

BONNE FEMME WATERSHED PROJECT

September, 2005

“People Working together to protect the Bonne Femme Watershed”

Annual Newsletter



PUBLIC DEBATE ON WATERSHED PLANNING POSSIBILITIES

Should conservation plans protecting sensitive habitat be required of development applications?

Should there be a real estate transaction fee to fund protecting water resources?

These types of questions will be addressed in a 3-way debate discussing various recommendations that may be considered by the Stakeholders for inclusion in the land use plan they are developing. This event will be held at **7 p.m., November 30th, 2005** (location to be determined). The basis for the debate will be the recommendations from the Subwatershed Sensitivity Analysis (See *Subwatershed Sensitivity Analysis Presentation*, Pg. 5).

The purposes of the debate are to: 1) increase community awareness of the work of the Stakeholders; and 2) start a public discussion of possible outcomes of the *(CONTINUED ON PAGE 2)*

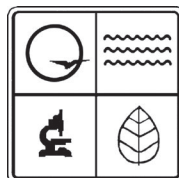
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SUBWATERSHED SENSITIVITY ANALYSIS PRESENTATION

The Project hired a contractor, Applied Ecological Services (AES), to perform a subwatershed sensitivity analysis. The purpose of the analysis is to use different methods to study the current state of streams in the watershed and how they might be altered as the watershed develops. They completed their work late this summer. Everyone is invited to attend their presentation on the analysis on **November 14th at 7:00 p.m., in the Boone County Commission Chambers**. The purpose of the presentation is for AES to explain what they did, and answer any questions people might have about their work. The presentation lays the **foundation for the November 30th debate** (see above). The final report will be available for download on the project's web site www.CaveWatershed.org, and hard copies of the executive summary are available upon request.

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U.S. Environmental Protection Agency Region VII, through the Missouri Department of Natural Resources, has provided partial funding for this project under Section 319 of the Clean Water Act.

DEVIL'S ICEBOX TOURS

You are invited to explore the underground wilderness of the cave.

Every year, about 400 brave people venture into Devil's Icebox Cave on Wild Cave Tours (WCTs) led by park-trained staff and volunteers. This adventure program introduces people to the wonders of an underground wilderness. This is one of only a few guided wild cave tour programs offered to the public in the state and nation. The following comments received from wild cave tour participants reveal how much they valued the experience: "Awesome opportunity to explore a natural cave." "A great adventure." "A good challenge – very rewarding." "I learned a lot about caves and bats and saw lots of new things."

A special invitation to participate in a WCT is extended to residents living in the watershed, some of whom may own land that drains water into the cave system. A close connection between land and cave is evident as water drips in and flows through the cave, affecting cave animals on its way.

WCTs are being offered on weekends August 13 through October 8. Participants need to be in good physical condition. A 'B' level WCT involves being in the cave 5 to 6 hours, boating through a half-mile water passage and hiking in rough terrain for another mile before turning around and doing the same on the way out (total of about 3 miles). A more detailed description, an explanation of how to register and a schedule are available by going to www.mostateparks.com (go to Rock Bridge Memorial State Park) or by calling (573) 449-7400.



Boat Landing inside Devil's Icebox Cave (photo by Rickard Walk).

PUBLIC DEBATE ON WATERSHED PLANNING POSSIBILITIES (CONT.)

planning efforts. This debate will also help the Stakeholders understand perspectives from the larger community; these perspectives will aid their watershed planning (see *Stakeholder Planning Efforts*, Pg. 4). After the debate, members of the audience will have the opportunity to voice their opinion on policy considerations. Following the public input part of the event, **free appetizers** and a cash bar will be available for participants to discuss the potential recommendations in a less formal setting. The text of the entire debate, public input, and other comments people provide will be available after the debate on our web site: www.CaveWatershed.org.

As space may be limited, we are encouraging people to pre-register. This pre-registration can be done either online, by sending an e-mail to tfrueh@boonecountymo.org (please indicate if you want an electronic or hard copy of the Subwatershed Sensitivity Analysis Executive Summary), or by sending in the completed form below:

Name: _____

Address: _____

Telephone: _____

E-mail: _____

Number of registrants: _____

Would you like to receive a copy of the Subwatershed Sensitivity Analysis Executive Summary?

If yes, circle which format you want: **electronic** or **hard copy**

Please mail to: Bonne Femme Watershed Project, 801 E. Walnut, Room 210, Columbia, MO 65201

STAKEHOLDER PLANNING EFFORTS

A stream's health is most affected by the use of the land in its watershed (see insert, Watersheds and nonpoint source pollution, Pg. 2). Therefore, in order to maintain the environmental quality of the watershed and its streams, land use and its management in the watershed needs to be addressed. The best way to do this is through creating a land use plan specifically designed to protect streams. A land use plan is a proposal for how land should be used, and where growth should occur.

The Stakeholder Committee is developing the content of the plan. These stakeholders represent broad interests from the greater community, including developers, environmentalists, farmers, builders, bankers, educators, smart growth, and more. This balanced, diverse representation on the Committee is essential to making a successful plan the entire community can support. The committee will also be instrumental in ensuring the plan gets implemented by garnering community support and speaking at public hearings.

The Stakeholders meet on a monthly basis.

Throughout the planning process, they have had educational presentations on various topics, such as karst hydrogeology, agriculture, property rights, economic growth, and stream life. These presentations give the Stakeholders important knowledge in order to make informed decisions. They also have had the opportunity to participate in various watershed events, including a watershed tour and forum, a conservation development seminar, and project open house.

A clear outline of the various chapters within the plan has been developed. The Stakeholders have completed most of the work on the first two chapters. The first chapter, the Introduction, places the big picture of the watershed plan in its context. It starts off discussing how the project came about and what other activities the project has been doing. How the Stakeholders created the plan is detailed. The watershed is described, including physical characteristics, history, and current conditions. Another section addresses how we use the watershed, touching on subjects such as agricultural, residential, recreational, and commercial uses, to name a few. Economic activity in the watershed is addressed. The final section briefly describes each chapter of the plan.

The second chapter discusses the Stakeholder issues. Their issues are listed both to help place the watershed in its societal context, and to clarify what needs to be considered throughout the planning process. Next, the process of how the Stakeholders identified the issues is described. A complete list of their issues follows, with an alternative grouping to help give the reader another perspective for how to think about them.

This fall, the Stakeholders will be working on the next few chapters of the plan. The third chapter will discuss the various scientific studies that help inform the planning process. These studies include dye tracing experiments (see Dye Tracing Studies, P. 6), water quality monitoring, and a subwatershed sensitivity analysis. Project members take samples from the streams in the watershed on a quarterly basis. These are tested for a variety of contaminants (e.g. nitrate, herbicides, etc.) and parameters (e.g. salinity, pH); this monitoring helps to understand trends in water quality throughout the watershed, and locate potential problems. The project has hired a consultant to perform the subwatershed sensitivity analysis. This analysis develops a large data set and uses various models to determine the impacts of various land management practices on the streams. It

Nonpoint Source Pollution and Watersheds

Nonpoint source pollution, unlike pollution from industrial and sewage treatment plants, comes from many sources spread across an area. This pollution is transported by rainfall or snow melt moving over and through the ground. As the runoff moves, it picks up and carries pollutants, finally depositing them into lakes, streams, wetlands, and even our underground sources of drinking water.

Urbanization causes stormwater to change dramatically. In addition to its transporting greater amounts of nonpoint source pollutants, stormwater runoff in urban areas increases both the timing and quantity of flow (as compared with pre-development flows). These changes in flow can significantly erode stream channels, thereby destroying infrastructure, personal property, and aquatic habitat.

A *watershed* is the land area that drains water to a particular stream, river, aquifer, or lake.

In order to protect streams, lakes, wetlands and groundwater from nonpoint source pollution, action must be taken throughout the watershed since the pollution sources are spread across the watershed.

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STAKEHOLDER PLANNING EFFORTS (CONT.)

should be completed by early September.

Chapter four will discuss the Stakeholders' vision for what the watershed should look like in 25 years and the process used to develop that vision. The Stakeholders will come up with the ideal land use situation in the watershed. This idealized situation gives a goal to strive towards in the land use planning. Chapter five will transform the vision into achievable goals. The final chapter, number six, will detail the Stakeholders' watershed management recommendations.

The 18 member stakeholder committee has met 12 times with the average meeting lasting 2 hours. Their hard work and dedication will help focus other aspects of the Bonne Femme Watershed Project. For more information on the Stakeholders, check out the Project's web site at www.CaveWatershed.org.

OUTREACH AND EDUCATION

During the past year, the Bonne Femme Watershed Project has hosted several educational and outreach opportunities. They had two primary purposes:

- Educate people about the watershed and related issues
- Provide people with an opportunity to learn about the Watershed Project, and give input and feedback to the staff.

Two watershed tours were led in the fall of 2004. Later that fall, a workshop was held discussing the economic and water quality benefits of conservation developments. In February, 2005, the Project hosted an open house to introduce the Watershed Project to the community and provide an opportunity for interaction with Project members. In April 2005, project staff and volunteers conducted a tour of local springs. Media outreach and subsequent reporting played an integral part in getting the

word out to the public about each of these events.

Watershed Tour

A tour of the watershed was held September 25, 2004. The primary purpose was to highlight the natural diversity of the watershed. The tour began with a presentation at Rock Bridge Memorial State Park. This presentation focused on both the Watershed Project, and what could be seen during the tour. Next, park staff and volunteers led a walking tour to the double-sinkhole cave entrance known as "Devil's Icebox", talking about the special geologic features of the area.

After the walking tour, attendees boarded a bus for the tour of the watershed. A stop was made at the University of Missouri's Bradford Farm Small On-site Wastewater Demonstration site where Dr. Randy Miles conducted a guided tour. He explained the operations of various new small on-site wastewater systems and their benefit for water quality. A second stop was made for lunch in Ashland. During lunch, a facilitated discussion was held to determine the effectiveness of the tour and provide an opportunity for increased interaction with Project members. Many participants were impressed with the diversity of the watershed, while several others found the tour at Bradford farms particularly interesting. A repeat of the tour was held in early December for those who could not attend the first one.

Conservation Development Seminar

Approximately 100 people attended the Development and Conservation: Hand in Hand seminar in Columbia. The seminar was a cooperative effort between the Bonne Femme Watershed Project and the Hinkson Creek Restoration Project. Other sponsors included: Boone County Smart Growth Coalition, Central Missouri Development Council, City of Columbia, Columbia Board of REALTORS®, Columbia Chamber of Commerce, Columbia Home Builders Association, Community Stormwater Project, and the County of Boone. The broad sponsorship helped to make for a diverse audience, which included developers,

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A RIVER IS THE REPORT CARD FOR ITS WATERSHED
-ALAN LEVERE

OUTREACH AND EDUCATION (CONT.)

builders, design professionals, local government officials, and concerned citizens.

The goal of the seminar was to educate people on the economic and environmental benefits of conservation developments. The seminar featured two speakers: Mark Meyer, a civil engineer who specializes in stormwater management, and Dr. Michael Sands, Environmental Team Leader for Prairie Holdings Corporation. Mr. Meyer showed how to integrate natural hydraulic and hydrologic processes into development site designs. These changes in site design can treat stormwater runoff in order to help protect the environmental quality of our streams. Dr. Sands discussed the design, development and market-success of Prairie Crossing development, a conservation development located near Chicago, IL. Follow up conversations with some of the attendees indicate that there is a continuing need in Columbia for educational events such as this, but particularly ones that focus on the technical aspects of conservation design.

Project Open House

The Bonne Femme Watershed Project held an open house on February 23rd, 2005 from 5-8 p.m. The venue, the Little Bonne Femme Baptist Church, is right next to the Bonne Femme Creek. Approximately 50 people attended the event, which is pretty good, especially considering it was lightly snowing. The majority of attendees were concerned landowners in the watershed. A slide show helped introduce the watershed project. This presentation had both good attendance and good audience participation. Displayers included: Rock Bridge Memorial State Park, Friends of Rock Bridge, Boone County Regional Sewer District, Audubon Society, NRCS/SWCD, and MDNR's watershed management program. Questionnaires were one way to provide feedback to the Urban Conservationist about watershed concerns and questions.

WATER IS THE MOST CRITICAL RESOURCE ISSUE OF OUR LIFETIME AND OUR CHILDREN'S LIFETIME. THE HEALTH OF OUR WATERS IS THE PRINCIPAL MEASURE OF HOW WE LIVE ON THE LAND.
-LUNA LEOPPOLD

Spring Tour

Project staff led a tour and discussion on karst topography and springs on April 12th, 2005. It started out with a presentation on karst topography, dye tracing, and the Bonne Femme Watershed Project. Karst, typified by an abundance of springs, caves, sinkholes, and losing streams, is found in several areas of the Bonne Femme Watershed. Dye tracing is one method used to learn about where water flows once it enters karst conduits. The basics of the Watershed Project were presented so attendees could learn how they can participate and see the connection between the science of karst systems and what we are doing to try to protect them.


After the presentation, we walked to two springs found within Rock Bride Memorial State Park. At each one, we discussed how they function, the rate of flow from each one, and some interesting aspects about their history.

Media outreach

A wide variety of media have covered the Bonne Femme Watershed Project activities. This media coverage helps expand the outreach and highlights the work and successes of the Watershed Project. The September watershed tour had lots of media coverage: project staff appeared on two local radio talk shows to discuss the upcoming tour, and advertisements for the tour ran in a local paper and a local radio station. In addition, local TV news did a story on the event. Staff issued a press release for the Development and Conservation seminar, which led to a local newspaper paper story covering the seminar. For the February Open House, there was a press release, radio talk-show appearance, newspaper article, and local TV news coverage emphasizing the event.

FUNDING FOR WORK ON YOUR PROPERTY

The Project has some funds available to help landowners install practices on their property that will help protect the streams in the watershed. This is an excellent opportunity to accentuate the positive by helping people install the types of practices that will benefit the streams. These federal funds are what are known as cost-share: the landowner pays for 40% of the practice, and the Project pays the remaining 60%. These funds can cover a wide spectrum of practices, including agriculturally-related ones (i.e. fencing livestock out of streams, installing a riparian buffer, etc.), installing an alternative on-site sewer system, or completing a conservation development (one that addresses several aspects of stormwater: stream channel maintenance, groundwater recharge, water quality maintenance, and reducing flooding impacts). The practices need to be installed on property located in the watershed (see map, P. 7). There will be a presentation on the cost-share funding at the Project's annual **Open House in February, 2006**. For more information, contact Terry Frueh at 573-886-4343 or tfrueh@boonecountymo.org.




DYE TRACING STUDIES

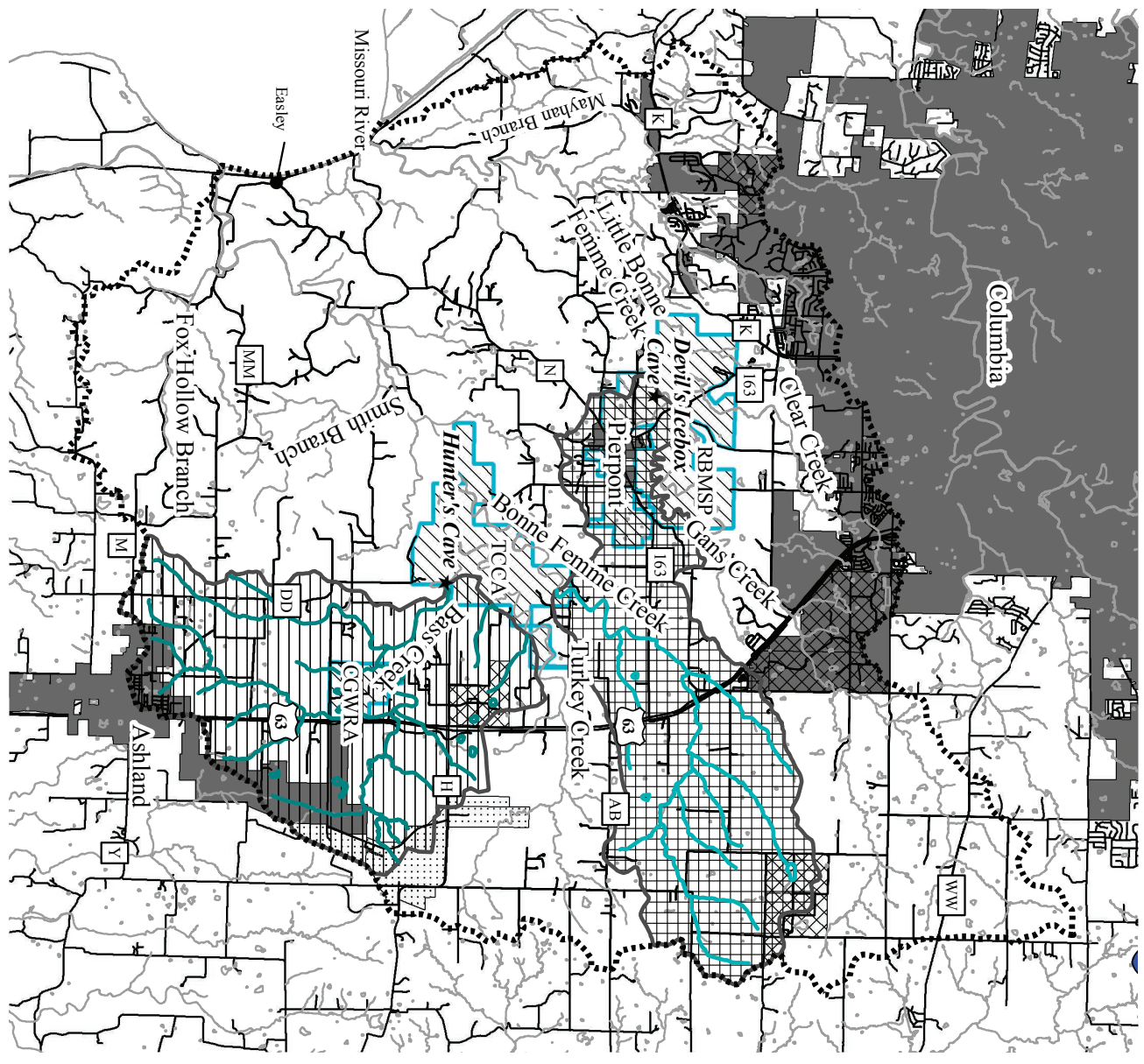
One characteristic that makes the greater Bonne Femme Watershed distinctive is its karst topography. Karst is typified by sinkholes, springs, caves, and losing streams (streams that have a portion of their flow go underground into cave systems). One part of protecting the streams in the watershed is paying careful attention to those that flow underground. Contrary to popular perception, just because water from a spring looks clear, it is not necessarily clean. These cave systems are sensitive ecosystems that are vulnerable to pollution. Surface water travels quickly through cracks and fissures into the cave system, bypassing the filtering of pollutants by vegetation and soil. Thus, pollutants from the land surface are carried into caves streams as well. In contrast, in non-karst areas, there is usually more time and opportunity for rainwater to pass through vegetation and soils. That water loses some of its pollutants before it reaches our streams and lakes. In order to protect cave systems, it is important to know from where the water comes. Dye tracing is often used to determine where water flows once it leaves the surface. This is a rather basic tool: pour in a nontoxic fluorescent dye at point A, and sample at numerous points to see where it comes out. If dye is found at a point (say, point D), then we know that water flowed from point A to point D.

Previous studies have shown that the Pierpont Sinkhole Plain, and the reach of Bonne Femme Creek immediately upstream from the Highway 163 bridge, both have water flowing underground to the Devil's Icebox, located in Rock Bridge Memorial State Park (see map Pg. 7). Hunters Cave, located in Three Creeks Conservation Area, is another karst system in the watershed. Its recharge has recently been delineated (see map P. 7).
















We used dye tracing to study underground flow in two separate traces. The first trace studied the section of Bonne Femme Creek below Highway 163. This section was suspected to lose water to Devil's Icebox Cave. Our dye tracing study confirmed that this section of the creek does in fact flow underground into and through Devil's Icebox Cave. The second trace examined Gans Creek to determine if it loses water to any other areas. The results indicated that water does not leave Gans Creek's stream channel. This information is helpful when trying to protect cave streams and all of the life that depends on them.



Hunter's and Devil's Icebox Caves recharge areas determined from dye tracing studies



LEGEND

-  Bonne Femme Watershed Project area
-  Hunter's Cave recharge area
-  Streams draining into Hunter's Cave
-  Streams draining into Devil's Icebox
-  Devil's Icebox Cave recharge area
-  Streams draining into Devil's Icebox
-  UMC property within BFWP area
-  Columbia Regional Airport
-  Incorporated areas
-  State Parks and Conservation Areas
-  Roads
-  Streams
-  RBMSP = Rock Bridge Memorial State Park
-  TCCA = Three Creeks Conservation Area
-  CGWRA = Charles Green Wildlife Research Area



map created by Terry Funch, Boone County Planning and Building 7-14-05

Bonne Femme Watershed Project

Boone County Planning and Building Inspection
801 E. Walnut, Room 210
Columbia, Missouri 65201-7730

WANT HELP \$FUNDING\$
WORK ON YOUR PROP-
ERTY? SEE PAGE 6.

We're on the web!
www.CaveWatershed.org

Calendar of local Watershed Events

Saturday, September 24, 10-12:30
Boone Electric Cooperative

“Show-Me Watershed-Friendly Yards and Neighborhoods”
Learn how ordinary yard care practices can affect our local streams and rivers. Free rain gauge to all participants, door Prizes.

Saturday, October 1, 10-noon.
4 locations

Hinkson Clean Sweep. All supplies provided. Prizes, free t-shirts, pizza and soda. To sign up, e-mail scott.hamilton@mdc.mo.gov or call 817-6447.

Oct. 18 (Kansas City) and
Oct. 19-20 (St. Louis)

Low-Impact Development technical workshop. Contact MARC (KC) 816-474-4240, and East-West Gateway (SL) 314-421-4220 for more info.

November 14, 2005 7 p.m.
Boone Co. Commission Chambers

Bonne Femme Subwatershed Sensitivity Analysis Presentation (see article, **Pg. 1**)

November 30, 2005 7 p.m.
location TBD

Bonne Femme Watershed Planning Debate (see article, **Pg. 1**)

February, 2006
location TBD

The Bonne Femme Watershed Project will have an Open House and cost-share presentation (see **Funding for work on YOUR Property, Pg. 6**)