Kansas Springs

by Roy Beckemeyer

"Spring: A place where ground water flows naturally from the earth into a body of surface water or onto the land surface, at a rate sufficient to form a current. "—Buchanan et al., 1998

Almost twenty years ago, the Kansas Geological Survey (KGS) undertook a series of studies of springs in Kansas. (Buchanan *et al.*, 1998, 2000; Sawin *et al.*, 1999). Buchanan *et al.* (200) noted that "...in spite of the importance of springs in Kansas history, the scientific and historical literature devoted to the topic is scant." The studies have continued, and much of the material is available online (Mcfarlane, 2003; Mcfarlane *et al.*, 2005; Sawin and Buchanan, 2001). This article is intended to serve as a convenient resource for accessing some of the information now available on Kansas springs.

Springs in Kansas History

Springs are an important natural resource, especially in arid regions like Kansas, and springs have played a significant role in the history of our

state, both for Native Americans and for European settlers. Buchanan *et al.* (2000) placed springs of importance to the history of Kansas into four categories: "those clearly visited by and used by Native Americans; those that were

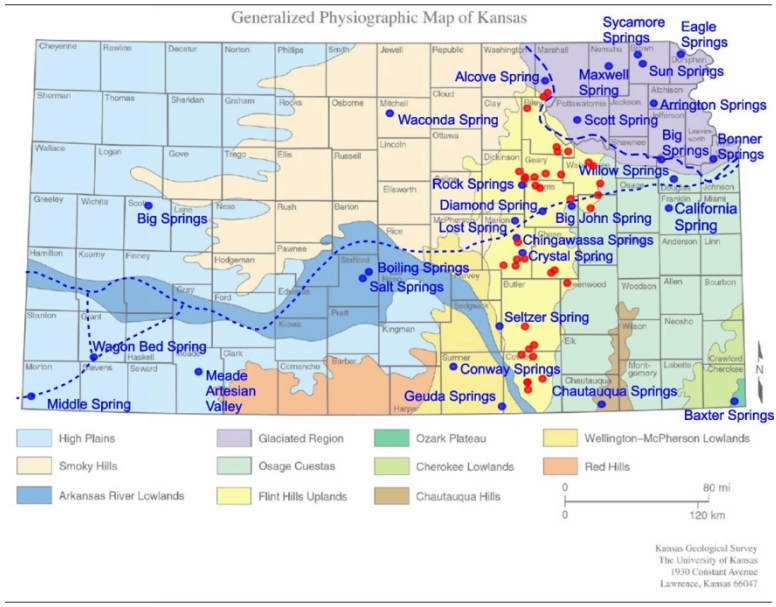

Figure 1. Approximate locations of some Kansas springs and historical trails overlaid on the Kansas Geological Survey Generalized Physiographic Map of Kansas. Overlay by Roy Beckemeyer with named springs (blue circles) traced from information in Buchanan, Sawin and Lesback (1998, 2000). Other Flint Hills springs (red circles) traced from Sawin et al., 1999.

important stopping points along...the historic trails across the state; those that were important or well-known mineral water resorts or spas; and those that were used for water supply..."

Waconda Spring (also known as Great Spirit Spring) was known to and regularly visited by Native Americans. Patrick (1879) reported:

> The Pottawatomies, who have often been through here on their hunts since this country was settled, could never be prevailed upon to pass the spring without stopping to...dip their arrows into its waters. They believed this would give them great success in their hunts and wars with other tribes.

This spring, in Mitchell County, was also the site of a mineral water spa and hotel from 1884 until the 1960's, when it was submerged under the waters of Waconda Lake (Glen Elder Reservoir).

Alcove Spring, north of Blue Rapids in Marshall County, was a well-known stopping place on the Oregon Trail. Buchanan *et al*. (2000) quoted George L. Curry, a member of the infamous Donner Party, who stopped at Alcove Spring in 1846:

> Camp up the spring branch on the right hand fork is a most beautiful spring and a fall of water of 12 feet Mr. Bryant of our party has named it the 'Alcove Spring' the water is of the most excellent kind the spring is surrounded with Ash Cotton wood & Cedar trees it is an excellent place to camp...

Crystal Spring is the source of water for the community of Florence, Kansas, in Marion County. It is unique because of its high discharge rate and its use as the city water supply. Water is pumped periodically from the spring to replenish water in the city's storage tower (Macfarlane *et al.*, 2005).

A fascinating look into springs and their importance to Kansas in the state's early days is provided in E. H. S. Bailey's "Special Report on Mineral Waters," published in 1902.

Flint Hills Springs

The first of the Kansas Geological Survey's reports on springs was a paper titled "Flint Hills Springs" (Sawin *et al.*, 1999). Their report begins:

> Springs are an important component of the Kansas landscape and an aid in understanding the connection between groundwater and surface water and the impact of human activity on the environment. Despite their importance, little information has been collected systematically on springs in Kansas.

The KGS thus embarked on their long term study to look at the springs of Kansas by physiographic region. In the Flint Hills study, they used the following criteria to choose springs for their investigation:

(1) Named, well-known, and historic springs.

(2) Springs with published water quality data.

(3) Springs with flow rates of at least five gallons per minute.

(4) Unique or unusual springs.

(5) Areas or counties with a low density of springs.

A section titled "Geology and Characteristics" of springs was used to delineate the various types of springs and their origins. Some of the nomenclature they used was derived from the foundational work by O. E. Meinzer

(1923). Some of the types of springs are included in the **Glossary** section at the end of this article.

Sawin *et al*. (1999) ended up visiting 47 spring locations in the Flint Hills. They noted "This total represents only a portion, but hopefully a geographic and stratigraphic representation, of the numerous springs in the Flint Hills." Approximate locations of the wells are indicated in Figure 1 at the beginning of this article. Springs they looked at for which there were historical water quality data included Blasing's Artesian Mineral Wells in Riley County southeast of Manhattan; Chingawassa Springs, Flowing Artesian Well, and McCarthy Springs, all in Marion County northeast of Marion; Lee Spring and Old Coin Spring, both southwest of Florence in Marion County; Spring Hill Farm southeast of Winfield in Cowley County; the City of Burden's water supply spring in Cowley County; and Jack Spring and Perkins Spring, both southwest of Matfield Green.

The authors concluded, on the basis of their study of Flint Hills springs, that water quality was "almost universally high, using drinking water standards as a gauge, with only a few exceptions." Forty of the 47 springs were

"below the 250 ppm [parts per million] limit for sulfates in drinking water." The tests did not include any checks for living organisms, heavy metals, or herbicides. And most of the locations were sampled only once, so variations in flow through the year were not checked. "Taking those qualifications into consideration, however," they said, "it is clear that Flint Hills springs are of generally high quality. Comparing historical water-quality numbers with the results of our study shows that they have maintained that quality."

The authors also noted that "Flint Hills springs, for the most part, have maintained their flow rate. With the exception of springs that have been disrupted by construction, most flow rates are relatively stable." In some situations they found that springs shown on topographic maps seemed to have disappeared, and they said "Areas where springs had dried up usually were surrounded by cultivated ground."

In the end, as a result of the lack of cultivation and the absence of irrigation, "Flint Hills springs generally have fared better...than springs in other parts of Kansas," (Sawin *et al.*, 1999).

Annotated Works Cited and Resources

Bailey, E. H. S. *Special Report on Mineral Waters*. University Geological Survey of Kansas, Vol. 7, 1902, 343 pp. [The first comprehensive study of springs in Kansas. Bailey paid particular attention to mineralized springs and artesian waters that were of economic import. The report includes photos, historical information, and detailed chemical analyses.]

Bouwer, H. *Groundwater Hydrology*. McGraw-Hill, New York, 1978, 480 pp. [A technical work.]

Buchanan, R., R. Sawin, and W. Lebsack. *Kansas Springs, Kansas Geological Survey Public Information Circular (PIC) 1*. Kansas Geological Survey, Lawrence, KS., 1998, 5 pp. [A primer on springs and their geology. A great place to begin your education in springs in Kansas. Includes a physiographic region-by-region summary of important springs.]

Buchanan, R., R. Sawin, and W. Lebsack. "Water of the Most Excellent Kind—Historic Springs in Kansas." *Kansas History*, vol. 23, 2000, pp. 128-141. [Excellent historical review.]

Macfarlane, P. A. *The hydrogeology of Crystal Spring with and delineation of its source water assessment area. Kansas Geological Survey, Open-file Report 2003-35.* Kansas Geological Survey, Lawrence, Kansas, 2003, 167 pp. [Technical details of the results of a two-year study of Crystal Spring, the source of water for the town of Florence, Kansas.]

Macfarlane, P. A., M. A. Townsend, and G. Ohlmacher. *Midcontinent Meeting for the National Karst Map Project—Field Trip Notes, Kansas Geological Survey Open File Report 2005-50*. Kansas Geological Survey, Lawrence, Kansas, 2005, vii + 71 pp. [Guidebook for a KGS field trip to the Flint Hills with a stop at Florence, Kansas and Crystal Springs. Includes milemarkers and detailed notes on geological features.]

Meinzer, O. E. *Outline of Ground-Water Hydrology: with definitions. U.S. Geological Survey Water—Supply Paper No. 494.* United States Government Printing Office, Washington, D.C, 1923, pp. 1-71. [The source for definitions of geohydrological terms. Essential for building a lexicon of the geohydrology and place.]

Patrick, G. E. "The Great Spirit Spring," *Transactions of the Kansas Academy of Science*, vol. 7, 1879, pp. 22-26. [An early description and history of a spring that was subsequently submerged beneath a water impoundment. The author was a Chemistry Professor at the University of Kansas.]

Sawin, R. S., and R. C. Buchanan. *Water Quality of Selected Springs—Tallgrass Prairie Preserve, Chase County, Kansas. Kansas Geological Survey Open-file Report 2000-0,* Kansas Geological Survey, Lawrence, Kansas, 2000. [Technical details of water quality tests of springs on the Tall Grass Prairie Preserve. Spring water quality was found to be high, and it was determined that seasons, burning, and grazing practices did not apparently affect water quality.]

Sawin, R. S., and R. C. Buchanan. *Springs Inventory—Tallgrass Prairie National Preserve Chase County, Kansas. Kansas Geological Survey, Open-file Report 2001-40*, 2001. [A comprehensive inventory of springs on the National Preserve. A plot map of the spring sites on the Preserve is available online here.

Sawin, R. S., R. C. Buchanan, and W. Lesback. "Flint Hills Springs." *Transactions of the Kansas Academy of Science*, vol. 102, nos. 1-2, 1999, pp. 1-31. [The first of the Kansas physiographic regions for which a spring study was completed.]

Glossary

(Quoted directly from Buchanan *et a*l., 1998)

Aquifer: A geologic formation capable of holding and yielding significant amounts of ground water [sic].

Artesian aquifer: An aquifer in which ground water is confined under pressure significantly greater than atmospheric pressure. This pressure, called artesian pressure, is generally due to the weight of water at higher levels in the same zone and is sufficient to cause water to rise above the level of the aquifer in a well or natural fissure. An artesian aquifer is bounded above and below by confining beds of less permeable rock. Syn: confined aquifer.

Contact: A plane or surface between two different types, or ages, of rock.

Contact spring: A type of gravity spring whose water flows to the land surface from permeable rocks that are

underlain by less permeable rocks, preventing the downward movement of water.

Ground water: Underground water that is generally found in the pore space of rocks or sediments.

Permeable: Permeability is a measure of the ease with which a fluid will move through a porous material (e.g., sand and gravel or rock). A geologic unit is permeable if ground water moves easily through it.

Seep: A discharge of water that 'oozes out of the soil or rock over a certain area without distinct trickles or rivulets' (Bouwer, 1978).

Spring: A place where ground water flows naturally from the earth into a body of surface water or onto the land surface, at a rate sufficient to form a current.

Surface water: Water found at the earth's surface, usually in streams or lakes.

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