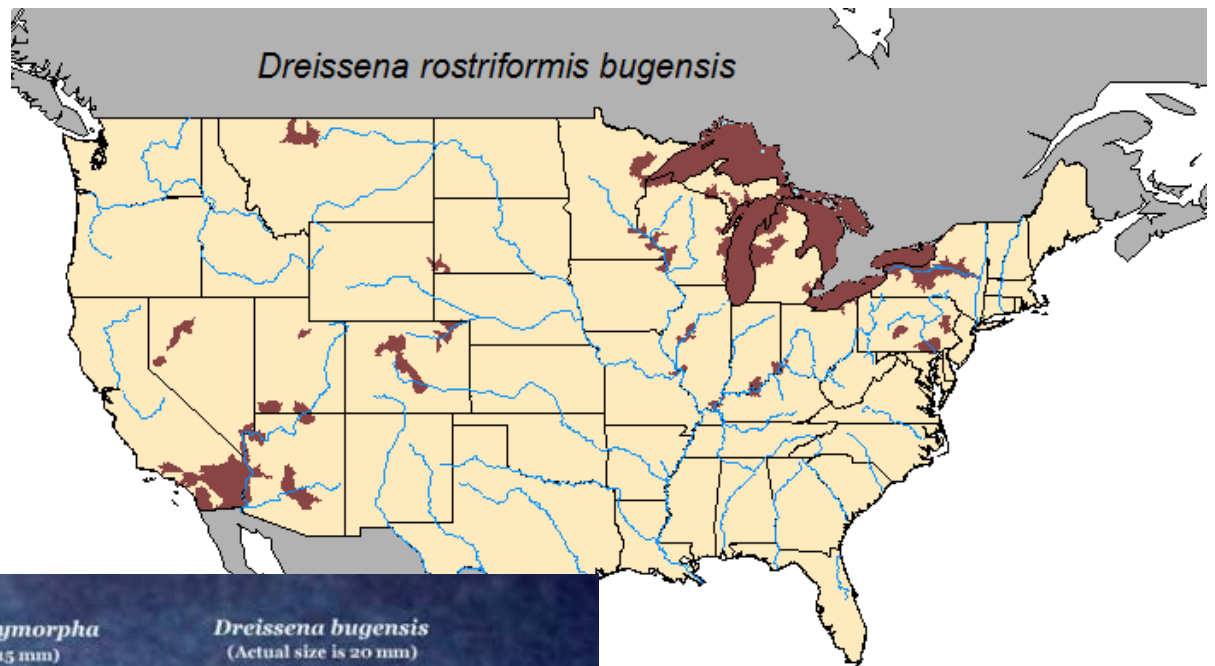


Management Approach

The Kansas Department of Wildlife, Parks and Tourism (KDWP) developed the Kansas ANS Management Plan which was adopted on April 25, 2005. The goals of the plan were simple:

- Prevent new introductions of ANS into Kansas
- Prevent dispersal of established populations of ANS into uninfested waters of Kansas
- Eradicate or control to minimize the adverse ecological, economic, social and public health effects of ANS in an environmentally sound manner
- Educate all aquatic users of ANS risks and how to reduce the harmful impacts
- Support research on ANS in Kansas, and develop systems to disseminate information

However, since 2005 there have been numerous water bodies that have been adversely affected by a particular invasive species. Current KDWP staff serving as the State of Kansas' representative on an array of ANS organizations that coordinate regional and national efforts to manage invasive species; conducting research projects pertinent to KS ANS priorities; permitting and inspecting 200+ bait shops statewide; sampling 110 lakes across the state to detect new populations of zebra or quagga mussels; working with other KDWP fisheries staff to conduct fish health testing at state and private fish hatcheries, broodfish lakes, and in response to fish kills; creating and providing education and outreach materials including a [webpage](#), signage at waterbodies, radio ads, press releases, Facebook ads, brochures, direct mailings, event displays, presentations, and trainings; and implementing a watercraft inspection and decontamination program.



Map created on 6/19/2019. United States Geological Survey



Reservoir Operations

The Lake Level Management Plans (LLMP) that have been established at multiple federal reservoirs are a tool that can be used to eliminate zebra mussels that remain exposed to the elements as the water above Conservation Pool is released. However, the LLMPs are subject to weather conditions and will not eliminate those below the water or ice line.

Planning

KDWPT will continue to work with other states on improving detection techniques, limiting spread of invasive species, some of which will be accomplished with State Water Plan Funds.

Damage assessment and recovery

KDWPT has estimated that ANS causes an estimated \$\$\$ annually to the Kansas economy. To better refine this value, they have launched a study to survey surface water right holders across the state about estimated annual ANS treatment costs. The study is anticipated to take up to a year to complete with results in late 2021.

Measuring Success

Limit the spread of ANS species; increased implementation and usage of watercraft inspection and decontamination stations as documented by KDWPT.

Recommended Actions and Strategies - ANS
Policy or Program Recommendations
<ul style="list-style-type: none">• RAC Goals addressing ANS problems (VER, MDC & NEO)• Continue to support KDWPT in their management of the ANS Plan
Implementation Actions
<ul style="list-style-type: none">• Follow RAC Action Items (list out)• Provide funding dollars through the State Water Plan to aid in prevention of spread• Provide a platform for ANS presentations (Webinars, Governor’s Conference)• Promote continuation of KDWPT’s Clean, Drain, Dry initiative• Install Watercraft Inspection and Decontamination stations near federal reservoirs
Data, Research, and Studies
<ul style="list-style-type: none">• Annual lake/stream monitoring for ANS• KDWPT Collaboration with other States
Funding and Resource Needs
<ul style="list-style-type: none">• Additional state match dollars to capture federal dollars to implement Action Plans

Section 2. Harmful Algal Bloom (HAB)

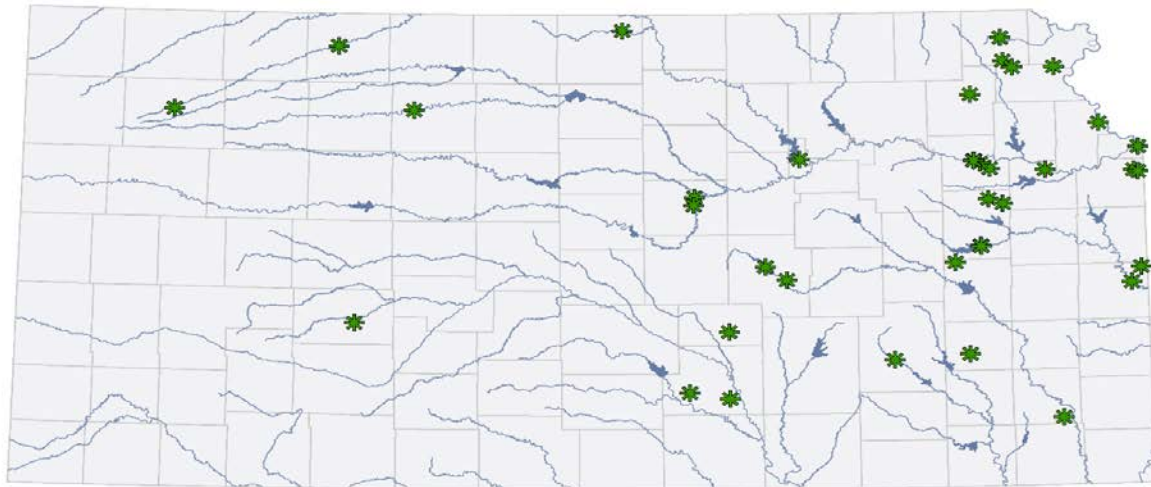
There are many different photosynthetic aquatic organisms that have historically been called “algae.” Though there are some functional similarities among the different forms of “algae,” these organisms have a wide range of physical attributes and origins. “Blue-green algae” are actually bacteria and are thus even more distinct from other types of algae. Blue-green algae are simple aquatic organisms that exist naturally in marine and freshwater waters, rivers, lakes, wetlands, and ponds. When they are present in low numbers, they are a normal part of a healthy ecosystem. Blue-green algae are also known as cyanobacteria. These bacteria are a world-wide problem and the Environmental Protection Agency (EPA) has a great deal of information/research available [here](#).

At times, blue-green algae can reproduce very rapidly, creating a dense growth known as a bloom. A “harmful algal bloom,” or HAB, refers to a dense growth of algae that has the potential for creating toxins or other nuisance compounds. Some species and strains of blue-green algae produce a variety of toxins, which in some cases are released from healthy cells, but in other cases are released only when they become stressed and/or die. It is still not fully understood why these compounds are produced – whether they are adaptations that benefit the organism, or whether they are merely by-products of some other important process. Cyanotoxins can have acute and chronic effects on liver, kidney, lungs, and nervous system, and there are no known antidotes. The cyanotoxin most commonly found in

Kansas lakes is a family of compounds called microcystins, which primarily affects the liver. Not all strains of a given species produce toxins, but a majority of the potentially harmful blue-green algae that have been seen in Kansas belong to one of three genus groups: *Microcystis*, *Aphanizomenon*, and *Dolichospermum* (formerly called *Anabaena*). These species become a problem when nutrients (phosphorus and nitrogen) are present in concentrations above what would occur naturally. Under these conditions, algae can “bloom,” or grow very quickly to extreme numbers. Summer heat and calm, clear water can increase the likelihood of a bloom occurring, because blue-green algae are especially adapted to take advantage of such conditions. The water could be colored pea-green, blue, or blue-green, and a cyanobacterial bloom can look like a vivid paint spill or floating grass clippings.



Public Lakes Confirmed with Harmful Blue-Green Algal Blooms (HAB) in 2019



* Confirmed 2019 HAB locations

Data Source: KDHE Bureau of Water, & Bureau of Environmental Field Services

Data current as of December 31, 2019

Management Approach

The Kansas Department of Health and Environment (KDHE) HAB Response Program was established in 2010 with over 100 water bodies affected by HABs in the past 10 years. More information about the program which is complaint-based and only addresses blooms on public waters is available [here](#). Managers of private waters are encouraged to perform a jar test and use private labs if they believe they are experiencing a bloom, more information is available [here](#). Under the KDHE program, there are three levels of Advisories. A **Watch** is triggered by microcystin concentrations over 4ug/l or cyanobacterial density over 80,000 cells/ml, a **Warning** for microcystin over 8 ug/l or cyanobacterial density over 250,000 cells/ml, and **Hazard** for microcystins over 2,000 ug/l or cyanobacterial density over 10,000,000 cells/ml.

Reservoir Operations

The LLMP at Milford Reservoir was reconfigured in 2018 to mimic conditions that limited the HABs in the reservoir in 2017. During this year it appeared that certain water levels and timing releases resulted in no HABs on the reservoir. Information on the Milford LLMP can be found [here](#).

Planning

KDHE will continue to work with other agencies to address this worldwide problem and seek a solution partially funded with State Water Plan Funds.

Damage assessment and recovery

KDHE holds weekly calls throughout the HAB season to provide lake managers with current conditions. However, revenue lost due to HAB lake closures or individuals not visiting a particular lake has not been clearly enumerated. There is a considerable amount of research that is taking place within the state and worldwide to solve this issue.

Measuring Success

Reduced number and duration of HAB occurrences.

Recommended Actions and Strategies - HAB
Policy or Program Recommendations
<ul style="list-style-type: none">• RAC Goals addressing HABs (KS, NEO)• Kansas Wildlife Federation suggestions• Continued funding of programs such as Kansas Reservoir Protection Initiative (KRPI) or Milford RCPP limiting nutrients into the water bodies• Current Research Appropriations (Reservoir Water Quality – HABs)
Implementation Actions
<ul style="list-style-type: none">• Follow Action Plans• Legislative action to implement KWF suggestions• State Water Plan dollars directed annually towards like projects
Data, Research, and Studies
<ul style="list-style-type: none">• KDHE, KBS, EPA, etc. HAB related information/research

Recommended Actions and Strategies - HAB
Funding and Resource Needs
<ul style="list-style-type: none"> • State Water Plan dollars • Grants for research

Section 3. Recreation

Recreational opportunities (e.g., boating, fishing, hunting, camping, and kayaking) improve the quality of life for the citizens of Kansas and contribute to the state’s economy. The availability of recreational destinations and activities provides Kansas the opportunity to prosper economically and increases the value of natural resources in the state.

Public lands that provide recreation opportunities are relatively rare in Kansas, with privately-owned lands accounting for 98.4 percent of the land in Kansas. State and federal lands account for approximately 1.4 percent of total lands in the state, and only a portion of these state and federal lands are associated with recreational parks and areas (Headwaters Economic, 2020). State-owned and controlled lands for recreation account for only 0.7 percent of lands in the state. Because of the scarcity of federal and state public lands for recreation in Kansas, it is imperative that these lands are protected and managed to promote sufficient recreational opportunities to meet the needs of local residents and visitors to the state. The year 2020 provided additional demands for outdoor recreational opportunities associated with the COVID guidelines and requirements.

Supply of Water for Recreation

Most federal reservoirs are surrounded by public parks that offer a variety of water-based recreation activities including boating, fishing, waterfowl hunting and wildlife observation. Park lands are managed by the Kansas Department of Wildlife, Parks and Tourism (KDWPT) or U.S. Army Corps of Engineers (Corps). In some cases, both KDWPT and the Corps operate separate parks at the same reservoir, differing in the type of facilities offered. KDWPT also operates state parks around reservoirs owned by the Bureau of Reclamation (Bureau) and smaller lakes owned by the KDWPT.

River Based Recreation

Only three rivers in Kansas are legally navigable and open to public recreation: the Arkansas, Kansas and Missouri rivers. Despite restricted access due to the state’s water laws, canoeing and other float type activities have become popular in Kansas, with reported participation increasing by 80% in the last decade. Public access is generally provided on navigable rivers and the upper reaches of public reservoirs. In general, the Stream Access Program of KDWPT is used to provide a systematic approach to implementing general access to navigable Kansas streams. Interest in river recreation is expected to increase more on the Kansas River due to the recent designation as a National Water Trail. This designation will bring federal funds to the state to develop additional facilities along the river.

Access to these rivers is only allowed where a public access point exists and this is the major limitation to river recreation. If no public access exists, boaters have to receive permission to access the river through private property. The number of public access points on the three navigable rivers has increased in recent years through initiatives by KDWPT, local governments, and interest groups. More

information on these rivers and access availability can be found at the KDWPT [website](#) and the Friends of the Kaw [website](#). Efforts are also underway to provide additional access along the Arkansas River, especially in the reach between Hutchinson and south of Wichita. Local communities recognize the health, social and economic value of providing river access in their communities and are willing to provide local funding and in-kind services to assist with access development.

No visitation numbers are regularly compiled for river float trips as most are organized by either private individuals or non-profit organizations and no permit is required.

Management Approach

The US Army Corps of Engineers (USACE), KDWPT and numerous NGO's provide the gateway to water-based recreation in Kansas with USACE and KDWPT regulating those activities. Water-based recreation demand is addressed by the use of federal, state and local reservoirs, rivers and wetlands. However, in many areas of the state the availability of surface water for recreation is limited and the public must travel long distances for water-based recreation opportunities. Kansas lacks natural lakes and contains only three legally navigable rivers. Consequently, water-related outdoor recreation in the state occurs mainly on and around the 24 federal reservoirs, 48 state fishing lakes, 198 city and county lakes and hundreds of smaller private impoundments, wetlands, and stream reaches. The USACE website is located [here](#) which provides individuals about amenities and additional information on the federal reservoirs. The KDWPT website located [here](#) provides additional information for areas that are managed including State Parks, State Fishing Lakes and river access points.

Reservoir Operations

Recreational use is not only for human needs, but also for the protection of fish and wildlife. Water based recreation is affected by drought. Water quality and quantity in streams are compromised during low flow conditions. Federal reservoirs are used to make quality releases to ensure that water is available for aquatic communities downstream. Sedimentation of reservoirs reduces the storage available to maintain these base flows and becomes more of a threat as lake levels drop due to drought conditions. The Kansas Water Office maintains a Reservoir page with pertinent information located [here](#).

Planning

USACE, KDWPT and NGO's will continue to provide for the expanding need for outdoor opportunities in our current environment. The Kansas River Reservoir Flood and Sediment Study (KRRFSS) has drawn multiple groups together to address water issues in the northern half of Kansas with expected outcomes by 2023.

Damage assessment and recovery

USACE and KDWPT along with other recreational entities have to deal with drought and flooding issues that impact facilities and revenue. These are documented in annual reports produced by USACE and KDWPT.

Measuring Success

Increased recreational opportunities/usage as monitored by participating entities as documented in annual reports.

Recommended Actions and Strategies - Recreation
Policy or Program Recommendations
<ul style="list-style-type: none">• RAC Goals addressing recreation needs?• Provide USACE and KDWPT opportunities to promote recreation as a mental health booster
Implementation Actions
<ul style="list-style-type: none">• Follow RAC Action Plans or else!• Support KDWPT pursuit of Land and Water Conservation funding• Use KRRFSS results to assist with recognition and implementation of possible actions
Data, Research, and Studies
<ul style="list-style-type: none">• Use KRRFSS recreation section as the newest nearly complete data set for Kansas Recreation in the northern part of the state
Funding and Resource Needs
<ul style="list-style-type: none">• Use of Land and Water Conservation funds• Increased license sales