

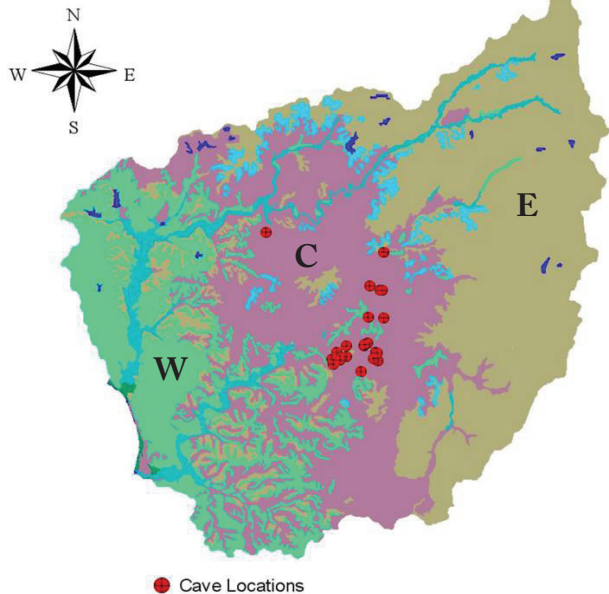
Karst, Geology & Soils of the Bonne Femme Watershed

The eastern zone (E) of the Bonne Femme Watershed was once covered by glaciers, leaving glacial till soils. Then, wind blown materials with high clay content covered the area once the glaciers receded. The topography in this area is relatively flat and karst features are absent.

In the central zone (C) of the watershed, soils are mostly weathered limestone bedrock. This is the area in which caves have formed. The topography consists of steep slopes, rock outcrops, sinkholes and more deeply dissected stream valleys.

The western zone (W) of the watershed is composed of wind blown soil deposits from the Missouri River flood plain. This soil is mainly silt. This zone is composed of sloping hills with few rock outcrops and no karst features.

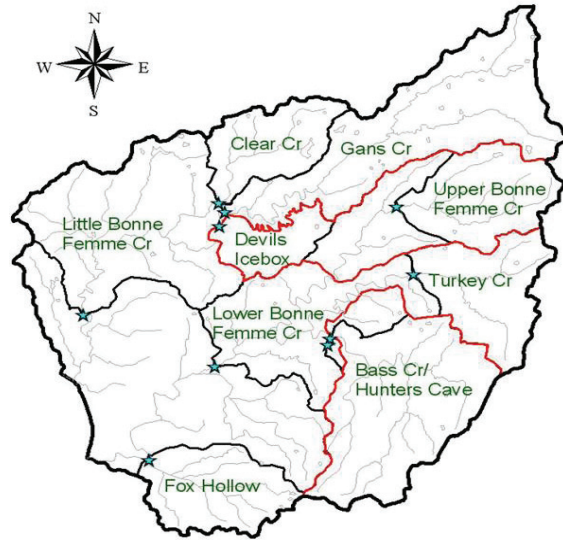
Bonne Femme Watershed



Information and maps courtesy of Dr. Robert Lerch, USDA-ARS

Bonne Femme Watershed Map

Which creek does your land drain to?



Help is Available! For more information, contact the Boone County Stormwater Division at 573-886-4330, or e-mail us at stormwater@boonecountymo.org.



Boone County, Missouri

Living With Karst



Sinkholes, Caves, and Groundwater Protection in Boone County, Missouri

Pierpont Sinkhole Plain The picture of the Grassland Trail area is just south of Rock Bridge Memorial State Park and west of the Pierpont Store.

The photo within the word 'karst' above is the Rock Bridge located in Rock Bridge Memorial State Park.

What is Karst?

Karst landscape occurs when rainwater combines with carbon dioxide, dissolving soluble bedrock such as limestone or dolomite, creating a series of cracks and channels that form caves, springs, sinkholes and losing streams.



Water flowing through a crack in limestone at Gans Creek.

There are over 418 sinkholes of a depth of at least 20 feet in Boone County; most of which are located near Pierpont and south of I-70 near Rocheport.

Why does Karst need special protection?

Sinkholes and losing streams allow pollutants to pass directly to cave systems and groundwater without the usual filtration from soil (see illustration below). In Missouri, groundwater in karst systems travel about one mile per day, while

groundwater in non-karst areas only travel a few feet per year. Therefore, pollution in a karst area can contaminate hundreds of gallons of groundwater in a very short time.

When does Boone County's Stormwater Ordinance apply to me?

If you are disturbing 3,000 square feet or more of land within:

- 1,000 feet of a losing stream, Outstanding National or State Resource Waters, or wetlands;
- 100 feet of permanently flowing streams; or
- When creating runoff that flows to a sinkhole or other direct conduit to groundwater such as a cave.

Ways You can Protect Our Groundwater

- **Check with Boone County before starting any grading activities or using motorized vehicles in or near a sinkhole.**

- **Never dump anything into a sinkhole or stream.** In addition to being illegal, dumping trash, brush, leaves,

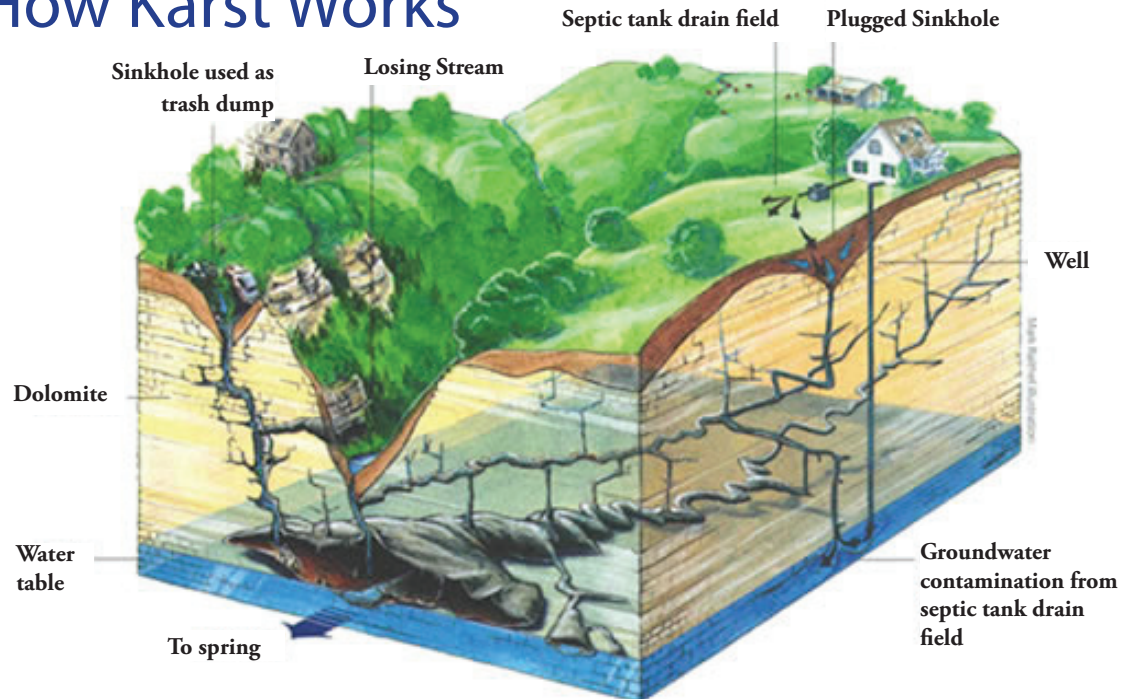


Sinkhole dump

- grass clippings, hazardous waste, or similar materials can contaminate well water, springs and cave streams used by people, livestock and wildlife.
- **Maintain a vegetative buffer (e.g. a grass filter strip) around a sinkhole to filter runoff.** Fencing livestock out of sinkholes improves water quality and protects them from potential harm.
- **Do not locate septic systems, feedlots, animal waste lagoons, or stormwater basins near known or suspected sinkholes or caves.**
- **When using chemicals near karst areas, select the ones that bind to soil, have low toxicity, and degrade quickly.** Always follow the directions on the label.

Courtesy of the Bonne Femme Watershed Project.

How Karst Works



This Bonne Femme Creek swallow hole, approx. 300 feet from the Hwy 163 bridge, is not seen in a normal stream bed. Dye tracing indicates that up to one mile of this creek is a losing stream.