

MEMO



DATE: November 30, 2020
TO: Verdigris RAC Members
FROM: Angela Anderson, Kansas Water Office
CC: Verdigris RAC Advisors
RE: December 14, 2020 RAC Meeting

900 SW Jackson St., Suite 404
Topeka, KS 66612
Phone: (785) 296-3185
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www.kwo.ks.gov

The meeting of the Verdigris Regional Advisory Committee (RAC) will be held **at 1:00 p.m., Monday, December 14, 2020. The meeting will be held as GoTo Meeting.**

Verdigris RAC meeting
Mon, Dec 14, 2020 1:00 PM - 3:00 PM (CST)

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The main item of discussion for the RAC meeting listening to a presentation from the City of Tulsa, receiving an update on the progress of the Kansas Water Plan (KWP) and discussing two draft sections of the Guiding Principles.

Enclosed are materials for the December 14, 2020 meeting:

- Agenda
- July Meeting Notes
- Guiding Principles Sections
- Press Release

If you cannot attend, or have any questions or concerns regarding the meeting, please contact me by telephone at (785) 296-3185 or by e-mail at angela.anderson@kwo.ks.gov.



**VERDIGRIS
REGIONAL ADVISORY COMMITTEE
MEETING AGENDA**

DATE: December 14, 2020

TIME: 1:00 p.m.

LOCATION: Verdigris RAC meeting
Mon, Dec 14, 2020 1:00 PM - 3:00 PM (CST)
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AGENDA DETAILS

- I. Welcome
- II. Roll call – John Ditmore (Chair & Industry/Commerce) (5 mins)
- III. Approve Agenda
- IV. Review of July RAC Meeting Notes (5 mins)
- V. Governor’s Conference Review (5 mins)
- VI. Adam Johnson, City of Tulsa, Significance of Verdigris Basin on Tulsa water supply & Source Water Protection Program (30 minutes)
- VII. Kansas Water Plan Update/Input on draft Water Quality Section & Education Resource Sections (30 minutes)
- VIII. Vacant membership for Public Water Supply discussion (5 mins)
- IX. Questions and Future Issues from RAC Members (10 mins)
- X. Agency Input (10 mins)
- XI. Public Input (10 mins)
- XII. Future Meetings
 - a. Kansas Water Authority – December 11th, 9am – GoTo Meeting

Verdigris Regional Advisory Committee Meeting

10:00 am
Friday, July 17, 2020
GoTo Meeting

Members in Attendance:

Name	City	Category	Term	Present
Chuck Shively (Chair)	Coffeyville, KS	Public Water Supply (cc)	2023	YES
John Ditmore (Vice Chair)	Coffeyville, KS	Industry/Commerce (cc)	2023	YES
Doug Blex	Independence, KS	WRAPS	2023	NO
Ken McNickle	Mound Valley, KS	Public Water Supply	2021	NO
Harold Engle	Madison, KS	Agriculture (cc)	2023	YES
Brian Graff	Neodesha, KS	At Large Public (cc)	2021	NO
Gary Kelley	Sedan, KS	Conservation/Environment (cc)	2021	YES
John Black	Howard, KS	Agriculture	2023	YES
Bob Culbertson	New Strawn, KS	Conservation/Environment	2023	YES
Ron Smith	Fredonia, KS	Industry/Commerce	2021	NO

Others in attendance:

Name	Agency
Taylor Herman	KCC
Angela Anderson	KWO
Gary Koons	KWO
Cara Hendricks	KWO
Pam Walker	Wilson Co. Conservation District
Lauren Koons	KWO
Matt Unruh	KWO

- Welcome and Introductions:** The meeting was called to order at approximately 10:01am by Chairperson, Chuck Shively (Public Water Supply). Chuck informed the group that the agenda sent out needed to be amended adding “Message of State Water Plan Fund Budget Recommendation to the Kansas Water Authority Budget Committee” to the agenda.

Harold Engle (Agriculture) moved to amend the agenda. Bob Culbertson (Conservation/Environment) seconded the motion. There was no discussion. Motion passed unanimously.

Harold Engle moved to accept the amended agenda. John Ditmore seconded the motion. There was no discussion. Motion passed unanimously.

- Review of the June Meeting Notes:** The meeting notes from the June meeting were reviewed. There were no additions or corrections. The notes were accepted as presented.
- RAC Goals/Action Plans Discussion/Possible Vote:**

The RAC reviewed the Goals/Action Plans that had been drafted at the June meeting. Angela Anderson was asked to review the Aquatic Nuisance Species (ANS) webinar that Chris Steffen with the Kansas Department of Wildlife Parks & Tourism (KDWPT) had facilitated.

Bob Culbertson moved to add Goal 3:

“Continually work to prevent the spread of Aquatic Nuisance Species (ANS), including Zebra and Quagga mussels, into Kansas Lakes that are not currently infested, by working with the agencies focused on ANS.

Action Steps:

- The KWO and the RAC will work to prevent the spread of ANS into Kansas Lakes that are not currently infested, by working with the Kansas Department of Wildlife, Parks, and Tourism (KDWP&T) and the US Army Corps of Engineers (USACE) to install four Watercraft Inspection and Decontamination stations near the federal reservoirs within the Verdigris Region.
- The RAC will work with the KDWP&T and USACE on an ongoing basis to provide education for lake users concerning the spread of ANS and how to prevent it.
- The RAC will encourage funding for the ANS Program through the State Water Plan Fund (SWPF).”

Harold Engle seconded the motion.

Discussion: Bobbi Lutjohann (KWO) informed the group as to the threat the Quagga mussels potentially have on the state reservoirs.

Motion passed unanimously.

Harold Engle moved to strike the words drawing attention to a specific entity in the basin in Goal #1 and add the words “and utilization”. Bob Culbertson seconded the motion. There was no discussion. Motion passed unanimously.

Bob Culbertson moved to approve all of the Goals and Action Plans for the Verdigris RAC. Harold seconded the motion. There was no discussion. Motion passed unanimously. The Verdigris RAC Goals and Action Plans now read:

Goal 1.

Increase drought tolerance in the Verdigris basin by optimizing reservoir releases and maintaining storage capacity.

Action Plans:

- Encourage agencies and private entities to work with water users to improve intake and utilization efficiencies.
- Evaluate ways to pass accumulated sediment through reservoirs.
- Continue to promote the use of sediment-reducing best management practices (BMPs) above water supply reservoirs.
- The Kansas Water Office will continue to find ways to optimize reservoir operations and mitigate drought.

Goal 2.

Protect watershed dam functions.

Action Plans:

- Evaluate the structural and financial health of watershed districts within the region.
- Utilize results of the evaluation to identify ways to maintain or improve the functionality of existing structures.

Goal 3.

Continually work to prevent the spread of Aquatic Nuisance Species (ANS), including Zebra and Quagga mussels, into Kansas Lakes that are not currently infested, by working with the agencies focused on ANS.

Action Plans:

- The KWO and the RAC will work to prevent the spread of ANS into Kansas Lakes that are not currently infested, by working with the Kansas Department of Wildlife, Parks, and Tourism (KDWP&T) and the US Army Corps of Engineers (USACE) to install four Watercraft Inspection and Decontamination stations near the federal reservoirs within the Verdigris Region.
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- The RAC will encourage funding for the ANS Program through the State Water Plan Fund (SWPF).

Goal 4.

Improve water conservation through a public education campaign, with priority given to youth, to increase awareness and protect water supply for future generations.

4. Message of State Water Plan Fund Budget Recommendation to the Kansas Water Authority (KWA) Budget Committee:

Cara Hendricks (KWO Asst. Director) highlighted the State Water Plan Fund (SWPF) and informed the group that the State Water Plan will be updated this year as part of the five-year update. In her powerpoint, she explained how fees feed into the SWPF as do Demand Transfers, which are a State mandated statute. The Demand Transfers are to total \$8 million originating from the State General Fund (SGF) and the Economic Development Initiative Fund (EDIF). In State Fiscal Year 2020, the SWPF received \$4 million from SGF and about \$500,000 from EDIF. State Fiscal Year 2021, the SWPF was slated to receive \$6 million from SGF and about \$1 million from EDIF. However, with the state of the State presently due to the pandemic, the amounts have been decreased to the 2020 level.

Cara reviewed the SWPF overarching categories of Groundwater Initiative, Water Quality, and Reservoir Water Supply and Sedimentation. Cara shared a chart put together by Richard Rockel (KWO) indicating which funding programs align with which Verdigris RAC goals/action plans. Cara highlighted more examples of projects in the Verdigris region that utilize the various budget program funding.

The RAC worked through developing the message they would send to the KWA Budget Committee.

Gary Kelley (Conservation/Environment) moved to accept and send the message. Chuck Shively (Public Water Supply) seconded the motion. There was no discussion. The motion passed unanimously.

Verdigris RAC message:

“The Verdigris RAC supports the budget and would like to highlight the following priorities that are important to fund in order to accomplish and carryout the goals and action plans of the Verdigris RAC. They are listed below in no particular order of priority.

- *Sediment Management through WID and BMPs (KWO)*
- *Assessment and Evaluation to optimize reservoir operations using FIRO and structures that improve efficiencies during dry periods. (KWO)*
- *Stream gaging (KWO)*
- *Watershed dam construction (KDA)*
- *Aid to conservation districts (KDA)*

**Support funding of the Aquatic Nuisance Species program through the Kansas Dept. Wildlife Parks & Tourism (KDWPT)*

Additionally, the RAC shows support for positions related to implementation of the Vision. (KWO)

5. Questions and Future Issues from RAC Members:

There were no questions or future issues.

6. Agency Input:

Cara Hendricks informed the group that there will be an August Kansas Water Authority meeting at a day and time yet to be determined.

Angela Anderson thanked the group for working through the full agenda via the virtual meeting method with smooth efficiency.

7. Public Input:

There was no public input.

8. Future Meetings:

- KWA – July 30th – 9am (GoTo Meeting)

9. Adjournment

Bob Culbertson moved to adjourn the meeting. Harold Engle seconded the motion. Motion passed. The meeting adjourned at 11:06 am.

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 2020 Integrated Water Quality Assessment can be found [here](#). The KDHE



Watershed Planning, Monitoring, and Assessment Section (WPMAS) monitors water quality conditions in streams and publicly owned lakes and wetlands throughout Kansas. The 2020 KDHE list of impaired waters identified:

- **86% of state's assessed stream miles are impaired for one of these uses - aquatic life, contact recreation or food procurement**
- **Over 96% of the state's assessed lakes are impaired for one of these uses - aquatic life, contact recreation or food procurement**
- **Less than 5% of the state's assessed wetlands supported aquatic life and recreational uses**

Programs administered by the Section are designed to meet the environmental surveillance and reporting requirements of the CWA and other [applicable federal and state laws](#). Information obtained through these efforts is applied in the development of the state's biennial Integrated Water Quality Assessment and 303 (d) 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, used to inform water quality standards development, and guide implementation of pollutant and pollution reduction activities. The WPMAS works with other KDHE programs, such as the Spill Response and Storage Tank 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.

Surface Water Monitoring Programs

The stream chemistry monitoring program's sampling network is comprised of 327 monitoring sites spanning all the major river basins in Kansas. Annually, 160 permanent sites are visited by staff on a quarterly basis, whereas the remaining 167 sites are monitored using a four-year rotational approach. Sampling stations are chosen to represent water quality conditions in more than 97% of the state's contributing drainage area.

KDHE has maintained a Stream Biological Monitoring Program since 1972. This program examines the structural attributes of aquatic macroinvertebrate assemblages and utilizes this information to provide a more refined picture of the ecological status of streams in Kansas. Unlike water chemistry measurements alone, which reflect conditions occurring at the moment of sample collection, biological monitoring provides an integrated measure of environmental conditions over time frames ranging from weeks to years, depending on the biological assemblage of interest. About 45 long-term core network stations located in watersheds of major rivers and streams are sampled every year when conditions allow. Additional sites are visited each year as dictated by TMDL development needs, special studies, and pollutant investigations. Since beginning, the program has collected macroinvertebrate samples and conducted freshwater mussel surveys at 225 sites throughout the state and the current database contains more than 90,000 high resolution (predominantly genus/species level) records from over 2,200 separate samples.

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.

The lake and wetland monitoring program surveys water quality conditions in publicly owned and publicly accessible lakes and wetlands throughout Kansas. Individual water bodies are sampled on a 3 to 6-year rotational schedule and water quality information is maintained on 175 lakes and wetlands in the state. These include all 24 federal reservoirs, most state fishing lakes, and various other county or locally owned and several privately owned but publicly accessible lakes.

The stream probabilistic monitoring program differs from the stream chemistry monitoring program in that monitoring sites are a randomly selected subset of Kansas streams. Results generated through the probabilistic monitoring program can be extrapolated with known statistical confidence to the state's entire population of streams, including hundreds of smaller water bodies largely outside the historical and current purview of the targeted monitoring programs.

Fish Tissue 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. On an annual basis, fish tissue from 200 to 300 individual fish captured from about 40 monitoring sites are analyzed for mercury. Organic contaminant concentrations, e.g., pesticides and PCBs, are evaluated at 5 to 10 monitoring sites per year. Sample site selection for both mercury and organic contaminants is based on a combination of targeted long-term and targeted screening sites as well as collecting according to the screening sampling design in support of the KDHE Stream Probabilistic Monitoring Program. Based on these data, KDHE in partnership with

KDWPT issues annual 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 efforts can address a variety of water resource concerns statewide. The concerns can include water quality, water supply protection, flooding, and wetland and riparian habitat protection or restoration. Solutions to identified concerns are developed locally by stakeholders within the watershed. WRAPS groups draw upon available water quality information and may supplement existing data with targeted assessments to guide planning and implementation activities. In some cases, 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 Kansas Surface Water Quality Standards (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.

To address some of these water quality concerns, multiple agencies and NGO's are collaborating to provide viable management tools. The Kansas Forest Service continues to promote stream buffers which have proven to reduce the movement of sediment, phosphorus and nitrogen into streams. Mature stream buffers affect the channel movement by adding strength and surface protection to the streambanks. More information related to the effectiveness and benefits of riparian forest buffers can be found [here](#). Additional policies need to be put in place to protect riparian forests in strategic locations. A significant amount of research has been conducted concerning the effects of wetlands on water quality. The research indicates there are positive effects a healthy, functioning wetland has on water quality. The Kansas Water Office serves as the wetland coordinator for the state with information of ongoing activities located [here](#). There are numerous partners across the state that are engaged in some form of wetland activities.

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 ground water. 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 illustrates how the nitrates get into the water supply and Figure 2 shows areas in the state that have nitrate problems.

One of groundwater quality issues of concern right now is the Equus Beds Chloride Plume. This problem stems from oil field production with produced water being deposited in open pits and allowed to seep into the groundwater. Information about the movement of the plume and the steps that are being taken to address the problem are located [here](#). The Kansas Department of Health and Environment is leading a group of agencies in continuing a groundwater study from 2009 looking at naturally-occurring minerals in private water wells in southwest Kansas. A total of thirteen parameters from arsenic to uranium are analyzed for presence and levels. Additional information and results of the program are available [here](#).

Additionally, beginning in 2019 KWO, KDHE, KDA, and KGS partnered on a groundwater study focused on analyzing the impacts of naturally occurring minerals on water used for human consumption from private water wells in the southwest Kansas region. The project invites homeowners within the study area to provide voluntary waters samples. More information about the study can be found [here](#).

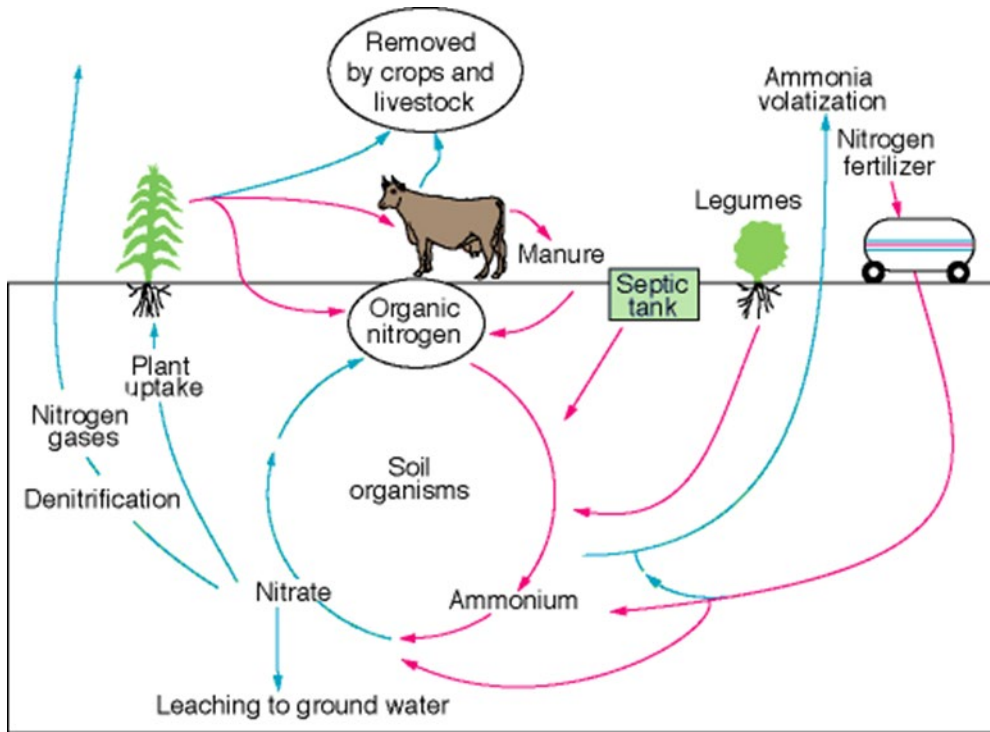


Figure 1. Nitrate in groundwater, KGS.

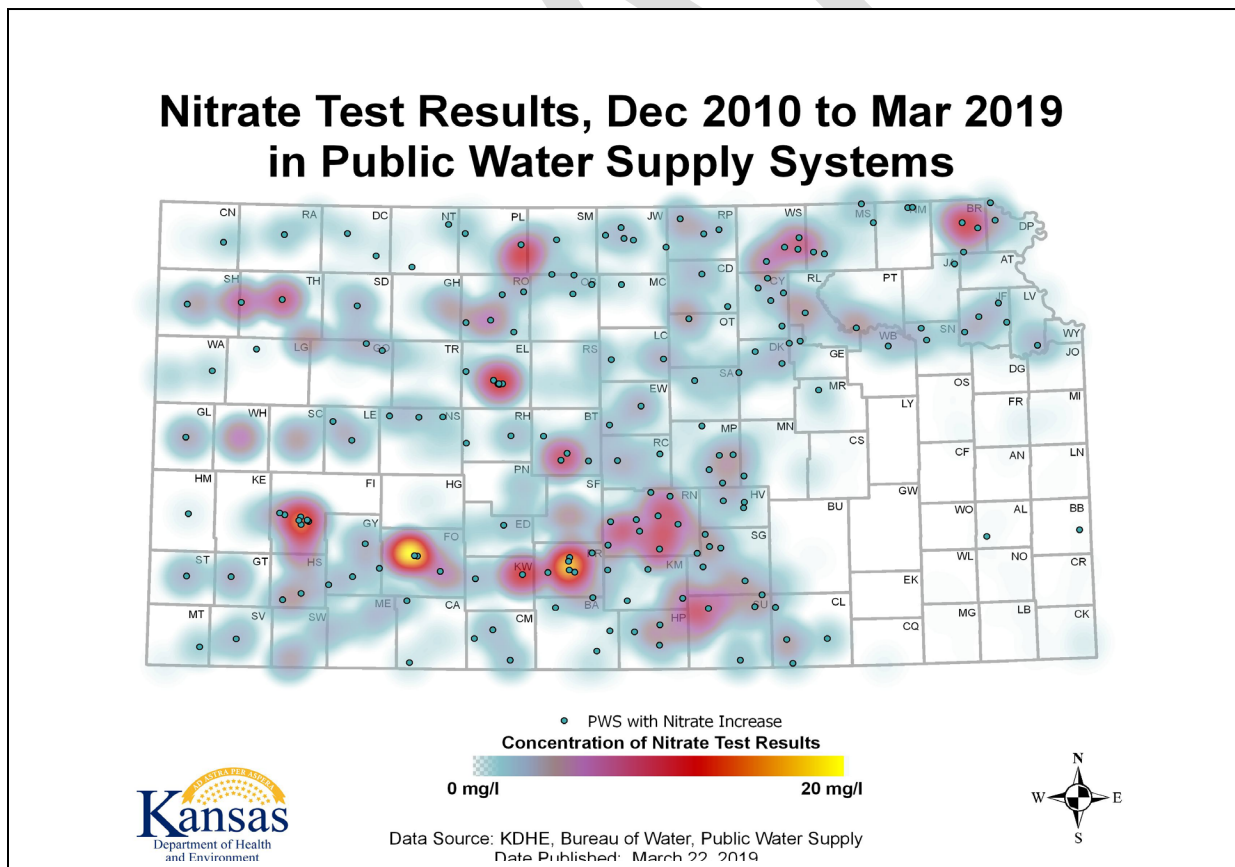


Figure 2. Nitrate Issues in Public Water Supply, KDHE

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](#).

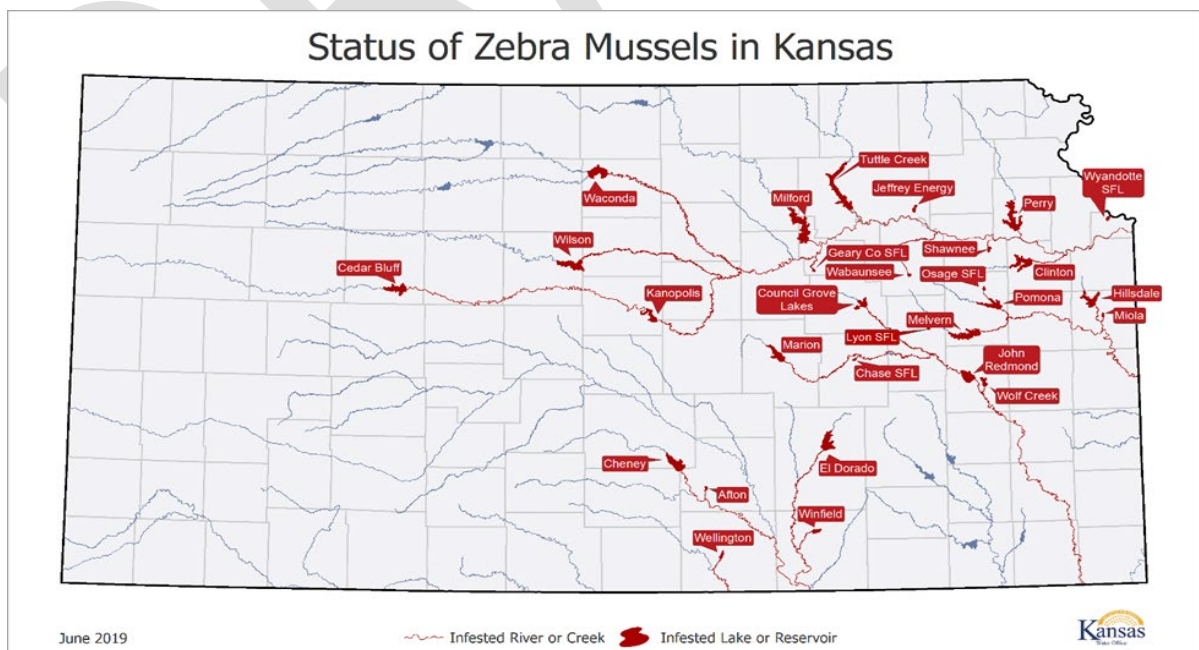
Recommended Actions and Strategies – Water Quality
Policy or Program Recommendations
<ul style="list-style-type: none"> • RAC Goals addressing water quality/reuse (EW, NEO, MO, RH, GBP, CIM, UR, KS) • Continue to support KDHE in Water Quality management • KWF Policy Comment recommendation – Public comment 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 3. Miles of rivers, including the Missouri, Kansas, Wakarusa, Neosho and related tributaries, are infested by Asian Carp, see Figure 4. 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.

- **More than 30 bodies of water, including water downstream from those bodies of water, have been infected with zebra mussels**
- **Asian carp are present in streams with connections to the Missouri River**
- **The Quagga mussel pose a bigger threat than zebra mussels**



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, Figure 5, a close relative of the zebra mussel but much 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. There are multiple regional and national coordination entities working in collaboration to address ANS issues, more information is located [here](#).

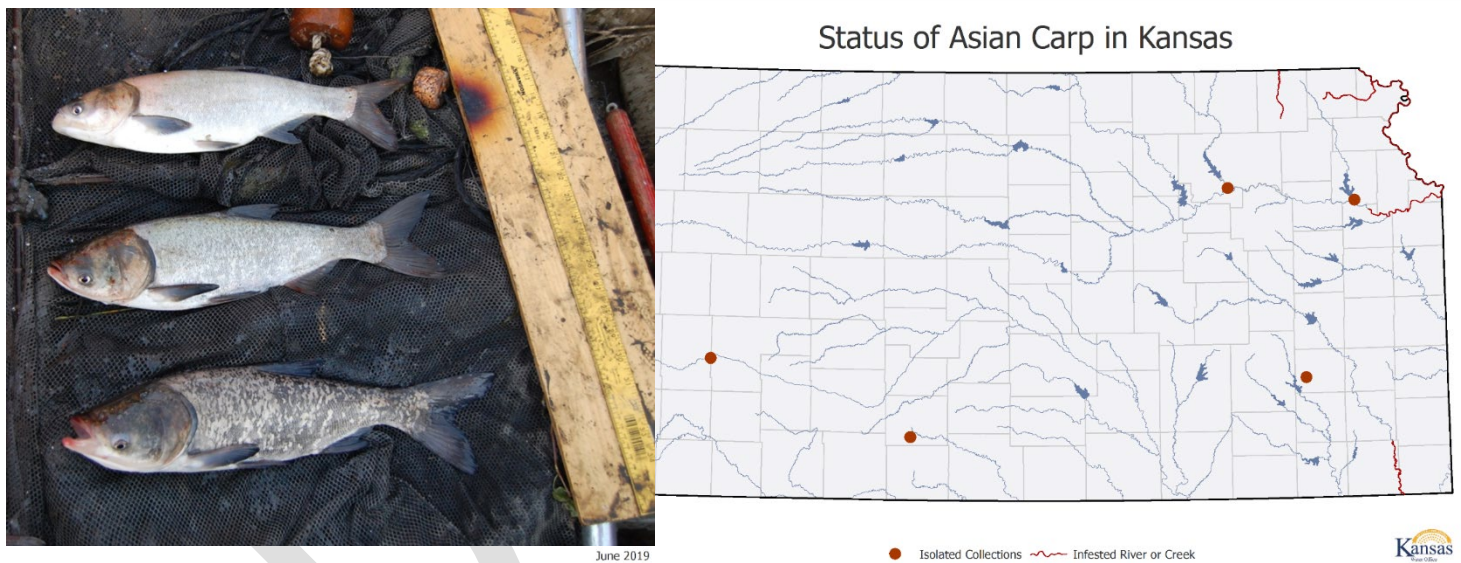


Figure 4. Asian Carp Infested Waters, KDWPT

Management Approach

The Kansas Department of Wildlife, Parks and Tourism (KDWPT) 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

KDWPT staff duties and activities include representing the State of Kansas on an array of 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 KDWPT 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.

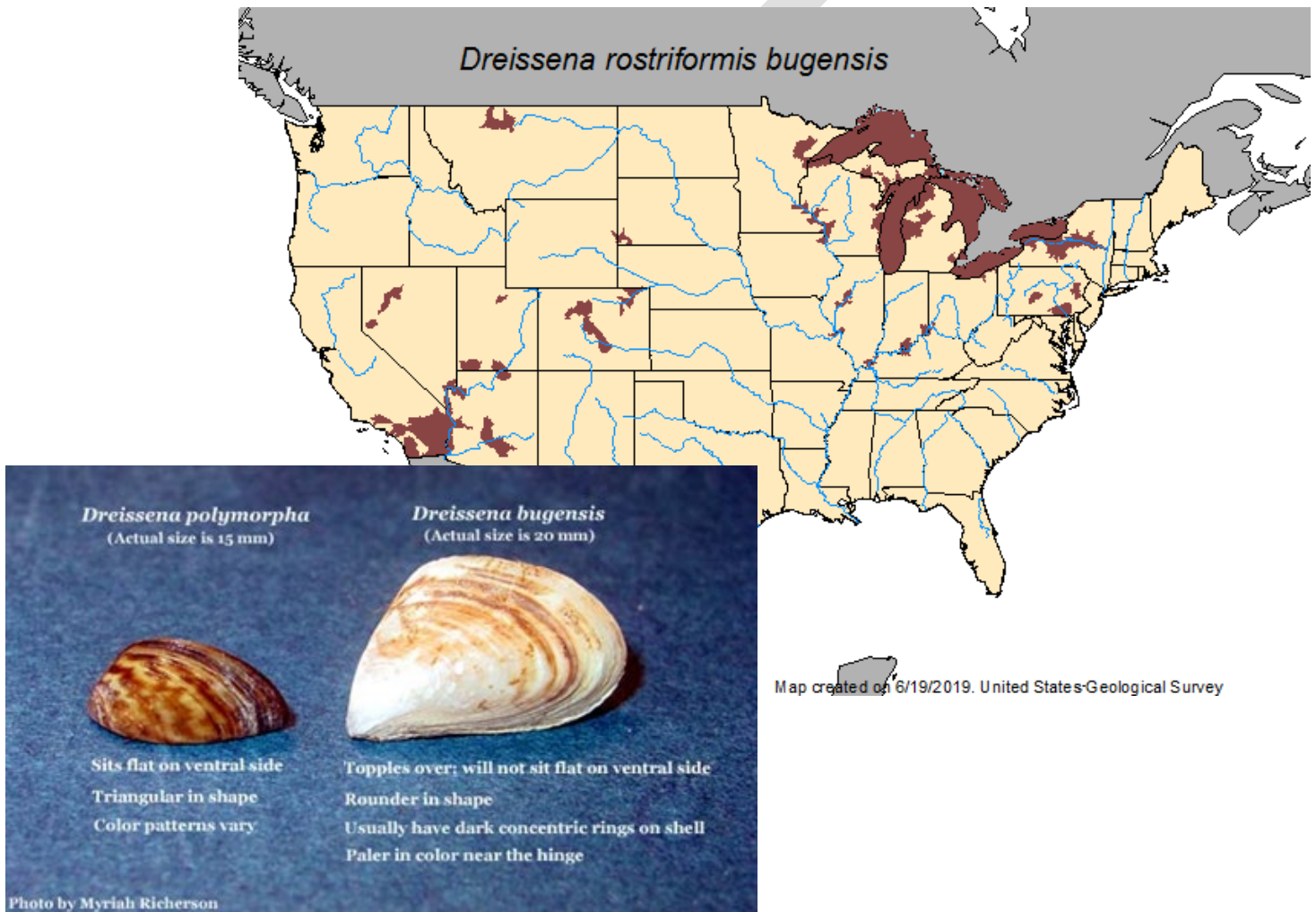


Figure 5. Quagga mussel size comparison to Zebra mussel. Quagga mussel distribution map, USGS.

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 limiting the spread of invasive species, some of which will be accomplished with State Water Plan Funds.

Damage assessment and recovery

In 1999, non-indigenous species (aquatic and terrestrial) in the United States were estimated to cause major environmental damages and losses adding up to more than \$138 billion per year (Pimentel et al., 1999). No comparable Kansas-specific estimate for ANS exists, however KDWPT is currently participating in a study surveying stakeholders and water users statewide to generate an estimate for current and potential zebra mussel financial impacts; results are expected in late 2021. On a smaller scale, in 2012 financial costs to water rights holders in just the Neosho River basin for zebra mussel associated impacts were projected to range between \$424,335 and \$1,509,054 annually (Smith, 2012).

Measuring Success

Limit the spread of ANS; 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, SHS)• 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

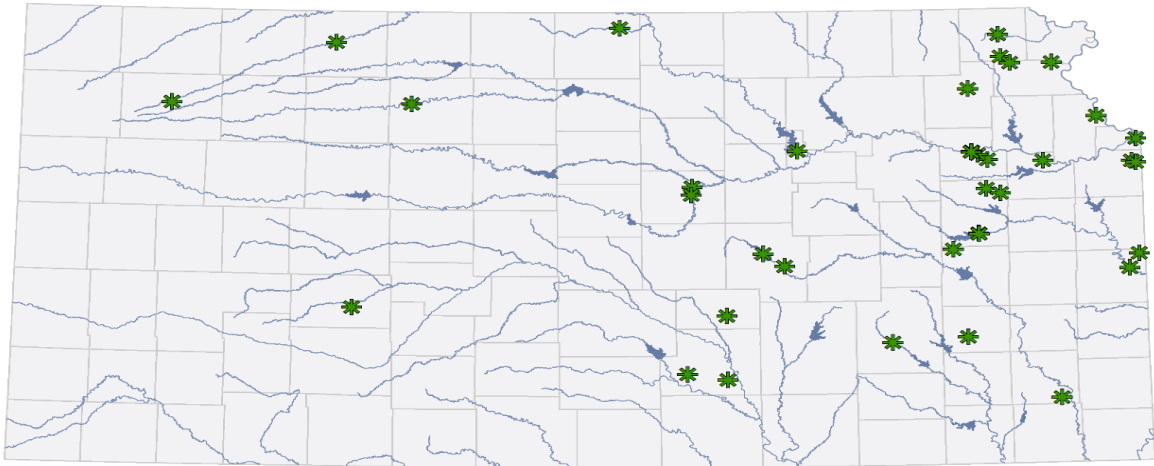
Section 2. Harmful Algal Bloom (HAB)

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](#).

- **HABs pose serious health concerns for people, livestock and pets**
- **HABs appear at new lakes every year**
- **Residual nutrients compounded with the inflow of annual added nutrients increase the likelihood of a HAB**

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, SHS, SR)• 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
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.

- **Federal and State lands account for approximately 1.4% of land in Kansas**
- **Limited outdoor recreation opportunities demonstrated the highest used ever due to COVID-19**
- **The Arkansas, Kansas and Missouri Rivers are the only navigable water in the state impacting recreational opportunities**

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), KDWP and numbers NGO's provide the gateway to water-based recreation in Kansas with USACE and KDWP 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 ammonites and additional information on the federal reservoirs. The KDWP 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, KDWP 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 KDWP 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 KDWP.

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

Kansas Water Plan Guiding Principles and Priorities

Increasing Awareness of Kansas Water Resources

Background & Issue

As the *Long-Term Vision for the Future of Water Supply in Kansas* was being developed and more than 600 public input meetings were held across Kansas, one message heard repeatedly was the need for increased education and outreach for Kansans of all ages on water resources issues within the state. While there are many existing water-related educational programs available for both youth and adults, it was noted through these public input meetings that a central message and coordinated educational resources were lacking to help better connect users to their water resources. Many of the Action Items in the *Long-Term Vision for the Future of Water Supply in Kansas*, as well as some goals developed by Regional Goal Leadership Teams, highlight the need for additional development of a state-wide water message and “one-stop-shop” for information and learning resources. To meet this goal, an inter-agency and inter-organizational coordinating team was formed in 2015. This team met throughout 2016 and hosted a series of outreach meetings to solicit input into the development of statewide education and public outreach materials as well as develop tangible action plans aimed at strengthening Kansans’ knowledge and awareness of water and water-related issues. From those meetings a Vision Education Public Outreach Supplement Section to the Vision was created and now serves as the foundation for the *Kansas Water Plan* Guiding Principle and Priority of Increasing Awareness of Kansas Water Resources.

- *Additional information to help build the case?*

Management Approach

The following are overarching principles which directed the development of the Vision Education Public Outreach Supplement Section to the Vision. These overarching principles will continue to serve as precepts for Increasing Awareness of Kansas Water Resources within the *Kansas Water Plan*.

- No actions are intended to displace current water education programs. Instead, the initiatives for Increasing Awareness of Kansas Water Resources are designed to promote such programs and to encourage the development of complementary programs. *Include recognition of other programs utilized for overall education efforts here*
- The initiatives and concepts described for Increasing Awareness of Kansas Water Resources are strategic in nature and, as such, do not describe the details of the implementation of the initiatives. The initiative implementation plans will be developed following the approval of the initiatives. Any local, regional or state agency, educational institution, non-government organization, private company or individual stakeholders interested in water education programs are invited and encouraged to provide input and feedback regarding the implementation plans and to participate in these initiatives.

- All of the initiatives for Increasing Awareness of Kansas Water Resources will be unified through a social marketing campaign and the Kansas Runs on Water website.
- All strategies and action items for Increasing Awareness of Kansas Water Resources exist under the larger umbrella of the *Kansas Water Plan*, and will support its mission to provide Kansans with the framework, policy and tools to manage, secure and protect a reliable, long-term statewide water supply. A reliable water supply is dependent upon both sufficient quantity and quality.

Measuring Success

As previously noted, actions identified for Increasing Awareness of Kansas Water Resources are not intended to displace any current water education programs in Kansas. This collaborative represents an opportunity to build upon and maximize the many successful education organizations and activities currently in place in Kansas. Just a few of these successes include: youth conservation poster and essay contests hosted through the County Conservation Districts, local community water festivals, Kansas Association of Conservation and Environmental Education (KACEE) Project WET, as well as the Awesome Aqua magazine and natural resource educator's guides developed through Kansas Foundation for Agriculture in the Classroom.

While we have many successes to celebrate related to water resource education in Kansas, gaps still exist and opportunities remain to strengthen Kansans' knowledge and awareness of water and water-related issues. Filling the gaps and success in the end will require everyone on all levels working together with a common goal of conserving and protecting our water resources for the next generation. Potential metrics which could be utilized to measure success towards Increasing Awareness of Kansas Water Resources include but are not limited to:

- *Develop and conduct statewide awareness assessment to establish baseline knowledge of Kansans' understanding and comprehension of water issues*
 - *Any information from partners which could be highlighted to help establish current baseline?*
- *Conduct mid-campaign survey to assess effectiveness of plan, comparing results with initial findings of baseline survey*
- *Assess the success of outreach campaign efforts through a post-campaign survey*
- *Establish baseline knowledge of youth in Kansas on water-related issues through a review of marketing research data on youth education*
 - *Any information from partners which could be highlighted to help establish current baseline?*
- *Conduct follow up surveys to assess changes in youth awareness and knowledge in water-related conditions and issues*
- *Evaluate increased participation over time in education and outreach-related efforts*
- *Development and implementation of Kansas water-related educational resources/curriculum*
 - *Information from partners on current educational programs/resources provided*

Partner feedback regarding desired written order of bullet points above would be appreciated.

Recommended Actions and Strategies

Policy/Program Recommendations:

1. Appoint an advisory group in conjunction with KSDE guidance to develop a multi-phased educational proposal for target audiences of K-12, community leaders and media to promote local conservation decisions. Existing educational efforts, programs and activities should be incorporated as appropriate. Ideas to be considered by the advisory group include:
 - *Implement community facilitation programs, with partners like K-State Research and Extension (KSRE), to develop ownership for local conservation districts*
 - *Design and implement a statewide curriculum for K-12 on water conservation, building on current resources and knowledge such as Project WET and integrate water conservation into science curriculum, by working with partners such as the Kansas Association of Conservation and Environmental Education (KACEE) and the Kansas Department of Education*
 - *Develop additional activities within youth and adult organizations such as 4-H and the K-State Research and Extension (KSRE) system to educate others and promote youth activities related to water conservation*
2. Create a long-term commitment to water conservation education by designating responsibility for water conservation public information and outreach within agencies of the Water Resources SubCabinet.
 - *Develop continual media plans and message maps related to water conservation and the importance of local engagement to be implemented by multiple partners through all aspects of traditional paid, earned and social media*
3. Enhance educational programming specifically for state legislators as well as other state officials, Congressional delegation and local policy makers.
4. Utilize agricultural education and 4-H to encourage young people to develop agricultural programs using water efficient technologies and less water intensive crops or crop varieties through recognition and incentive programs.
5. Develop models for the inclusion of water conservation into the agricultural education curriculum, including classroom, supervised agricultural experience and FFA activities.
6. Encourage the development of community college, technical programs and university programs to prepare the future workforce to work in irrigation efficiency technologies and with necessary expertise in less water intensive crops and crop varieties.

Implementation Actions:

Strategy 1: Develop and enhance a statewide marketing campaign to include brand recognition within Kansas households.

Action 1: In collaboration with a marketing firm, develop a media plan and campaign message maps to improve knowledge and awareness of water resources as well as promote local citizen knowledge and engagement in water conservation.

Short Term Action Steps:

- *Develop a portfolio of water resource education messages*
- *Showcase campaign through a concerted outreach launch event including social media, print coverage and television broadcasting*
- *Make modifications and improvements to media plan and message maps as necessary*

Mid Term Action Steps:

- *Conduct a mid-campaign survey to assess effectiveness of media plan, comparing results with initial findings of a baseline survey*
- *Assess the success of the campaign through a post-campaign survey and adapt accordingly annually*

- Continue to develop and incorporate digital strategies for end user interaction as identified by a marketing firm

Strategy 2: Establish a brand recognizable centralized website.

Short Term Actions:

Action 1: Create an online “one-stop shop” of vetted and approved statewide water-related resources and information for all Kansans including federal, state and other public officials.

- *Finalize development and promotion of the centralized website*
- *Create a clearinghouse for resource libraries on the website. Information to be included, but not limited to the following: curriculum resources, vetted resources for K-12 for utilization in classrooms, scientific research-based resources, economic indicator models, and water-related workshop resources as well as a list of experts and researchers who can provide information on water-related issues*

Action 2: Continue adding to centralized website utilizing materials and resources collected in Phase I, and promote website throughout the state.

- *Enhance centralized website by adding interactive user engagement opportunities such as online information requests and downloadable curriculum*
- *Maintain and add to resource library, keeping materials current and relevant*
- *Continue to assess the usefulness of the “one-stop shop” website*

Strategy 3: Increase awareness and knowledge of Kansas youth on water-related issues through K-12 education and beyond-the-classroom opportunities.

Short Term Actions:

Action 1: Establish baseline knowledge of youth in Kansas on water-related issues through a review of marketing research data on youth education.

Action 2: Create opportunities to encourage collaboration between organizations currently involved in water education for youth:

- Hold Governor’s roundtable including the Kansas Commissioner of Education, the President and CEO of the Kansas Board of Regents, as well as leadership from organizations involved in water-related education for youth which establishes a commitment for integrating efforts in water education
- Hold a statewide Summit on Water Education for educators and educational organizations to share best practices, resources, curriculum and services tied to standards/science teaching and include professional learning
- Develop a collaborative plan for sharing water educational resources on an ongoing basis to be included on the website as well as through professional development programs

Action 3: Develop a grant program for new and existing water education organizations to provide professional development, curriculum and resources which build on statewide messaging efforts. This includes identification of existing programs which align with water education goals and establish cooperative agreements which foster collective action and develop a grant program for innovations and/or to fill existing identified gaps in programs or services.

Action 4: Collaborate with youth-related organization leadership on water-related educational opportunities and establish sessions and experiences focused on water.

Strategy 3 (Continued): Increase awareness and knowledge of Kansas youth on water-related issues through K-12 education and beyond-the-classroom opportunities.

Mid Term Actions:

Action 5: Launch, promote and award financial resources for statewide water education program.

Action 6: Provide information to K-12 educators about available resources that correlate with educational standards.

Action 7: Provide information to beyond the classroom education organizations on water education curriculum, tools and resources.

Action 8: Provide recognition and awards to youth on water-related projects, offered through schools, clubs and organizations.

Action 9: Increase opportunities for professional development for educators on water-related curriculum to strategically emphasize information and education regarding the importance of water and water conservation practices. Some opportunities may be made possible through the grant program noted within Short Term Action Items.

Action 10: Conduct surveys to assess changes in youth awareness and knowledge in water-related conditions and issues.

Long Term Actions: Issues for future consideration for this specific strategy to be highlighted here. Partner feedback requested.

Strategy 4: Provide opportunities for Kansans of all ages to increase their awareness of local water issues

Short Term Actions:

Action 1: Establish and hire Community Outreach Specialist position(s). The ideal candidate(s) will possess a water conservation background coupled with strong community discussion, education and facilitation skills.

Action 2: Expand current collaboration efforts between university water researchers and water agencies to include higher education institutions in Kansas. Discussions would include state and regional water priorities, current and potential water research projects, as well as additional opportunities to collaborate.

Action 3: Work with developers of centralized website to create links to existing economic indicator resources. Site should provide continual evaluation of the economic impacts of reduced water use based on decision support resources.

Strategy 4 (Continued): Provide opportunities for Kansans of all ages to increase their awareness of local water issues

Action 4: Establish the “Top 3” water quality and quantity-related conservation measures for each Regional Planning Area for household, agriculture and industrial/municipal water use. These should be developed by the Regional Advisory Committees using existing data and displayed on the central website.

Mid Term Actions:

Action 5: Utilize the statewide media plan and message maps to promote local engagement in water resource management.

Action 6: Enhance working relationships between local and state entities for collaboration on water strategies. This should consist of a unified message disseminated throughout the state by local entities.

Action 7: Coordinate workshops for local decision makers on water initiatives throughout the state.

Action 8: Develop a grant program to support Regional Advisory Committees and other organizations that are working with communities to raise awareness about water issues, recognize successes and engage citizens in water conservation initiatives.

Action 9: Establish region-specific, targeted improvements for household, agricultural and industrial/municipal water quality and quantity-related conservation. These measures will be shared through the Community Outreach Specialist(s), workshops and educational events.

Strategy 5: Develop partnerships between industry, community, and educational institutions that will promote and train for water-related careers.

Short Term Actions:

Action 1: Begin evaluation of higher education institutions current academic offerings and identify water-related courses and curricula.

Action 2: Coordinate regional/topical workshops to facilitate development of partnerships between higher education and business and industry. Partnerships will analyze existing academic degree programs leading to water-related careers.

Action 3: Develop workshops and professional development opportunities for multiple water-related career paths.

Action 4: Develop a grant-sponsored internship/mentorship program in water-related careers, sponsored across water agencies.

Strategy 5 (Continued): Develop partnerships between industry, community, and educational institutions that will promote and train for water-related careers.

Mid Term Action Items:

Action 5: Seek opportunities to promote existing water-related degree programs at Regents institutions. In addition, based on evaluations of all academic offerings, apply for United States Department of Agriculture, National Institute of Food and Agriculture funding through programs such as: Higher Education Challenge Grants and Secondary Education, Two-Year Postsecondary Education, and Agriculture in the K-12 Classroom (SPECAC) Challenge Grants.

Action 6: Collaborate with higher education institutions to fill any gaps in the water-related academic career tracks that were identified during Phase I.

Action 7: Initiate and evaluate internship/mentorship grant program.

Long Term Actions:

Action 8: Evaluate and increase enrollment and business participation in the internship/mentorship program.

Action 9: Complete and evaluate U.S. Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA) funded grant projects.

Data, Research and Studies: As noted previously within this Guiding Principles section of the *Kansas Water Plan*, research and data analysis to characterize current baseline knowledge and understanding of Kansas water resource issues for all ages to provide a mechanism for evaluation of the overall success of implementation efforts to increase awareness of Kansas water resources. Data, research and studies which would support this evaluation include:

- *Partner feedback regarding data, research and studies to consider for inclusion*

Funding and Resource Needs: Financial resources needed to fully implement the recommended strategies and actions for Increasing Awareness of Kansas Water Resources could be in excess of \$1,000,000 per year depending on the extent to which a full education and outreach campaign is implemented. These financial resources would be utilized for items such as: media buying, social media management, campaign ad development, video development, website maintenance, educational resource development, professional

development, and support/evaluation on delivery of educational programs. There are just a few examples for implementation of the recommended actions and strategies previously noted. Development of public-private partnerships to allow for the full execution of these actions and strategies will be vital to the overall success of these efforts.

DRAFT