

# John Day

## fossil beds

National Monument

The National Park Service is introducing metric measurements in its publications to help Americans become acquainted with the metric system and to improve interpretation for visitors from other nations.

### ADMINISTRATION

John Day Fossil Beds National Monument is administered by the National Park Service, U.S. Department of the Interior. A superintendent whose address is John Day, OR 97845, is in immediate charge.

### Administration

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

National Park Service  
U.S. DEPARTMENT of the INTERIOR

☆ GPO 697-244

"Perhaps nowhere in North America... does a representative portion of the past history of mammalian life unfold so clearly and impressively as in the John Day region of north-central Oregon."  
—the late Chester Stock, paleontologist

### ARCHIVES OF ANCIENT LIFE

Here among the valleys and bluffs of the John Day Country lies buried a spectacular fossil record, a priceless archive of ancient life. Here scientists have unearthed a record of land plants and animals extending back 40 million years to days when strange beasts roamed in lush, subtropical forests. Today's deer, coyotes, sagebrush, and grass are a striking contrast to those ancient times.

John Day Fossil Beds National Monument preserves this fossil record for its scientific, educational, and inspirational values. Your visit here can awaken a sense of time's awesome duration, of prehistoric animals and plants, and of Oregon's geologic development. It can also introduce you to the scenic beauty of the John Day Country, to the region's wildlife and vegetation, and to the lingering flavor of the Old West.

The park consists of three separate units, located in the basin of the John Day River within Oregon's Blue Mountains Province. Although rocks of the nearby highlands date from more than 250 million years ago, the fossil record discovered along the John Day River and its tributaries begins with sea life of the Cretaceous Period, roughly 70 million years ago. Each geologic age thereafter has been marked by distinctive earth deposits that contain an outstanding fossil record. In general, the geologic formations become younger toward the south and east: oldest in the Clarno Unit, intermediate in the Painted Hills Unit, and youngest at the south end of the Sheep Rock Unit.

### GOOSE ROCK CONGLOMERATE

Beside Oregon State Highway 19 between Sheep Rock and Turtle Cove, the John Day River slices through a huge rock wall of conglomerate named Goose Rock (because of the Canada geese that nest along the river). It is composed of rounded stones that were deposited under the waters of a shallow sea that covered this area during the Cretaceous Period, roughly 70 million years ago. Evidence shows that this ancient sea was only temporary; the land was eventually lifted up, and the sea retreated far to the west. Today, scientists unearth fossils of snails and other marine creatures in certain of the Cretaceous age rocks of the John Day Country.

### CLARNO FORMATION

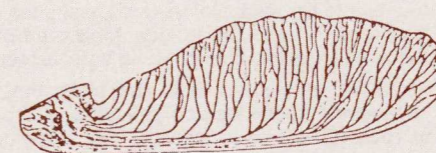
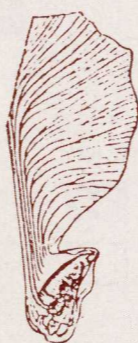
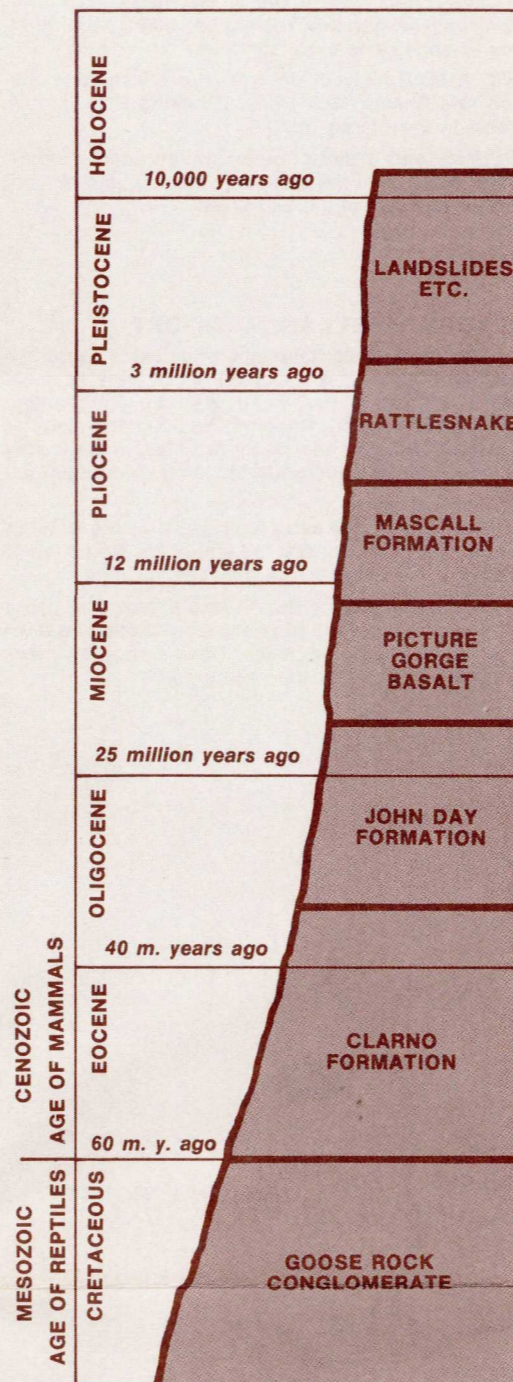
During the next two geologic ages, called the Eocene Epoch and Oligocene Epoch—on the order of 40 million years ago—volcanoes of several types erupted great volumes of fluid lava, rubby volcanic breccia, and powdery volcanic ash. Some of this material was redeposited by streams and mudflows, occasionally burying prehistoric animals and plants. Sometimes organisms were entombed so quickly that their bones, teeth, stems, and leaves were sealed up before decay could set in. Later, mineral matter slowly impregnated their bones, teeth, and stems, thereby faithfully preserving a record of ancient life. Leaves were recorded as detailed imprints in hardened mud.

Typically, the fossils were widely scattered, not gathered together in a "boneyard." Thus to the paleontologist, a "fossil bed" means simply an earth deposit containing some fossils. Excavating these records of the past takes time and hard work. (During your visit you are likely to see only tiny fragments of fossils on the ground.)

When scientists began digging in the Clarno deposits, they unearthed fossilized plants and animals that were totally unlike the inhabitants of today's semi-arid climate. Instead, they were more like the creatures now living in the moist, subtropical climate of India and Ceylon! Fish, crocodiles, and large swamp-dwelling rhinoceroses had lived here, accompanied by tapirs, primitive horses, small, agile land rhinoceroses, and two mammals that have no surviving relatives: the oreodonts and titanotheres. Petrified wood, leaf imprints, and fossilized seeds told of an exotic forest of palm, fig, cinnamon, catalpa, avocado, cycad, tree fern, and many other subtropical plants. Today, striking examples of the Clarno Formation rise up as palisades and pin-nacles in the park's Clarno Unit.

### JOHN DAY FORMATION

Millions of years went by and the climate slowly changed, while new plants and animals replaced the Clarno species. Never again did the John Day Country have a subtropical climate. By roughly 25 million years ago—late in the Oligocene Epoch—a moist, but less warm, temperate climate prevailed in the John Day Country.



Among the most abundant fossils are those of the oreodonts. These were pig-like or sheep-like mammals that have no modern relatives. Most of them probably grazed the land in herds, although during their long history some kinds may have been semi-aquatic and others may have climbed trees. Oreodont fossils have been found only in North America.

Fossil leaves from the John Day Formation resemble those of warm temperate forests today: birch, oak, beech, chestnut, sweetgum, and of special note, an ancient redwood whose living relatives include the giant sequoia, the coast redwood, and the dawn redwood of China. What a strange world it was 25 million years ago! The John Day Formation presents the most colorful and beautifully eroded of the fossil beds. Excellent exposures can be visited in the Sheep Rock and Painted Hills Units.

### MASCALL FORMATION

Still the volcanoes were not quieted. Roughly 15 million years ago eruptions built high peaks in the Strawberry Mountain area southeast of John Day. Rains washed white volcanic ash from the mountain slopes and carried it out upon the surface of the Picture Gorge Basalt where plants and animals were once again living. The resulting deposits, named for the Mascall Ranch near Dayville, today hold fossils of many Miocene and Pliocene life forms.

Plant fossils in the Mascall Formation tell of a cooler and drier temperate climate where seasonal frost would have encouraged deciduous trees—those that shed their leaves in autumn. Species so far discovered include hickories, sycamores, maples, elms, oaks, poplars, ancient redwood, and the swamp cypress. Grasses must have become more prevalent, for the pony-sized horses of this age had teeth well adapted for grazing. Certain horses were evolving single-toed feet enabling them to grow taller and run with greater speed. There were also huge bear-like dogs and a deer with strangely curved horns.



Painted Hills Unit

### RATTLESNAKE FORMATION

Crowning the horizon north of Mascall Overlook are beds of gravel capped by a thick rimrock. This "table top" rimrock was produced by a "glowing avalanche" even larger than those in the John Day Formation. This is the Pliocene Rattlesnake Formation, about 6 million years old. While it was accumulating, a long fracture, or fault, through the John Day Valley to the east was allowing the nearby Aldrich and Strawberry Mountains to be lifted up.

In the Rattlesnake, scientists have uncovered fossils of advanced single-toed horses, some of the last rhinoceroses known from North America, camels, peccaries, bear-like dogs, true bears, cats, rabbits, and squirrels. The climate was more like that of today, supporting grass, elm, sycamore, and willow.

### PLEISTOCENE AND HOLOCENE EPOCHS

During the last 3 million years or so—the Pleistocene Epoch—landslides, such as that which resulted in Cathedral Rock, allowed whole mountainsides of basalt rock and fossil beds to slide downslope. The John Day River cut deep into Picture Gorge, and modern horses and mastodons (ancient forms of the elephant) left their bones in the earth. This was also the Ice Age, during which glaciers scoured and carved the highest Blue Mountain peaks. Then during the Holocene Epoch—the last 10-15,000 years—the region merged into the semiarid landscape of juniper, sagebrush, and grass where today's deer and coyotes live.

### EVOLUTION IN A CHANGING ENVIRONMENT

The long and spectacular fossil record of the John Day Country reveals the genealogy of whole animal groups. Some groups flourished and then became extinct: the titanotheres, for example, completed their story in the Oligocene Epoch, whereas the abundant oreodonts appear in the Clarno Formation and disappear in the Mascall Formation. By contrast, the horses flourished from the Eocene Epoch until the very recent geologic past, and the rodents, rabbits, and dogs are still living in this area today.

Why did certain groups disappear while others persisted? The answer probably lies in their ability—or lack of it—to adapt to changing climates. The trend for the last 50 million years has been toward cooler, drier climates in western North America. As the climate changed, some of the plants changed, evolving new adaptations for survival in the changing climates. Animals—which depend on plants for food and habitat—were forced to evolve in response to both the changing climate and changing plantlife. Certain groups were not able to change. For them extinction was inevitable.

### PICTURE GORGE BASALT

In Miocene times, roughly 18 million years ago, much of the Pacific Northwest was buried by floods of dark-colored lava, called basalt. Rather than exploding from tall volcanoes, this lava issued quietly from long cracks in the earth and flowed swiftly for great distances. Layer upon layer of basalt lava inundated the John Day Country, building up in places to a depth of 600 meters (2000 feet). (Much later, the layers were tilted steeply, as seen in awesome Picture Gorge in the Sheep Rock Unit.)

The molten lava destroyed all living things in its path, leaving a gap in the fossil record.



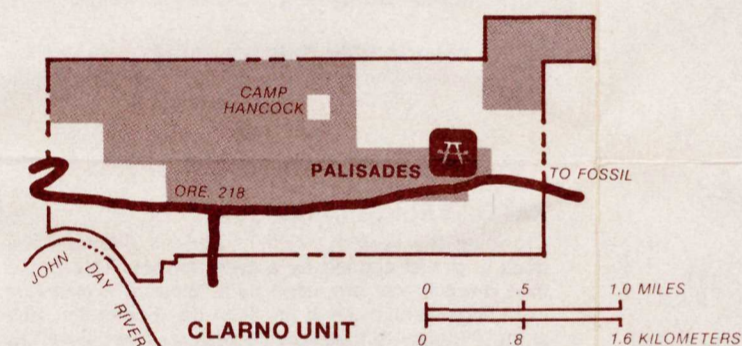
## HISTORY

Indians were the first human inhabitants here, but little of their story is known. Archeologists have uncovered and studied only a few of the Indians' campsites. Apparently their arrival here was many hundreds or even thousands of years before the first white settlement.

The history of whites in the region essentially begins with John Day, a Virginian who came to Oregon in 1812 with the Overland Expedition of the Pacific Fur Company (Astorians). He was a tall man "with an elastic step as if he trod on springs." John Day and Ramsey Crooks became separated from the expedition in Idaho and suffered great hardships as they continued their way westward. They crossed through eastern Oregon and emerged at the confluence of the John Day and Columbia Rivers, only to be robbed of their equipment and clothing by unfriendly Indians. When the two men were eventually recovered, they journeyed on to Astoria at the mouth of the Columbia. Although John Day's travels in Eastern Oregon were brief, his name has persisted as a trademark of the region.

Other pioneers and settlers came to farm, to mine, and to cut timber. Gold was discovered in the John Day Country in the 1860s and a brief gold rush followed. Today, cattle ranching, farming, lumbering, and tourism sustain the economy of this out-of-the-way, uncrowded region.

Thomas Condon, pioneer minister of The Dalles, Oregon, became the first authority on the fossil beds. As early as the 1860s, Condon alerted scientists in the United States and abroad to the rich fossil record of the region. Following Condon's pioneering work, a full century of exciting discoveries involved many of the world's leading geologists and paleontologists: Joseph Le Conte, Edward D. Cope, O.C. Marsh, John C. Merriam, Ralph W. Chaney. Assisted by the interest and cooperation of private land owners, the scientists collected a wealth of fossils from the John Day Country. Today these fossil pages from nature's archives are still being studied in major museums and universities around the world.



To protect this scientific resource, the State of Oregon began in the 1930s to purchase certain of the outstanding fossil beds as Oregon State Parks. Several years later, the national significance of the fossil beds came to public attention, and in 1974 Congress authorized the John Day Fossil Beds National Monument. The monument now consists of the former State Parks plus essential surrounding land, totalling more than 5800 hectares (14,402 acres).

## ECOLOGY

The John Day River drains a portion of Oregon's Blue Mountains Province. Nearby mountains include the Strawberry, Aldrich, and Ochoco ranges. These cooler, moister mountains grow forests of Douglas-fir, true fir, larch, and pine—a fact to keep in mind during summer's heat. The John Day Valley itself is a scenic land of scattered western juniper trees, sagebrush, and bunchgrass surrounding picturesque cattle ranches. Cottonwood trees and willows hug the streambanks. It is dry country, especially in summer, when only one or two centimeters (about 1/2 inch) of rain fall per month. During May colorful wildflowers enliven the green grass and shrubs, but typical daily highs of 35-40° C (95-105° F) change the hills to a rich tawny color by July. (At cooler elevations in nearby mountains, July is the peak month for wildflower displays.)

Along the river, the park visitor can often see Canada geese, ducks, great blue heron, and other water birds. The river itself is an important habitat for salmon and steelhead. On the surrounding slopes live mountain bluebirds, black-billed magpies, green-tailed towhees, California quail, chukar partridge, ring-necked pheasants, turkey vultures, red-tailed hawks, and golden eagles. Rattlesnakes are natural inhabitants of the landscape, and visitors should be aware of their presence.

Mammals include coyotes, bobcats, badgers, mule deer, jack rabbits, cottontail rabbits, and abundant rodents. In the high mountains, travellers may very infrequently see black bear and elk.

## HOW TO REACH THE PARK

The park consists of three widely separated units in Wheeler and Grant Counties of north-central Oregon: Sheep Rock Unit, Painted Hills Unit, and Clarno Unit. U.S. 26 runs east-west through the region, connecting Interstate 80N and U.S. 97. U.S. 395 runs north-south through the region, connecting Interstate 80N and northern California. (See maps.)

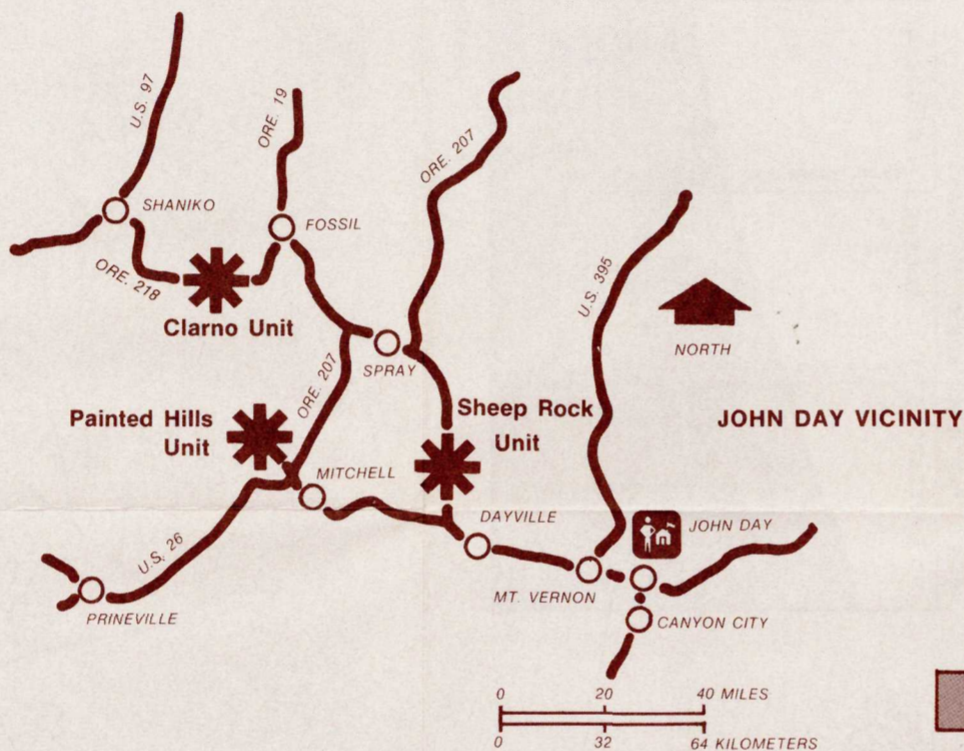
Sheep Rock Unit lies 5 miles (8 kilometers) west of the city of Dayville adjacent to U.S. 26 and Ore. 19. To reach the Painted Hills Unit, follow 6 miles (9 1/2 kilometers) along a marked county road that leaves U.S. 26 near Mitchell. The Clarno Unit is located about 20 miles (30 kilometers) west on Ore. 218 from its junction with Ore. 19 at Fossil, and about 30 miles (50 kilometers) east on Ore. 218 from its junction with U.S. 97 at Shaniko.

An airport suitable for small aircraft serves the city of John Day. Limited bus service is available in the region.

## WHAT TO SEE AND DO

**WAYSIDE EXHIBITS** at overlooks along roads interpret the outstanding features of each area of the park. Photogenic deposits and beautiful landscapes at these sites invite use of your camera.

**A HEADQUARTERS BUILDING** in the city of John Day provides information and a display of fossil replicas identical to the fossils unearthed in the park. Publications dealing with the History and Natural History of the area are also offered for sale.



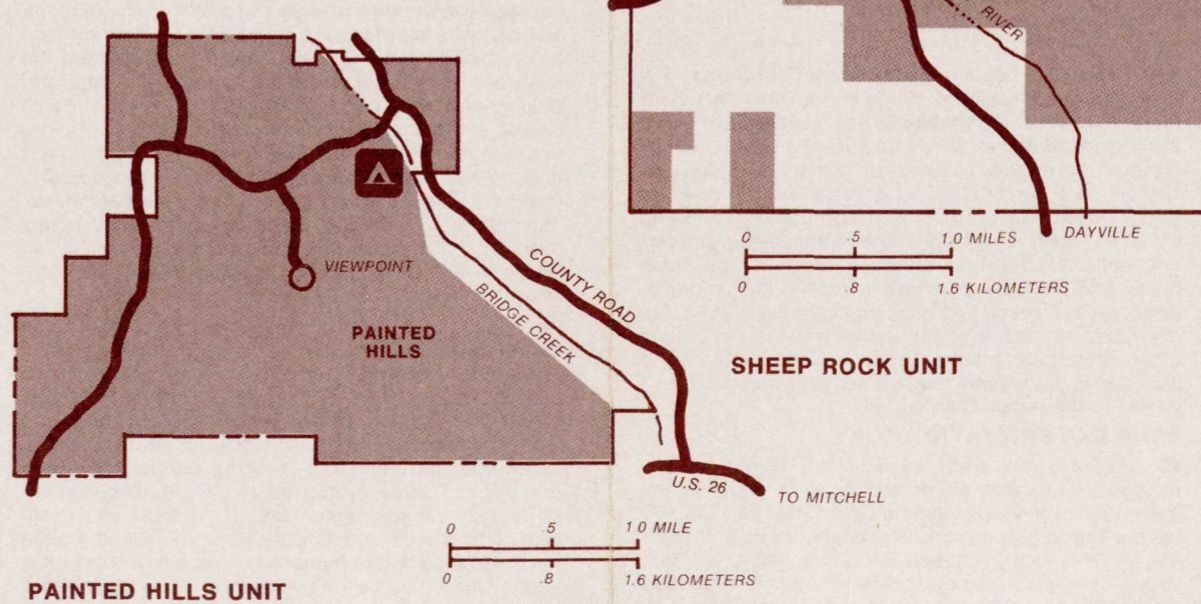
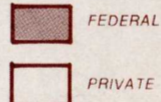
## FOR YOUR SAFETY AND COMFORT

John Day Fossil Beds National Monument is one of the newest additions to the National Park System. As such, facilities are extremely limited. As time and funding become available, the National Park Service plans to expand and improve the visitor facilities. In the meantime, your patience and understanding will be appreciated.

Visitors are advised to carry their own drinking water in summer. The air is dry and the sun is hot. Water is not available in the Painted Hills and Clarno Units.

Service stations are far apart—watch your fuel gage. While travelling, beware of unexpected cattle and deer on roads, especially at night. Drivers may also encounter fallen rocks on the road surface.

## LANDOWNERSHIP KEY

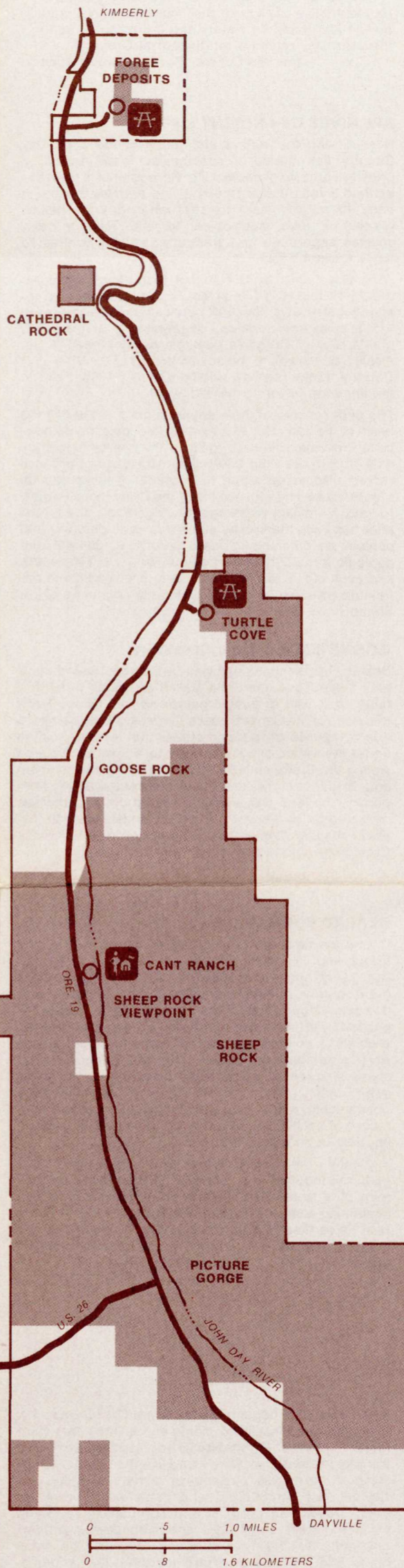


PAINTED HILLS UNIT

**THE JOHN DAY RIVER** offers steelhead fishing in season and whitewater recreation during the high waters of spring and early summer.

**PICNIC AREAS** for your enjoyment are located in the Clarno and Sheep Rock Units. (Drinking water is not available in the Clarno Unit.)

**MUSEUMS** and historic buildings in nearby communities bring alive the pioneer, ranching, and mining history of this part of the Old West.



SHEEP ROCK UNIT

For your safety, and for protection of fragile fossil material, do not climb on the geologic formations. They are hazardous. When dry, the deposits crumble easily; when wet they are very slippery.

Rattlesnakes, though not aggressive, are present nonetheless. Watch out for them, and if met, give them a wide berth.

Hospitals are located in John Day, Madras, and Prineville. Emergency treatment is available at clinics in Condon and Fossil. Wheeler and Grant Counties have volunteer emergency ambulance service to the nearest hospitals.

## NECESSARY REGULATIONS

The monument exists to preserve a rich fossil heritage. Fossil collecting over the past 100 years has drastically reduced the opportunity to view this record of the ages. Although the monument continues to serve bonafide scientific and educational research, the random collecting and digging of fossil material on park lands is no longer permitted. Your consideration and understanding of this is greatly appreciated.

Off road vehicles are prohibited, and foot travel away from existing trails is discouraged. This is especially true in the Painted Hills Unit where ugly scars in the earth easily result from tires and shoes. To protect the fragile resource, please stay on roads and trails.

The park is a wildlife refuge. Fishing is permitted, but all hunting and other use of firearms is prohibited on federal lands within the monument. Pets should be kept under physical control at all times.

Please be careful with fire and cigarettes. Open fires pose a definite hazard for summer grass fires. Permits for campfires are required.

Public and private lands are not identified in the area, nor are they fenced. The National Park Service asks you to respect the property rights of private land owners in the area, and for this reason visitors are asked to remain on park lands. Use trails wherever possible. If in doubt about land ownership, see map in this folder, or consult with a park ranger.

Some of the range is unfenced, you may see cattle grazing within the park. These animals are privately owned. Please do not disturb them, and do not take pets near them, as injury to pets or people could result.



Sheep Rock Unit

## ACCOMMODATIONS AND SERVICES

Camping in the park is very limited. A single primitive campground (no drinking water available) is open at Painted Hills. Excellent campgrounds are maintained by the State of Oregon, U.S. Forest Service, and U.S. Bureau of Land Management in the region. Primitive camping is also available in the Strawberry Wilderness Area southeast of John Day. Current camping information is posted in each unit of the park.

Lodging, fuel, food, and public telephones are available in the nearby communities, but not within the park.



Clarno Unit