Streams of Boone County

October 1, 2021-September 30, 2022

Water Year Summary

Boone County Resource Management

October 31, 2022

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Cover photo: From the overlook at Hart Creek Conservation Area, September 4, 2022.

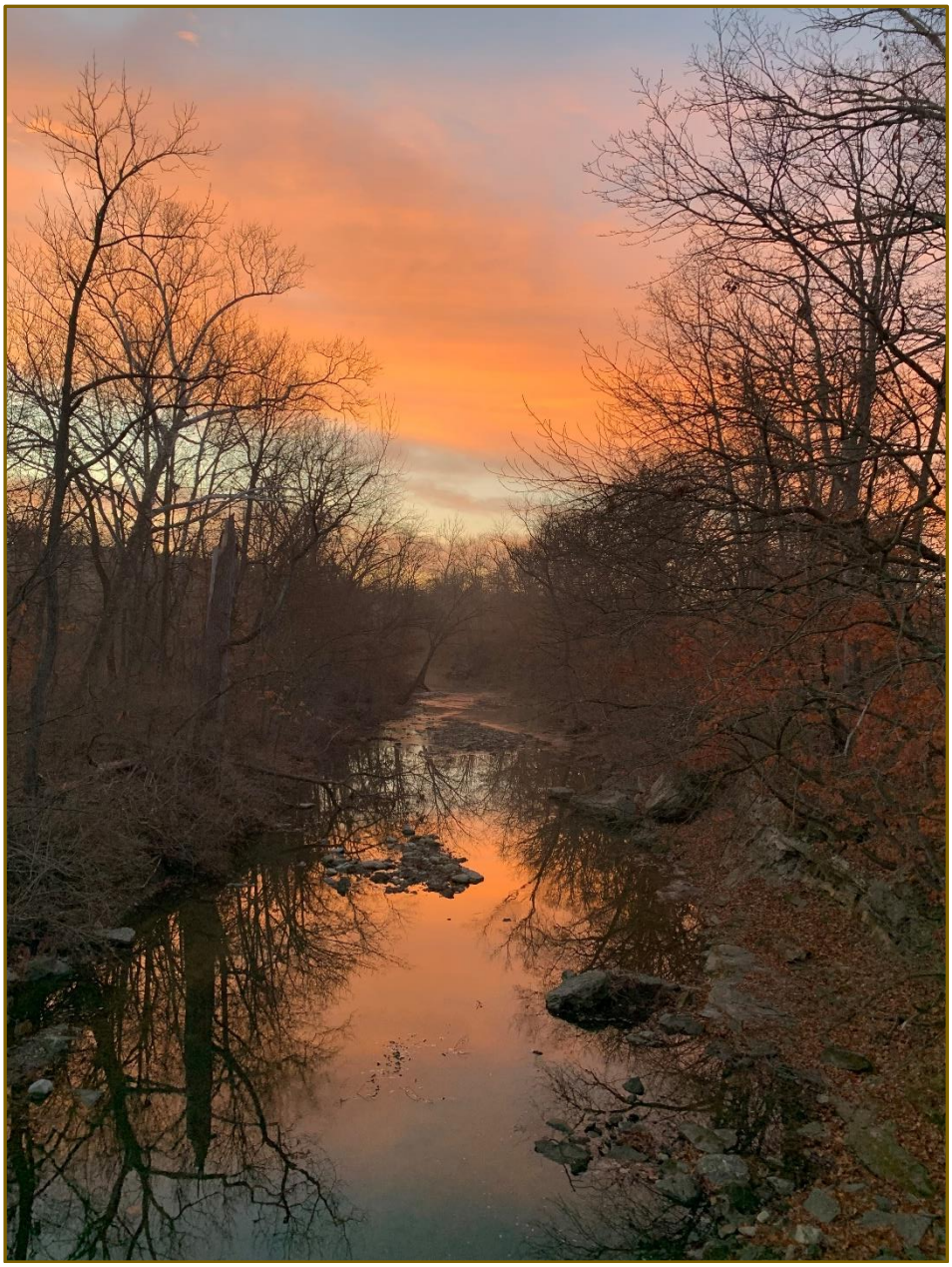
I. Introduction

Confluence of Grindstone Creek at Hinkson Creek, September 20, 2022.

Welcome to the 2021-2022 edition of the Streams of Boone County Water Year Summary! Once again the local climate offered us a variety of conditions, most notably the drought observed through the summer and fall of 2022. Boone County Stormwater staff continued to work on

projects and events, regardless of the weather, and some of these are highlighted in the following report.

II. Hinkson Creek Watershed



Hinkson Creek at the bridge on East Walnut Street, December 26, 2021.

a. 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 specific 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burden that would have accompanied such a massive stormwater reduction, PARTNERS sued the USEPA to have the TMDL rescinded.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.

b. 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.

c. What's new in 2022?

Synoptic Sampling project.

Synoptic sampling is a method of looking at different stream conditions such as nutrient concentrations, temperature, specific conductivity and pH at numerous locations along the stream during the same day. This method of sampling is different from previous monitoring efforts on Hinkson Creek that have either been in specific locations over a long time series (sensors deployed in the stream) or at specific locations during different times of the year (macroinvertebrate sampling by the Missouri Department of Natural Resources in the spring and fall at specific monitoring locations). The Hinkson Creek CAM partners funded a project with Dr. Alba Argerich and her students at the University of Missouri, School of Natural Resources for synoptic sampling in Hinkson Creek from 2020-2022. We expect to have a full report on the results of the synoptic sampling in the spring of 2023 and the results will be discussed in the 2022-2023 Water Year Summary.

Chemical Analysis project.

The Hinkson Creek CAM partners have funded a project for the United States Geological Survey / Columbia Environmental Research Center to collect water and sediment samples from Hinkson Creek and major tributaries in the spring and fall of 2022. The samples will be analyzed for the presence of various chemical compounds that may be contributing to the impairment of aquatic life communities in Hinkson Creek. We expect to have preliminary results of the analyses in the spring of 2023 and a full report in time for the 2022-2023 Water Year Summary.

Chloride Task Force.

A Chloride Task Force for the Hinkson Creek Watershed was created in 2022 to help direct the Collaborative Adaptive Management Process as to how to best address the impact of chloride from road salt on the streams. The team consists of experts from academia, local government, and private businesses to help shape an achievable and beneficial path into the future for best management practices for salt application. The initial meeting was held in August 2022 and will have eight sessions. Three meetings were held during the 2021-2022 water year.

To ensure the success of the task force, the members established the following Mission Statement:

> The Chloride Task Force will be successful if the team develops an interdisciplinary understanding of the actions and motivations driving the use of chloride-based deicers in the watershed and the resulting impacts of chloride on water quality, infrastructure, ecosystem, and human safety. The goal of the Task Force is to supply a path forward to expand community members' understanding of chloride impacts, and Best Management Practices appliers can adopt.

We will provide an update on the products generated by the Chloride Task Force in the 2022-2023 Water Year Summary.

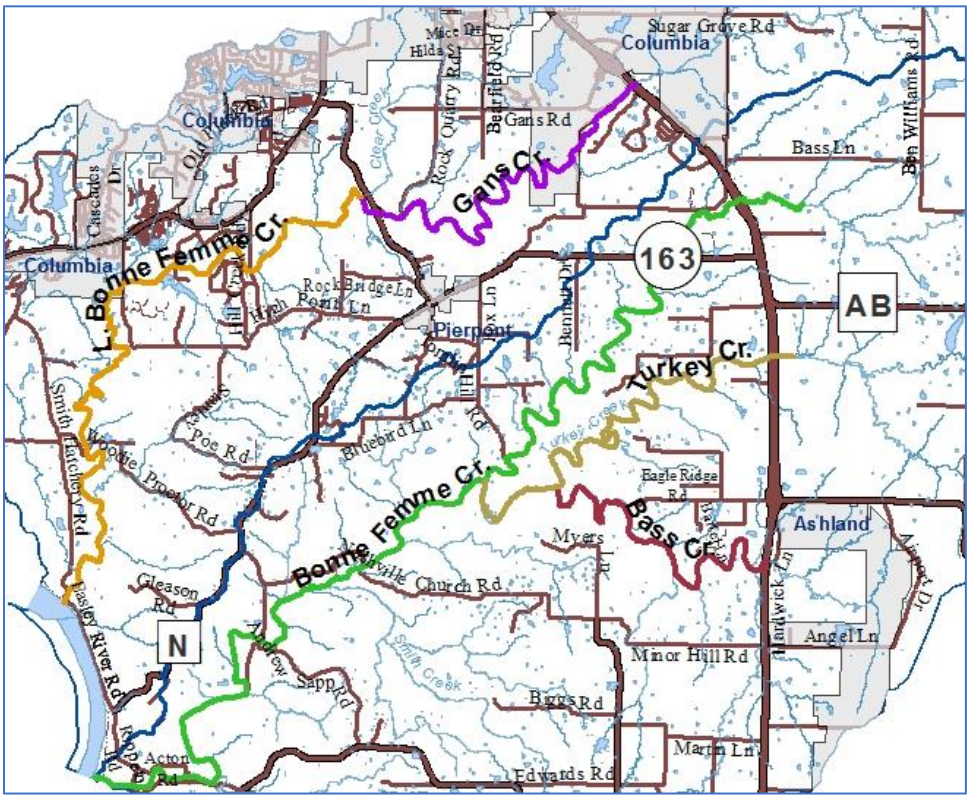
III. Bonne Femme Watershed Project

Ice on the limestone bank of Gans Creek, March 1, 2022

a. 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 (known together as the Greater Bonne Femme Watershed) in Boone County. The current project includes the development of a watershed-based plan (WBP) for the Greater Bonne Femme Watershed, as well as a stormwater best management practice (BMP) demonstration project (bioretention basins on E. Meyer Industrial Drive) and an outreach initiative to inform local stakeholders of the need for the current planning and future implementation

process. The WBP will consist of nine specific elements required by U.S. EPA; approval of the plan by EPA and the Missouri Department of Natural Resources will provide eligibility for future funding to address water quality concerns identified in the plan. The previous watershed project, which concluded in 2007, resulted in the Bonne Femme Watershed Plan. The plan may be viewed in its entirety on www.cavewatershed.org. 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 and codified in state law.



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

The blue line marks the division between the Bonne Femme and Little Bonne Femme watersheds. The impairment in the watershed is of concern as some of these stream reaches are

also classified as outstanding state resource waters, known for clarity and quality of habitat for aquatic life.

b. Education and outreach update 2022.

Boone County and project partners 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 2022 and hosting a spring and fall Stream Team Water Quality Monitoring Blitz in and around Rock Bridge Memorial State Park. The spring monitoring blitz was held on April 9, 2022. We were unable to conduct the fall monitoring blitz this year due to drought conditions and lack of stream flow. The cumulative results of the available macroinvertebrate scores from the monitoring blitzes to date are presented below:

Stream	WQ Rating Fall 2016	WQ Rating Spring 2017	WQ Rating Fall 2017	WQ Rating Spring 2018	WQ Rating Fall 2018	WQ Rating Fall 2019	WQ Rating Fall 2021	WQ Rating Spring 2022
Gans Creek Upstream	Fair	Excellent	Not monitored during the event	Good	Fair	Excellent	Fair	Good
Gans Creek Downstream	Good	Excellent	Good	Good	Good	Fair	Good	Fair
Little Bonne Femme Creek Upstream	Excellent	Excellent	Good	Good	Good	Excellent **	Good	Excellent
Little Bonne Femme Creek Downstream	Excellent	Excellent	Good	Good	Not monitored during the event	Not monitored during the event	Good	Excellent
Clear Creek	Fair	Good	Excellent	Good	Excellent	Excellent **	Not monitored during the event	Not monitored during the event

** These two streams scored in excess of the normal excellent range established by Missouri Stream Teams.

Additional education events in and near the Greater Bonne Femme Watershed included a monthly program with the Southern Boone Area YMCA afterschool program with 45 students discussing how to have positive interactions with our waterways to provide positive impacts. Rock Bridge High School Biology Club engaged with Boone County Stormwater staff and conducted a water quality monitoring event in Three Creeks Conservation Area to further their knowledge and connection to local waterways. Three volunteer days were hosted for replacing plants at the Boone County bioretention basins on E. Meyer Industrial Drive. Watershed signs were installed and maintained in the watershed to help citizens create a link from the roads to the waterways.

9-element watershed-based plan update.

Boone County stormwater staff continued to work with the Missouri Department of Natural Resources and project partners to develop a 9-element plan for recovery of stream water quality and protection of outstanding state resource waters in the Greater Bonne Femme Watershed. A final draft of the 9-element plan was submitted to MDNR and the Environmental Protection Agency in July of 2022. Additional revisions are required before EPA will accept the plan, and we expect a final approved version in 2023. The plan will be available for viewing on the cavewatershed.org website once the final approved version is available.

Once the 9-element plan is finalized, we will be moving into the implementation phase and working with project partners and interested landowners to improve water quality in the Greater Bonne Femme Watershed. Please stay tuned for more information about this project in the 2022-2023 Water Year Summary!

IV. Countywide Chemical Sampling Project, 2022-2023

Cedar Creek at Backbone Road, October 27, 2022.

The Missouri Department of Agricultural awarded funding to Boone County in partnership with the University of Missouri to evaluate concentration and risk of seventeen pesticides, herbicides, and related metabolites in streams throughout Boone County. Grab samples of stream water will be collected from streams around Boone County in the fall of 2022 and in the spring of 2023.

Sample collection for the project began in September 2022. Sample locations are chosen based on land use characteristics, stream order, accessibility, and other watershed characteristics. Water samples will be analyzed by the bioanalytical laboratory at the University of Missouri. Concentrations of pesticides, herbicides and related metabolites will be quantified by using a mass spectrometer – a device that can identify the presence and quantities of constituents using light frequencies after analytes are added to the stream water. Other water quality parameters will be analyzed including chloride, nitrogen and phosphorus, and signs of urbanization and fertilizer use will also be assessed. Health risks of the detected compounds will be modeled.

Project partners will be providing a status report on the project due December 31, 2022, and a final report at the conclusion of the project at the end of June 2023. After analysis each sampling season, Boone County will post the sampling sites and data on an interactive map on the stormwater page of the Boone County website. The map is in the development phase and we are very excited about debuting the map on the Boone County Stormwater webpage in the spring of 2023!

V. Concluding Remarks

Boone County Stormwater staff are excited to continue working to improve water quality in our local waterways and to engage in education and outreach activities with our citizens in the 2022-2023 water year. Many projects will be wrapping up in 2023 and the knowledge gained from the results will inform our understanding of local conditions moving forward. Information from these projects will be made publicly available on our websites – please stay tuned for updates as they become available.

Pancake ice on the Missouri River, January 10, 2022.