Collaborative Adaptive Management (CAM) Progress Report
Stakeholder Committee
January 1, 2017 – December 31, 2018

Committee Members

Monica Espinosa, EPA CAM Facilitator

Members	Representing
Karl Skala	City of Columbia
Fred Parry	Boone County Commission
Todd Houts	University of Missouri
Tim Rielly	Missouri Department of Natural Resources
Tom Trabue	Chamber of Commerce
Mark Farnen	Central Missouri Development Council
Jonathan Sessions	Columbia School Board
Dee Dokken	Sierra Club
Ben Londeree	Smart Growth Coalition
Diane Oerly	Stream Teams
Jeanine Pagan	Property Owner
Paul Mehrle	Property Owner
Frank Gordon	Soil & Water Conservation Board
Nathan Odle	Large Scale Commercial Representative
Jay Turner	Agricultural Community

In 2011 the U.S. Environmental Protection Agency (EPA) established the Hinkson Creek TMDL calling for a substantial reduction in peak flow for specified design storm events. An alternate plan was negotiated in 2012 among the EPA, Missouri Department of Natural Resources (MDNR), Boone County, the City of Columbia, and the University of Missouri which involved Collaborative Adaptive Management (CAM.) "Collaborative adaptive management is a science-driven, stakeholder-based process for decision-making while dealing with the scientific unknowns inherent in many physical and biological systems. It uses a continuing process to make changes and then to determine the effect of those changes." http://www.helpthehinkson.org/stakeholders.asp The EPA provides a facilitator, MDNR provided three years of testing and participates in CAM committees, and the local entities share costs and provide support for CAM committees. The standing committees are: the Stakeholder Committee, Action Team, and Science Team. The stakeholders were selected to represent a broad spectrum of local interests who make recommendations to Boone County, the City of Columbia, and the University of Missouri. The Action Team members are professionals

associated with Boone County, the City of Columbia, the University of Missouri, Boone County Regional Sewer District, and Missouri Department of Transportation who provide support to the Stakeholder Committee. The Science Team members are volunteer scientists and a storm water engineer who make recommendations to the stakeholders about projects to learn more about the Hinkson Creek and to improve its quality. To date the Stakeholder Committee recommendations have been based on recommendations from the Science and Action Teams.

The goal of the CAM process is to improve the Hinkson Creek water quality so as to remove it from an impaired status. The criterion for delisting Hinkson Creek is three consecutive tests where all of the test sites are fully supporting (16 or better on the Macroinvertebrate Stream Condition Index [MSCI] Scores.) An alternate criterion is the percent of fully supporting sites in the reference stream in the Ozark/Moreau/Loutre Ecological Drainage Unit. For example, if 85% of the reference stream sites are fully supporting then at least 85% of the Hinkson Creek sites must be fully supporting as well. As an aside, dissolving CAM would reinstate the EPA TMDL process.

The following is a summary of the CAM Stakeholder Committee activities for 2017-2018 with appropriate online links. The CAM Stakeholder Committee was scheduled to meet eight times since the last report. Minutes exist for six meetings (due to a lack of quorum and federal government shutdown for two occasions). http://www.helpthehinkson.org/CAMStakeholders.asp Four presentations were made to the Stakeholder Committee. Six publications resulted from studies recommended by the Stakeholder Committee. Three special meetings were held. The Riparian Subcommittee met 16 times. Four projects approved by the Stakeholder Committee are at various stages. The Stakeholder Committee approved three proposals for action. Preliminary MSCI results for 2017 and 2018 were provided and are discussed. An appendix contains non-CAM projects completed by local government entities.

I. Presentations and Reports
   a. Trent Stober, HDR, and David Carani, HDR: Our Columbia Waters presentation. February 9, 2017
   b. CAM Science Team: Hinkson Creek Collaborative Adaptive Management Science Strategy document. February 9, 2017 http://www.helpthehinkson.org/documents/HinksonCreekScienceStrategyDraft_20170208.pdf
   c. CAM Action Team: Potential Action Projects presentation. December 11, 2017 http://www.helpthehinkson.org/documents/ListofPotentialProjectsforStakeholderConsideration.pdf
   d. Danelle Haake, St. Louis University, River des Peres Chloride Study presentation. June 26, 2018

II. Publications

a. Kellner, E., Hubbart, J.A. (2017). Improving Understanding of Mixed-Land-Use Watershed Suspended Sediment Regimes: Mechanistic Progress through High-Frequency Sampling. *Science of the Total Environment 598,* 228-238
b. Kellner, E., Hubbart, J.A. (2017). Spatiotemporal Variability of Suspended Sediment Particle Size in a Mixed-Land-Use Watershed. *Science of the Total Environment* 1-12. DOI: https://doi.org/10.1016/j.scitotenv.2017.10.040
c. Kellner, E., Hubbart, J.A. (2017). Confounded by Forgotten Legacies: Effectively Managing Watersheds in the Contemporary Age of Unknown Unknowns. *HP Today* 1-10. DOI: 10.1002/hyp.11223.
d. Kellner, E., Hubbart, J.A. (2018). Flow Class Analyses of Suspended Sediment Concentration and Particle Size in a Mixed-Land-Use Watershed. *Science of the Total Environment 648,* 973-983. DOI: 10.1016/j.scitotenv.2018.08.187
e. Kellner, E., Hubbart, J.A. (2018, *Accepted*). A Method for Advancing Understanding of Streamflow and Geomorphological Characteristics in Mixed-Land-Use Watersheds. *Science of the Total Environment* x: xx
f. Hinkson Creek: Collaborative Adaptive Management/Riparian Corridor Restoration brochure. June 2018

III. Field Trip and Special Meetings

a. CAM Summit on April 10, 2017. This was a joint meeting of the Stakeholder Committee, Science Team, and Action Team to discuss current status (See I. b. above) and future direction of CAM.
b. Upper Hinkson Creek Land Management Workshop on September 6, 2018 (See IV. c. below.)
c. CAM Stakeholders took a tour on November 2, 2018 to six sites in the Hinkson Watershed.

IV. Riparian Sub-Committee met sixteen times in 2017-18. Minutes are at: http://www.helpthehinkson.org/RiparianSub-committee.asp

a. There was planning for a USDA Regional Conservation Partnership Program (RCPP) grant proposal for riparian cost share BMPs. Action is on hold awaiting a RFP. (See V. c. i. below.)
b. Hinkson Creek: Collaborative Adaptive Management/Riparian Corridor Restoration brochure on June 2018 (See II. f. above.)
c. Upper Hinkson Creek Land Management Workshop was held on September 6, 2018 and was attended by about 50 landowners
d. Identification of private landowners with at least three acres along Hinkson Creek was performed to invite them to the workshop (see IV. c. above.)

V. Recommendations and Actions

a. Actions:
    i. Flow and Sediment Study is in its final year. Initial proposal is at: http://www.helpthehinkson.org/CAM%20Agendas/Meeting%20Document

s/04-30-14%20Stakeholders/FY2015%20Research%20Proposal%2020140319.pdf

ii. Sediment Mapping Project data collection was completed in August 2018 and involved measuring sediment depth at selected intervals in Hinkson Creek. The project is in the data analysis stage.

iii. El Chaparral Riparian Restoration Project was completed in March 2018. http://www.helpthehinkson.org/documents/ElChaparralRiparianRestorationProjAnnualRpt2018.pdf

iv. Forum Nature Area Monitoring Project to evaluate the effectiveness of The Forum Level Spreader is ongoing. A description of the Level Spreader project is at: http://www.helpthehinkson.org/documents/20180910_MWEA_Presentation-Forum_Nature_Area_Level_Spreader.pdf

b. Recommendations:

i. Redesign of the CAM website to make it more user friendly http://www.helpthehinkson.org/default.asp

c. Proposals:

i. A motion to authorize pursuit of USDA Regional Conservation Partnership Program (RCPP) funding to address water and soil quality in the watershed was unanimously approved on December 11, 2017 (See IV. a. above.) http://www.helpthehinkson.org/documents/USDARegionalConservationPartnershipProgramSummary.pdf

ii. It was recommended that the Action Team provide a refined plan, timeline, and fiscal impacts for items 1-4 on the potential projects list. Unanimously approved on December 11, 2017. (See I. c. above; namely; 1) Stream Stabilization Projects, 2. In-depth Macroinvertebrate Analyses (see VI. c. iii below), 3) Grade Control Program, and 4) Riparian Restoration on Public Properties.)

iii. A motion to approve a macroinvertebrate study to provide in-depth analyses of previously collected data. (data mining) was unanimously approved on June 26, 2018 http://www.helpthehinkson.org/documents/Hinkson.Macro.RFP.5.15.2018.pdf A RFP is in preparation.

VI. Macroinvertebrate Results (MSCI scores determine 303d status.)

a. Macroinvertebrate results through 2017 are presented in tabular form at: http://www.helpthehinkson.org/documents/2017_Hinkson_MSCI_Table%20(002).pdf

The last nine test periods have produced mixed results. The best results were in the Fall of 2014 (8 of 11 sites fully supporting) and Spring of 2016 (8 0f 11 fully supporting). In the Fall of 2014 seven supporting sites were at stations HC 4-8 while in Spring 2016 seven supporting sites were at stations HC 1-5.5. The worst

results were the Spring of 2017 (3 of 11 supporting) and the Fall of 2017 (2 of 8 supporting). Every site was fully supporting at least three times (3-6) and not fully supporting at least two times (2-6). Very dry weather probably was a factor for some of the poor results.

b. Due to the mixed results and cost of testing, the Action Team decided not to sample for the next 1-3 years until they know where to target their sampling.

Appendix

The City of Columbia, Boone County, and the University of Missouri completed additional storm water projects that were independent of CAM. Below are some of these projects.

Boone County

Removed and replaced curb & gutter along with the road work projects for Georgetown and Lake of the Woods Subdivisions. The entire cost was $959,136.45 https://www.showmeboone.com/road-bridge/documents/reports/2017_Year_in_Review.pdf

Phase II of the Lake of the Woods street rehabilitation that included curbs & gutters cost $714,836.93. https://www.showmeboone.com/resource-management/documents/annual-reports/2018_RB_Annual_Report.pdf

City of Columbia

"Really Big Tree Project" at 10th and Broadway: https://www.youtube.com/watch?v=5vXsPhDyvCk&t=17s A similar "Really Big Tree Project" was completed by students at the Columbia Public School's Center for Early Learning-North (A cooperative effort between the City and Columbia Public Schools.)

Wastewater and Stormwater Integrated Management Plan: https://www.como.gov/utilities/sewer/imp/

Storm Water Capital Improvement Projects: https://www.como.gov/utilities/stormwater/capital-projects/ (Sinclair Road Culvert, Rollins Road at Rock Creek Culvert, Manor Drive, Hitt Street and Elm Street, and 9th Street and Elm Street)

Sewer Capital Improvement Projects (Many contain storm water components, e. g. relining of leaky sewer lines to reduce storm water inflow and infiltration into the sanitary sewer system and stream bank repairs as part of new sewers: https://www.como.gov/utilities/2013-sewer-bond-funds/

Purchase of one house on Again Street and an abutting one on Worley Street as part of a storm water management program for the area.

A detention facility associated with the Lynn Street Cottages near to the intersection of Sexton Road and Garth Avenue

University of Missouri-Columbia

Permeable pavement with underground stormwater storage was installed at Dobbs Group Student Housing.

A bioretention basin was constructed at the Missouri Orthopedic Institute.

Permeable pavers were installed at the Missouri Orthopedic Institute.

Underground stormwater storage was installed at the Patient Center Care and Learning Center (PCCLC).

Following demolition the 35,500 square feet of impervious area associated with Laws Hall, Lathrop Hall, and the Dobbs Dining Facility was replaced with turf grass.

Five small landscape gardens were converted to small rain gardens at Parking Lot AV-15.

A bioretention basin was installed at Stewart Hall.

New vegetated swales were installed at the East Campus Plant Growth Facility and the MUHC Quarterdeck building.

The Riparian corridor consisting of areas of hardwood trees was restored along Hinkson Creek.