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wyoparks.wyo.gov/index.php/places-to-go/curt-gowdy

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Geology of Curt Gowdy State Park

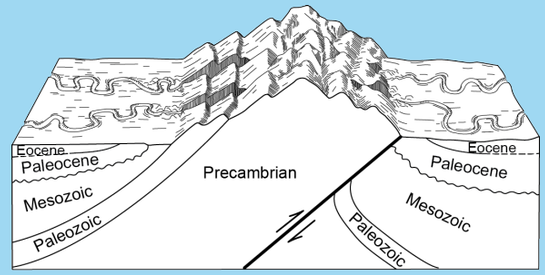
INTRODUCTION

Welcome to Curt Gowdy State Park. Situated in Laramie and Albany counties, Wyoming, Curt Gowdy State Park covers an area of 3,400 acres (5.3 mi^2) in the southern Laramie Mountains at an elevation of approximately 7,600 ft above sea level. The highest elevation in the southern Laramie Mountains (9,055 ft) is located in the Sherman Mountains to the west of the park. Curt Gowdy State Park, founded in 1971, was originally named Granite State Park and included the Crystal and Granite Springs reservoirs. It was expanded in 2005 to include the Upper North Crow Reservoir, the area of Hidden Falls, and the canyon below the dam at Crystal Reservoir.

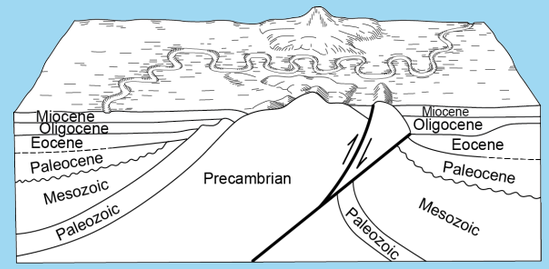
GEOLOGIC EVOLUTION OF THE LARAMIE MOUNTAINS

The Laramie Mountains, which lie between Cheyenne and Laramie, expose sedimentary rocks along their flanks and are cored by crystalline Precambrian basement rocks that range in age from 1.43 to 1.78 billion years old. The mountains formed during the Laramide orogeny, a mountain-building event that began about 70 million years ago. The mountains in southeastern Wyoming were uplifted along thrust faults that allowed deep, older crystalline rocks to ride up and over younger sedimentary rocks. The result of this thrust faulting can be seen approximately 3.5 miles east of the park entrance on Wyoming State Highway 210 where steeply dipping beds of sedimentary rocks tilt eastward toward Cheyenne.

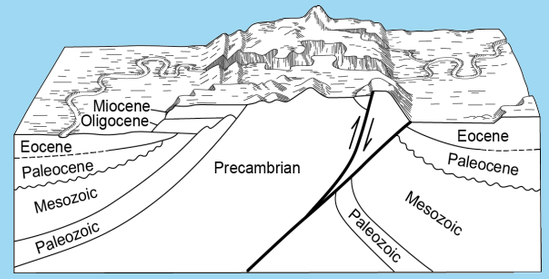
Active uplift and mountain building related to the Laramide orogeny ceased in Wyoming around 35 million years ago and was followed by regional erosion of the mountains. Rivers and streams removed material from the mountains, depositing it in nearby sedimentary basins. Over time, these basins filled with enough sediment to bury most of the Laramie Mountains, leaving isolated peaks and hills dotting a broad, flat plain. Gradually, river systems eroded much of the sediment that covered the mountains, once again exposing the crystalline and tilted sedimentary rocks.



Late Cretaceous to Eocene (70–35 million years ago) uplift of the Laramie Mountains.



Late Eocene to mid-Miocene (35–11.6 million years ago) erosion and burial of the Laramie Mountains.



Late Miocene to Holocene (11.6 million years ago to present) exhumation of the Laramie Mountains.

SHERMAN BATHOLITH

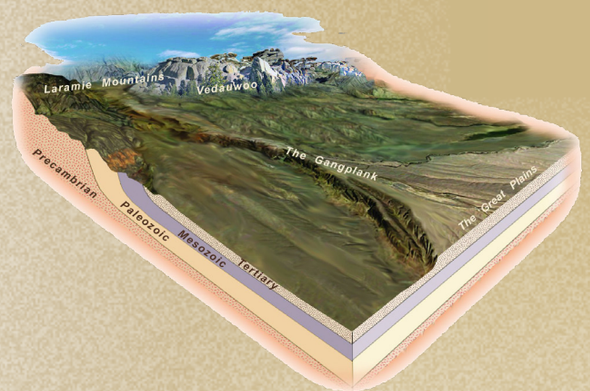
The rock exposures in and around Curt Gowdy State Park are primarily associated with the Sherman batholith. The Sherman batholith is a large mass of igneous rock that crystallized from magma deep within the earth approximately 1.43 billion years ago. These rocks, now exposed due to uplift and erosion, can also be seen at Vedauwoo, a nearby U.S. Forest Service recreation area.

The **Sherman batholith** is composed of three different granites: Sherman, porphyritic (pȯr-fə-ˈri-tik), and Lincoln. These granites formed from the same intrusive magmatic event, but each has unique identifying characteristics.

Sherman Granite: the most common rock type in the Sherman batholith. It is a coarse-grained (crystals 5–50 mm), reddish-orange, biotite hornblende granite. This granite is composed mostly of pink potassium feldspar, white plagioclase feldspar, and gray quartz crystals. The biotite crystals are dark colored, shiny, and flake off in thin layers. Hornblende is also dark, but does not flake. Sherman granite exhibits a rare texture called "rapakivi," named for similar rocks found in Finland. This texture consists of pink potassium feldspar crystals encircled by white plagioclase feldspar. The rapakivi texture of the feldspar crystals suggests that chemistry and temperature conditions evolved as the magma cooled deep within the earth's crust.

Porphyritic Granite: an orange-gray, biotite hornblende granite. The term "porphyritic" describes a texture that consists of large size variations among the different minerals that make up the rock. The pink potassium feldspar grains are much larger than the other mineral grains in this granite (see photo), suggesting that they crystallized at slower rates within the magma than the smaller grains.

Lincoln Granite: a medium-grained, red-orange to orange-gray biotite granite. It is chiefly composed of quartz, potassium feldspar, plagioclase feldspar, and biotite. The crystals in this granite are 1–5 mm and generally uniform in size, distinguishing it from porphyritic granite and Sherman granite.



Block diagram showing the "Gangplank," which ties the Great Plains to the Laramie Mountains.

THE "GANGPLANK"

Located just southeast of the park, along U.S. Interstate 80, there is a narrow strip of relatively flat-lying rocks on the eastern flank of the Laramie Mountains. This geologic feature is the "Gangplank," a natural land bridge that slopes from the valley floor to the Precambrian core of the Laramie Mountains. Composed of valley-filling sediment, the "Gangplank" is the site where the Transcontinental Railroad first crossed into the mountains from the plains.

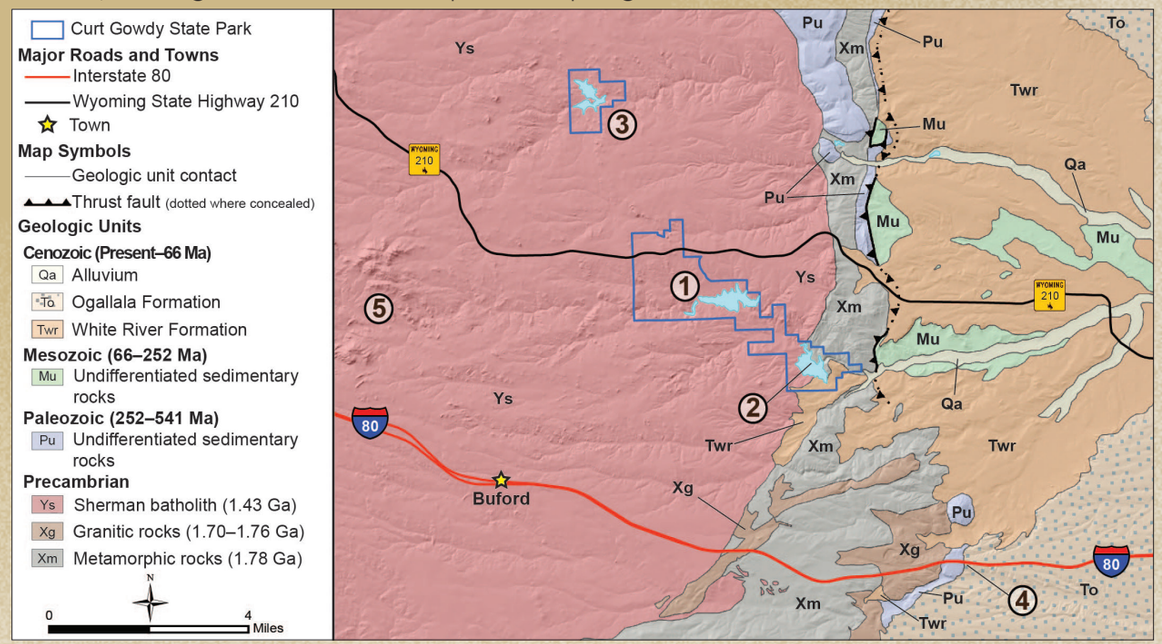
HYDROGEOLOGY

The park contains three large reservoirs: Granite Springs, Crystal, and Upper North Crow. Together these reservoirs store up to 10,600 acre-feet of water (1 acre-foot = 326,000 gallons) and serve as a major source for Cheyenne's municipal water supply. Crow Creek, its tributaries, and numerous small springs supply water to all three reservoirs. In addition, Crystal and Granite Springs reservoirs receive snowpack runoff from high-altitude reservoirs in the Medicine Bow Mountains to the west. Gravity is used to move the water more than 50 miles through a system of pipelines.

Upper end of Granite Springs Reservoir where Middle Crow Creek flows into the reservoir in a canyon cut into Sherman granite.

The rock fractures seen in the granite throughout the park form a shallow groundwater system. During the spring, these fractures rapidly convey water from snowmelt to the many small springs present in the park and throughout the southern Laramie Mountains. Groundwater moves so quickly through this fractured rock aquifer that flow rates from the springs are highest a few weeks after snowmelt and then decrease rapidly. By early autumn, flows from many of the springs are reduced to a trickle, and smaller springs may dry up completely.

A unique hydrologic feature of the park is Hidden Falls. This small natural waterfall on Middle Crow Creek is accessible via a 2-mile hike on the Crow Creek Trail. The waterfall was created by uneven weathering of granite along the streambed. When erosion removes rock from some places more quickly than others, knickpoints, or sharp changes in stream channel slopes can be created, forming waterfalls and small pools and plunges.



Bedrock geologic map of a portion of the southern Laramie Mountains. Ages of rocks are in millions of years ago (Ma) or billions of years ago (Ga). 1) Granite Springs Reservoir, 2) Crystal Reservoir, 3) Upper North Crow Reservoir, 4) the "Gangplank," and 5) Sherman Mountains.