Streams of Boone County 2017-2018 Water Year Summary



Boone County Resource Management October 31, 2018

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Cover photo: Looking upstream on Bonne Femme Creek swollen with backwater from the Missouri River at the bridge on S. Rippeto Road, October 9, 2018

I. Introduction



A perfect storm of high temperatures, low rainfall and nutrient loading led to this algae bloom on Gans Creek, June 17, 2018

The Stormwater Team at Boone County Resource Management is excited to deliver the second annual snapshot of activities and information about the Streams of Boone County! It has been an stressful year for our streams as they have endured a long period of drought through the late spring and summer months. We have hopefully come to the end of the drought and look forward to the fall and winter months ahead. For those who may be new to this report, we are restating the background information. Thank you for reading!

II. Hinkson Creek



A view of Hinkson Creek, August 2, 2018

A brief history. Hinkson Creek was placed on the list of impaired waters in 1998 for failure to fully support aquatic life. Under the Federal Clean Water Act, the list is generated by the Missouri Department of Natural Resources (MDNR) every other year and approved by the

Missouri Clean Water Commission and the United States Environmental Protection Agency (USEPA). Failure to fully support aquatic life in this context means that the community of macroinvertebrates in the stream does not contain sufficient diversity of organisms, particularly organisms that are intolerant of pollutants in the water. Despite many years of research, MDNR and others have not been able to identify a pollutant in Hinkson Creek that is causing the impairment.

As a pollutant could not be identified, USEPA issued a Total Maximum Daily Load (TMDL) document that identified stormwater as a surrogate for a known pollutant. The TMDL would have required Boone County, the City of Columbia, and the University of Missouri (PARTNERS) to reduce the loading of stormwater into the creek by approximately 37%. Because of the financial burden that would have accompanied such a massive stormwater reduction, PARTNERS sued the USEPA to have the TMDL rescinded. In 2011, an agreement was reached between USEPA, MDNR and the PARTNERS to settle the lawsuit and the Hinkson Creek Collaborative Adaptive Management process was implemented.

What is Collaborative Adaptive Management? Collaborative Adaptive Management (CAM) is a process by which stakeholders involved in an issue work to identify and implement strategies for improving that issue. In this case, the issue is the impairment of Hinkson Creek. Strategies range from research to help identify the cause of the impairment to projects designed to reduce the transport of pollutants into the stream. Three groups work together on the CAM process: a stakeholder committee, an action team, and a science team. The process is iterative, so as more information becomes available, that new information informs the process moving forward. Projects that are implemented can discover decision-relevant science or generally improve the

health of Hinkson Creek. For more information on CAM participation and processes, please see www.helpthehinkson.org.

What's new in 2018? To better understand the fate and transport of sediment in Hinkson Creek, the Boone County Urban Hydrologist conducted a mapping survey of a section of the stream in 2018. The survey started at Forum Boulevard and continued to the Highway 63 / 70 interchange. At preselected points (every 100 meters), various parameters were recorded including the depth of sediment on the bottom of the stream. Once the results are analyzed, the Hinkson CAM Science Team should have a better understanding of the movement of sediment in Hinkson Creek, potentially identifying sources of sediment and depositional areas. This is important for several reasons, as sediment deposition can smother habitat available for aquatic organisms. Also, sediment, itself a pollutant, can transport other pollutants of concern that may be causing impairment in the stream. Stay tuned for more information on this study in the next annual report!

At the request of the CAM Stakeholder Committee, the Science Team has designed a study to further explore macroinvertebrate data collected by MDNR in Hinkson Creek over the last several years. The purpose of the study will be to gather additional information about the macroinvertebrate communities living in the stream and hopefully answer a few questions. Are the species that live in Hinkson Creek tolerant to certain types of pollutants? Would the use of a different method for scoring the macroinvertebrate community structure tell us anything about what could be causing the impairment? A Request for Proposals will be published by January 1, 2019, and Boone County will be hosting the study.

III. Bonne Femme Watershed Project



Turkey Creek near Highway 63, showing signs of relief after the long drought, October 10, 2018

What is the Bonne Femme Watershed Project? The Bonne Femme Watershed Project is the revitalization and continuation of several projects from the past that sought to protect and conserve water quality in the Little Bonne Femme and Bonne Femme Watersheds in Boone County. The previous watershed project, which concluded in 2007, resulted in the Bonne Femme

Watershed Plan. The plan may be viewed in its entirety on <u>www.cavewatershed.org</u>. The map below shows much of the watershed with roads marked for reference. The five streams highlighted with bright colors show reaches that are impaired because *E. coli* levels in the water, on average (calculated as a geomean during the recreational season which runs from April through October of each year), exceed the water quality standards set by USEPA and MDNR.



A map of the Greater Bonne Femme Watershed in Boone County, Missouri.

The blue line marks the division between Bonne Femme and Little Bonne Femme watersheds. The impairment in the watershed is of concern as several of these streams are classified as outstanding state resource waters, known for clarity and quality of habitat for aquatic life.

Science update 2018. In addition to the quarterly water quality monitoring that has been ongoing in the Greater Bonne Femme Watershed (for Acetochlor, Alachlor, Atrazine,

Deethylatrazine, Deisopropylatrazine, Metolachlor, Metribuzin, and Simazine (agricultural chemicals or their breakdown products); Nitrate, Ammonium and Phosphate (nutrients used in agricultural fertilization or found in animal / human waste); *E. coli*), the Boone County Urban Hydrologist, in collaboration with the local USDA / ARS office, conducted microbial source tracking in 2018. Microbial source tracking (MST) uses DNA analysis of filtered stream water samples to determine possible source organisms for *E. coli* found. The first round of MST testing in the spring showed that most of the *E. coli* in the samples submitted was from ruminant sources. In this context, ruminant means cow or deer. It is important to note that the percentages mentioned refer to just the samples submitted and do not necessarily represent the bacteria levels in the entire stream. While bacteria from human sources were found in some of the samples, the percentage was low across a variety of flow conditions. Current MST analysis is more focused (human and cow) and the results should be in soon! The ongoing MST analysis will help Boone County to identify possible sources of bacteria in the impaired streams so that we can work to reduce pollutant loading over time.

All three gauging stations have been operating in the Greater Bonne Femme Watershed in 2018! The County maintains stations to monitor the depth of stream water on Turkey Creek, Bonne Femme Creek and Little Bonne Femme Creek. This information will be used to develop strategies for bacterial load reduction in the 9-element plan which is discussed in more detail below.

Education and outreach update 2018. Through partnerships with various state and local agencies, Boone County continued to participate in outreach and education events that focus on water quality and the unique natural resources found in the Greater Bonne Femme Watershed.

These events included participation at the Rock Bridge Memorial State Park Water Festival during the summer of 2018 and hosting a spring and fall Stream Team Water Quality Monitoring Blitz in an around Rock Bridge Memorial State Park. The cumulative results from the macroinvertebrate scores from the monitoring blitzes to date is offered below:

Stream	Water	Water	Water Quality	Water	Water Quality
	Quality Doting Fall	Quanty	Kating Fail	Quality	Rating Fail
	Rating Fail	Kating	2017	Spring	2018
	2010	Spring 2017		2018	
Gans Creek	Fair	Excellent	Not	Good	Fair
Unstream (Gans	1 411	Lxcellent	monitored -	0000	1 411
Creek Recreation			low flows		
Area)			IOW HOWS		
Gans Creek	Good	Excellent	Good	Good	Good
Downstream	0000	Execution	Good	0000	0000
(foot bridge at					
Gans Wilderness					
Area trailhead)					
Little Bonne	Excellent	Excellent	Good	Good	Good
Femme Creek	Excention	Excellent	Good	0004	0004
(just downstream					
of confluence					
with Gans Creek)					
Little Bonne	Excellent	Excellent	Good	Good	Not
Femme Creek (at					monitored
Spring Brook					
trail water					
crossing)					
Clear Creek	Fair	Good	Excellent	Good	Excellent
(upstream of					
Highway 163					
Bridge)					
Devil's Icebox	Poor *	Poor *	Poor *	Poor *	Not
Spring Branch					monitored
(between the					
cave spring and					
the rock bridge)					

* The water quality rating in the Devil's Icebox Spring Branch is always poor because only two types of macroinvertebrates live in the cave system

Macroinvertebrate scoring is calculated based upon diversity and pollution tolerances of organisms found. In a drought year like 2018, we would expect scores to be lower as aquatic organisms were stressed by low flows.

A land management workshop was held in the watershed in March of 2018, and we thought it was a great success! Another land management workshop is planned for February of 2019. Local and state agency personnel will again provide information for landowners in the watershed on topics ranging from establishing pollinator habitat to effective best management practices for reducing nutrients in stormwater runoff. There will be new topics offered in 2019 based upon suggestions received from attendees of the 2018 workshop!

9-element plan development. Boone County was awarded a Chapter 319 Subgrant from MDNR to draft a 9-element plan for recovery of stream water quality and protection of outstanding state resource waters in the Greater Bonne Femme Watershed. The grant period began August 1, 2018 and will run through July 31, 2020. By drafting the 9-element plan and following up with implementation of the plan elements, Boone County hopes to work with and for citizens in the watershed to improve and protect water quality in the years to come. MDNR has agreed to allow Boone County some time to work through the 9-element plan process instead of proceeding immediately to administrative measures through the USEPA. We are excited about the opportunity to craft more local solutions to resolving the stream impairments. Stay tuned for updates on plan progress on www.cavewatershed.org throughout the coming year!

IV. Stream Team #4794



Looking upstream at what should be the waterfall on Lick Fork Creek, from the bridge on Voorheis Road, August 10, 2018

Streams surveyed in 2018. The Boone County Stormwater Team actively participates in the Missouri Stream Teams program as Stream Team #4794. In 2018, team #4794 monitored water quality on Bonne Femme Creek, Turkey Creek, Little Bonne Femme Creek, the Devil's Icebox

Spring Branch in Rock Bridge Memorial State Park, Silver Fork Creek, Lick Fork Creek, Cedar Creek and Hinkson Creek, all in Boone County! Streams are typically monitored for chemical constituents (nutrients) four times per year, and macroinvertebrate sampling is conducted twice per year. Due to drought conditions in 2018, stream water quality data would not have been representative so there were fewer rounds of sampling.

Moving forward. The streams mentioned in this report are only a small fraction of the streams in Boone County. The Stormwater Team looks forward to adding streams to our monitoring list in the future so that we can inform the understanding of water quality county-wide. We welcome suggestions from citizens of Boone County for other waterways that may need a closer look or are currently exhibiting high water quality. Water quality monitoring is not just about restoring impaired waters but also protecting those waters that are in good condition moving into the future.

V. Concluding remarks

It has been an exciting and challenging year for water quality in Boone County. As partners in the CAM process we have designed new research plans for Hinkson Creek and made great strides toward understanding stream impairments in the Greater Bonne Femme Watershed. The Stormwater Team looks forward to what may come in 2019 and pledges to continue working with local partners and agencies toward our mutual goal of improving water quality!