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Big Creek Middle Smoky Hill River Watershed Monitoring Project

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Abstract Text:

The Big Creek Middle Smoky Hill River Watersheds (BCMSHR) cover a portion of 10 counties in west-central Kansas with approximately 2,400 square miles. The BCMSHR Watersheds drain into Kanopolis Reservoir in Ellsworth County, Kansas. The primary threats to water quality in the BCMSHR Watersheds are sedimentation, nutrients, and fecal coliform bacteria.

According to the 1999 Unified Watershed Assessment, in the Big Creek Watershed, 82.5% of the total stream miles are impaired. Approximately, 67% of the waterways and 50% of the lakes require TMDLs for Fecal Coliform Bacteria (FCB), Chloride (CL), Sulfate (SLF), Ammonia (AM), Selenium (SE), and Dissolved Oxygen (DO). Lakes are impaired by Eutrophication (E) and insufficient water flow. Approximately 55% of the streams are impaired by FCB, 17% by SLF, 17% by CL, and 11% by nitrates.

According to the 1999 Unified Watershed Assessment, in the Middle Smoky Hill River Watershed, 15.4% of the total stream miles are impaired. Approximately 20% of the waterways and 40% of the lakes sampled require TMDLs for Fecal Coliform Bacteria (FCB), Chloride (CL), and Sulfate (SLF). Lakes are impaired by Eutrophication (E) and Sulfate (SLF). Approximately 48% of the streams are impaired by FCB, 26% by SLF, and 26% by CL.

Kanopolis Lake is listed on the State of Kansas' 303d –Impaired Waters – list due to Eutrophication, chloride, and sulfate. Kanopolis Lake has received a high priority TMDL for Eutrophication and has TMDLs for siltation and reductions are needed.

Designed as a multi-purpose use project on the Smoky Hill River, Kanopolis Reservoir is federally authorized for flood control, irrigation, recreation, fish and wildlife, water quality, downstream low flow augmentation, navigation, hydroelectric power, and water supply. The irrigation purpose cannot be implemented until an irrigation district has been constituted to use the water. Navigation and hydroelectric power are no longer eligible operating purposes. The state of Kansas designated uses include: general purpose; expected aquatic life; primary contact recreation; domestic water supply; food procurement; and irrigation water supply.

In 1946 during construction, the original multi-purpose pool and flood pool storage capacities of Kanopolis Reservoir were 447,251 acre-feet. The designed sedimentation rate was 564 acre-feet/year. The most current sedimentation survey was done in 1993 with an estimated actual sedimentation rate at 643 acre-feet/year. From the designed sedimentation rate to the most current actual sedimentation rate, we have a 13% additional sediment load impacting Kanopolis Reservoir.

The estimated current capacity is at 409,383 acre-feet or 9.15% loss of capacity due to sedimentation. With one of Kanopolis Reservoir's state designated uses being for domestic water supply, the Post Rock Rural Water District supplies water for eleven wholesale accounts of seven cities and four rural water

districts. This equates to a maximum quantity of 400 million gallons per year (mgy) for the district and 4,301.2 mgy for all of Kanopolis Reservoir water yields. However, applications for requests of water rights to the reservoir continue with six active applications at this date. If these applications are accepted the maximum quantity yield will be exceeded by 4,300 mgy (nearly double that of current rates). This will have a profound effect on the more than one-half million visitors that utilize Kanopolis Reservoir and surrounding area for a variety of outdoor recreational activities. The importance and need for water quality restoration and protection is apparent, thus the need to address the primary threats of sedimentation, nutrients (Eutrophication) and fecal coliform bacteria.

The need for determining how to best target and apply best management practices for TMDL reductions is apparent with the watersheds' size. The monitoring project has two components. Component 1 is to determine the pollutant loading from the only NPDES Phase II city in the watersheds while the Component 2 is to determine pollutant loading from agriculture land and other communities in the watersheds. The sampling area will span from Cedar Bluff Lake in Trego County, Kansas to Kanopolis Lake in Ellsworth County, Kansas.

Sample analysis will consist of total nitrogen, total phosphorus, E. coli, total suspended solids, temperature, pH, salinity, specific conductivity, dissolved oxygen, percent dissolved oxygen saturation, flow rate, stream depth, and site observations.

In Component 1 of the project, we sample bi-weekly and after run-off (rainfall) producing events. In Component 2 of the project, we sample monthly or weekly (depending upon the site), and after run-off (rainfall) producing events. We have 30 sampling sites across the watersheds between the two components.

By looking at our sampling data and computer generated watershed rankings, we will be able to look at what locations to place BMPs within the watershed that would have the greatest impact on reduction loads.

Impact Statement:

The project's monitoring effort will identify priority sources and extent of sediment, nutrients and Escherichia coli bacteria for the Big Creek and Middle Smoky Hill River Watersheds, target outreach activities, and implement practices that will reduce TMDL loadings to a point that they can be delisted from the Kansas TMDLs on streams and lakes in these watersheds.

Data collected from the monitoring in these watersheds will allow extension educators to improve local understanding of management impacts on stream and lake water quality and guide local watershed decision partnerships in the best use of their funds to maximize water quality improvements.