

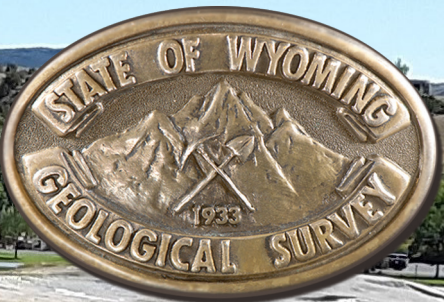
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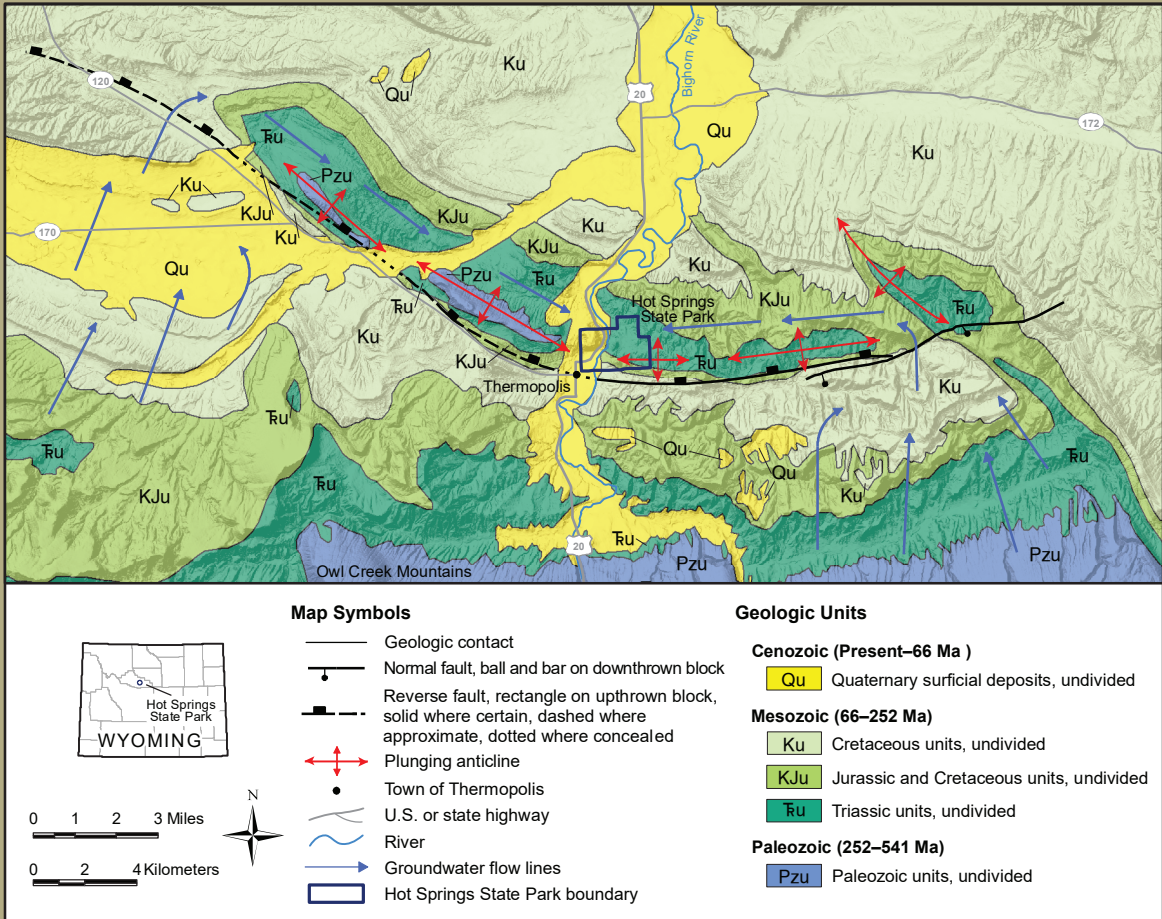
Geology of Hot Springs State Park



INTRODUCTION

Hot Springs State Park, located just outside the town of Thermopolis, is host to world-famous mineral hot springs. Water from the towering Owl Creek Mountains south of the park travels deep within the ground, where it is heated by geothermal energy before returning to Earth's surface. This geologic voyage creates the natural warm springs and beautiful travertine deposits that form the extraordinary terraces along the Bighorn River and other features visible in and around the park.

Four miles south of Thermopolis, U.S. Highway 20 enters the northern end of Wind River Canyon, which cuts through the Owl Creek Mountains. Here, billions of years of Earth's geologic history, including the geologic formations mentioned in this pamphlet, can be safely observed from regular highway turnouts.



Bedrock and surficial geologic map of the region surrounding Hot Springs State Park. Groundwater (blue arrows) flows from the Owl Creek Mountains northward to the park.

GEOLOGIC HISTORY

The geologic event that led to the eventual formation of the park’s physical features occurred between 70 million and 35 million years ago. This significant mountain-building episode, known as the Laramide orogeny, exerted compressional forces forming large faults and arch-shaped folds called anticlines. Steeply tilted, younger, sedimentary rocks are exposed on the flanks of these anticlines; older Precambrian rocks commonly make up the center of the anticlines. The nearby Owl Creek Mountains are an example of such anticlines. The smaller Thermopolis Anticline runs through the park and town, exposing Triassic “red bed” rock layers throughout the park, particularly on the east side.



Triassic "red beds" like those seen throughout the park.

HYDROGEOLOGY

Water, originally rainfall and snowmelt, infiltrates porous and fractured sedimentary rocks on the northern side of the mountains. Driven by gravity, the groundwater flows down-gradient through these important regional aquifers northward into the Bighorn Basin. The groundwater flows around the Thermopolis Anticline where it reaches a maximum depth of almost 7,000 feet. There, it is warmed geothermally (by the earth’s heat) to temperatures that exceed 160°F, dissolving minerals in the host rock as it flows. On the north side of the anticline, the mineral-rich groundwater flows upward under artesian (natural) pressure through vertical fractures in overlying rocks, discharging at Hot Springs State Park and other springs in the area. As it travels to the surface, the heated water mixes with groundwater in the overlying formations, cooling to about 130°F.

The spring water cools as it flows over the ground surface, and minerals dissolved in the hot water precipitate out to form a type of limestone called travertine. Over time, the travertine builds up, forming the massive terraces that tower more than 30 feet above the Bighorn River. The various colors observed in the travertine terraces result from mineral interactions with different species of algae that thrive in the warm spring flow.

The location and rate of discharge of the hot springs have varied greatly over time. Old travertine deposits scattered along the crest of the Thermopolis Anticline show that the hot springs have moved over millions of years. These old deposits are the white rocks seen at the top of Monument Hill to the east and on T Hill to the west.

Big Spring and White Sulphur Spring are the only two active springs in the park currently. In the last 40 years, Bathtub, Black Sulphur, Railroad, Terrace, and Piling springs have stopped flowing. Tepee Fountain, a man-made feature in the park, is fed by thermal water redirected from Big Spring. The fountain, originally built in 1906, is cored by a stone pyramid surrounding a steel pipe. As water flowed over the stone, travertine coated the feature and turned it into what is seen today.



Photo at right: Tepee Fountain, a fabricated travertine feature, was formed by piping heated groundwater to the surface.

Below: Aerial view of Hot Springs State Park with named hot springs shown.

