Fossil Butte

National Monument
Wyoming

National Park Service
U.S. Department of the Interior

Creating a Fossil Record

An enormous western landscape surrounds Fossil Butte. Long slopes rise to broad-backed ridges where the earth's rock crust reflects against the sky. Cattle graze huge ranges of hardy, native grass. Exposed and almost treeless, the surface barely conceals a wealth of coal, phosphates for fertilizer, and oil-producing shale.

The contrast from a semi-arid land of such bold proportions to the delicate tracings of prehistoric fishes makes Fossil Butte even more exquisite. Perhaps some of the first to discover the hundreds of varieties of fossils here more than a century ago sensed the same thing as they began to collect and study the fish.

Although significant questions remain to be answered, succeeding generations of scientists have given us most of the geological story of ancient Fossil Lake, of which the park today is a small part. The ridges extending north and south are expressions of a long period of mountain building before which most of the western United States was submerged beneath the sea. Basins between the ridges where the earth buckled downward collected millions of years worth of eroded gravel and rock debris washed and weathered from higher ground.

When the land heaved again, mountain ridges were rejuvenated; the basins sank further, collected water, and became lakes. In the warm humid air, large palms, ferns, and cinnamon trees sheltered the ancestors of modern mammals. Horses no bigger than today's dogs, primitive monkeys, and the ponderously built ancestors of the rhinoceros and elephant lived in an environment of mountains and valley, all in a subtropical setting.

Such was the terrestrial life of the Eocene Epoch 50 million years ago. No less abundant was the life in the water and near the shore of Fossil Lake. Crocodiles and turtles basked in the sun. Snakes, lizards, clams, snails, and small free-swimming shellfish concentrated at water's edge. Within the lake swam large numbers of fish, many of them closely related to the perch, herring, and stingray of today. This healthy Eocene environment changed abruptly four times. The Fossil Lake itself dried up each time. Fish died in great numbers during the life of the lake and settled undisturbed into the lake bottom. Nor did millions of years disturb their frail shapes. Blankets of sediment gradually turning to hard rock kept intact their skeletons, their delicate fins and tail rays, and even their scales.

The Process of Fossilization

Normally, a living thing rapidly begins to decay soon after death. In ancient Fossil Lake, however, the great depth of the lake, the presence of calcium carbonate on the bottom, and the thermal stratification that occurs in lakes of warm temperate climates all contributed to preserving fish, plants, and other fossils.

Thermal stratification simply means that a cool layer rests below a warmer layer on the surface and little mixing occurs. The surface layers are much warmer, lighter, and less viscous than the deeper, cooler waters. Winds supply oxygen to the surface layers, but are unable to penetrate and circulate the deep waters. The decay of organic matter at the lake bottom uses up all the available oxygen and produces hydrogen sulfide and carbon dioxide, both toxic to most living organisms.

The lack of suitable living conditions prevents many small predatory creatures from disturbing any material on the lake bottom. In addition, the lack of oxygen may slow the decomposition process, allowing the dead organisms to be covered before any great degree of decay occurs.

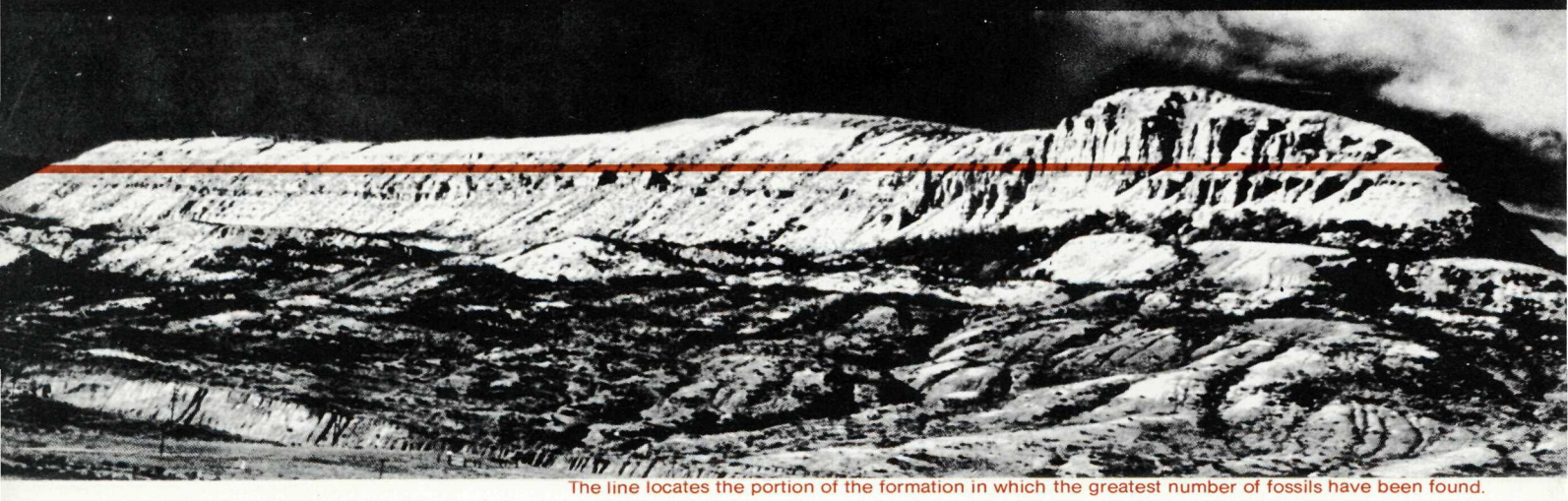
During the spring and early summer algal blooms in the surface waters consume carbon dioxide during the production of food. The removal of the carbon dioxide makes the water more alkaline. But in the fall the algae die and this organic matter slowly settles to the bottom, where it ferments and decays. As oxygen is consumed in the process, more carbon dioxide is given off and the water becomes somewhat acid. This action, in turn, causes some of the carbonate mud present on the bottom to redissolve. This dissolved mud is the protective coating into which the dead fish sink. It seals them into the bottom with the other sediments and the actual process of fossilization begins.

In time great pressure changes layers of sediments into laminated limestone containing a fossil record—a record that is viewed millions of years later by paleontologists who are trying to piece together the vast puzzle of life 50 million years ago.

Today's landscape gives no clue to its appearance millions of years ago. Here the imagination must run rampant to recreate that long ago scene.

"The chemicals that composed the fish—most of them at least—are still there in the stone. They are, in a sense, imperishable. They may come and go, pass in and out of living things, trickle away in the long erosion of time. They are inanimate, yet at one time they constituted a living creature."

—Loren Eiseley, *The Night Country*, courtesy Charles Scribner's Sons



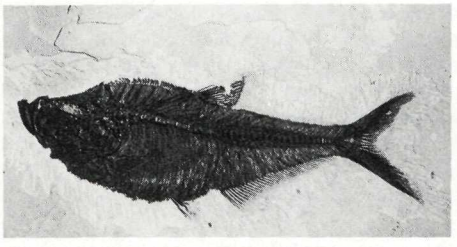
The line locates the portion of the formation in which the greatest number of fossils have been found.

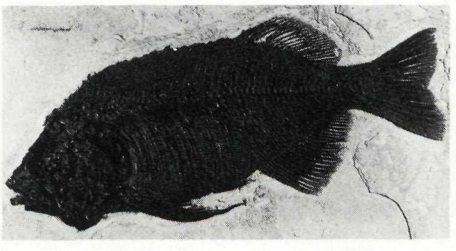
The Fossil Record

The wonder of a fossil—lifeless, yet animated with the precision of life; beautiful as it lies entombed in rock, yet evoking a strange and eerie message from the past.

These special attributes have an amazing power over our imaginations. And here at Fossil Butte is the most noteworthy record of freshwater fossil fish ever found in the United States. In fact, its only rival in scientific interest in the world is the fish quarry near Solenhofen, Germany.

The base of Fossil Butte consists of brightly colored red, purple, yellow, and gray beds of the Wasatch formation. Eroded portions of these horizontal beds slope gradually upward from the valley floor and then abruptly steepen. Overlying them and extending to the top of the butte are buff-to-white beds of the Green River formation in which the greatest concentrations of fish fossils are located.





"Beautifully preserved fish...with delicate fins, tail rays and scales, all virtually undisturbed... are entombed here in thinly layered sediments recording the abundant life and ecology of an ancient subtropical lake."

—Wilmot H. Bradley, U.S. Geological Survey

The majority of fossil finds for more than 100 years have come from a section of laminated limestone averaging 46 centimeters (18 inches) thick. But fossilized organisms can also be found throughout many of the other layers that compose the butte.

The fossil fish represent several varieties of perch as well as other freshwater genera and several kinds of herring whose descendants now live in saltwater. Other fish include paddlefish, stingray, and catfish. Well-preserved insect fossils, snails, clams, fragments of a few birds and bats, and many plant remains are also found in the rock layers.

The underlying Wasatch formation is most famous for fossilized animal remains that are found elsewhere. But only fragments of primitive horses, tortoise shells, ancestral monkeys, snakes, birds, and crocodiles have been found here at Fossil Butte.

Visiting the Park

Exploring on foot adds new dimensions to a visit to this semi-arid, western Wyoming landscape, for here is a place where prehistoric and present-day natural beauty can be viewed firsthand.

At the visitor station you can obtain hiking information and see exhibits which should help you understand the story of Fossil Butte.

A trail with interpretive wayside markers leads from the visitor station up to the site of the old fossil quarries on the butte. You may see some fossil fragments while you are hiking, but do not expect to see whole, fully exposed specimens like those on exhibit in the visitor station.

An offshoot from the main interpretive trail takes you to some terrestrial fossil exhibits in the Wasatch formation.

Guided walks are given on an informal schedule.

Rangers can provide specific directions and topographical maps to those who want to take extended hikes in the park. There are no designated trails except for the interpretive trail.

The Climate The annual precipitation in this semi-arid climate averages about 23 centimeters (9 inches). Most of it falls as snow. Summer days are warm, but nights are cool. Winters are clear and cold.

Plants and Animals Indian ricegrass, junegrass, and wildrye predominate in the grasslands here today. They are interspersed with shrubs such as sagebrush, rabbit brush, snowbush, greasewood, and serviceberry.

Scattered stands of Douglas-fir and limber pine grow on some of the highest north-facing slopes. In autumn, the aspen appear as splashes of gold along the ravines on the southwestern face of Cundick Ridge. At lower elevations, willow thickets mark the courses of intermittent streams.

Several different species of wildlife live on or pass through this rugged area. Mule deer, moose, and pronghorn antelope are common native inhabitants.

In the fall, elk descend from the higher elevations for the winter. A few coyotes and bobcats find an ample food supply in a big rabbit population. Birdlife is abundant, and many species nest here, including the golden eagle.

Accommodations No lodging or camping facilities are available at the park. The nearby towns of Kemmerer and Cokeville have restaurants and overnight accommodations.

Picnics A picnic area is located in a small aspen grove about 6 kilometers (3.75 miles) beyond the visitor station.

Protect Fossil Butte All objects in the park—rocks, wildflowers, trees, and animals—are protected by law and must be left undisturbed so that others, too, many enjoy them. Fossils, specifically, must not be disturbed or collected.

Administration Fossil Butte National Monument consists of 3,313 hectares (8,180 acres) about 18 kilometers (11 miles) west of Kemmerer. The butte is located just north of U.S. 30N and the Union Pacific Railroad, both of which traverse the valley. It was established as a national monument on October 23, 1972, to be administered by the National Park Service, U.S. Department of the Interior. The superintendent's address is P. O. Box 527, Kemmerer, WY 83101.

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