

Looking Back Through the Cobbles of Time: A Geologic Overview of Caribou Ranch

Setting the Scene

To paraphrase Genesis, "In the beginning, Colorado was largely without form and void of living things". During that beginning, about 1.7 billion years ago, it is believed this part of Colorado resembled the oceanic region off present-day SE Asia. Volcanic island arcs (similar to Indonesia, Japan, and the Philippines) were inexorably drifting northward carried on an oceanic plate that was being subducted under the southern edge of proto North America close to the current border between Wyoming and Colorado. What we now know as Colorado did not exist and consisted largely of open ocean.

As portions of these small exotic terranes ground into and became welded onto North America, extending its edge southward, the bulk of the material (beach sands, lagoonal muds, volcanic ash and lavas, and such) were pulled miles beneath the edge of the continent where unfathomable heat, pressure, and compressive forces caused the sands, muds, and volcanic materials to metamorphose into quartzites, schists, and contorted gneisses. Eventually tectonic forces and erosion brought these rocks to the surface. It is upon these ancient and tortured rocks that you now stand.

Over the ensuing eons these rocks would be raised up into mountain ranges numerous times, only to be eroded and buried under thick sedimentary layers of their own debris. Seas would advance and retreat over the face of the land, piling up huge deposits of oceanic sediments only to have them raised up by new mountains and eroded again. A billion years would pass before significant evidence of life would appear. Not until about 500 million years ago did primitive plants and eventually animal life begin to venture out upon a nascent Colorado.

The Rocky Mountains we know today did not begin to appear until about 70 million years ago as renewed tectonic forces slowly lifted them skyward carrying a mantle of debris from their predecessor Ancestral Rocky Mountains and nearly two miles of oceanic sediments from the Cretaceous seaway that had drowned Colorado for nearly 30 million years. Through erosion and removal of the overburden, these ancient rocks once again emerged into the light of day. Toughened by their ordeal these rocks, and slightly younger granites that intrude them, resist the ravages of erosion and today make up the craggy highlands we enjoy today.

The valuable gold, silver, tungsten, and other mineral ores of which this area is renowned were also emplaced during this most recent mountain-forming period, making them the youngest rocks to be found in the area... more than 1.6 billion years younger than their host rocks!

The lovely crags and canyons we enjoy today are but afterthoughts, geologically. Much of the current landscape was carved out during the Pleistocene Epoch starting about 1.8 million years ago and ending about 10,000 years ago. Repeated glacial advances and retreats during that time radically transformed a gently rolling upland into a wonderland of majestic spires and dramatic precipitous canyons.

Here at Caribou Ranch we are standing near the terminus level of the mighty glaciers that were eating away and reshaping the higher peaks. Huge volumes of glacially worked rock debris started its journey here as it was flushed eastward to carpet the Great Plains and eventually help form part of the Mississippi Delta.

The Catastrophic Flood of Glacial Lake Devlin

In our area, the Pinedale Glaciation marks the last major glacial advance of the Pleistocene. It lasted between 33,000 and 12,000 year ago. The North Boulder Creek Glacier ground to a halt about 21,000 years ago, leaving its terminal moraine on the north side of Boulder Creek just east of the Blue Bird Mine complex. When the glacier was in its prime, it filled the valley upstream with massive ice and churned up sizable lateral moraines along its flanks. For more than 10,000 years this wall of ice and morainal debris dammed the mouth of Caribou Creek which branches off to the southwest a bit northwest of Caribou Ranch

Open Space. Meltwater from upstream glaciers along Caribou Creek collected behind the ice dam at Boulder Creek to form a large and deep lake known as Glacial Lake Devlin.

The glacier began to recede about 18,000 years ago and by about 14,000 years ago had retreated up valley beyond the entrance to Glacial Lake Devlin. The morainal deposits proved unable to hold back the water and the moraine failed catastrophically, draining Lake Devlin into North Boulder Creek at an estimated rate of 100,000 cubic feet per second (cfs)! By comparison, the flow of the Big Thompson flood of 1976 was about 30,000 cfs; the great Boulder flood of 1894 was just about 13,000 cfs, and the flood of 2013 was estimated at a mere 6,000 cfs!

As a result a new channel for Caribou Creek was carved through the moraine and huge boulders from the moraine were flushed downstream, depositing many of them more than a mile away where Boulder Creek levels out slightly next to the Blue Bird Mine site. So as you stroll among the boulders along the now tranquil Blue Bird Loop trail, try to imagine how the scene unfolded when Lake Devlin burst through the moraine and unleashed its fury downstream where you now stand.

Some time after the turn of the 20th century, before Lake Devlin's history was known, the City of Boulder decided to construct an earthen dam at the mouth of Caribou Creek to impound water. Around 1920-1930 that dam also failed, causing the Caribou Creek Flood. The earthen dam was roughly a quarter of the height of the original morainal dam, so the flood was considerably smaller. It deposited new boulders downstream on top of the previous ones and the two can be distinguished from one another here at Caribou. The older boulders from the Glacial Lake Devlin flood are larger, more weathered, and festooned with lichens. The Caribou Creek Flood boulders appear smaller, fresher, and with little or no lichen.

A Little About the Blue Bird Mine

In 1871 silver-bearing ore was discovered on the site. The discovery was given the name "Blue Bird" due to the presence of azurite, a deep blue copper carbonate mineral associated with the silver ore. In the next few years seven adjoining ore deposits were discovered becoming the Blue Bird Mining Group. In 1877 the Santa La Saria Mining Company bought the Blue Bird Mining Group for \$300,000. By 1882 the company employed 40 miners and produced 10 tons of ore a day, assaying at between \$200 and \$800 per ton. The following year global recession and falling silver prices caused most mines to close. Since that time the mine has had several owners and only sporadic production. The Blue Bird Mine closed for the last time in 1965.

Sources:

Ancient Glacial Ice and Crashing Water, Images magazine, Summer 2007

The Blue Bird Mine: A Chronology, compiled by Sue and Alan Cass, Summer 2011

Investigating late Pleistocene and Anthropocene flood deposits along North Boulder and Caribou Creek, Colorado Front Range, by Christopher R. Halcsik, Rollin D. Salisbury Department of Geology, Beloit College, Beloit, WI, 2013.

Prepared as a public handout to accompany an interpretive program at Caribou Ranch Open Space Preserve by Boulder County Parks and Open Space volunteer naturalist Roger Myers, July 2015.