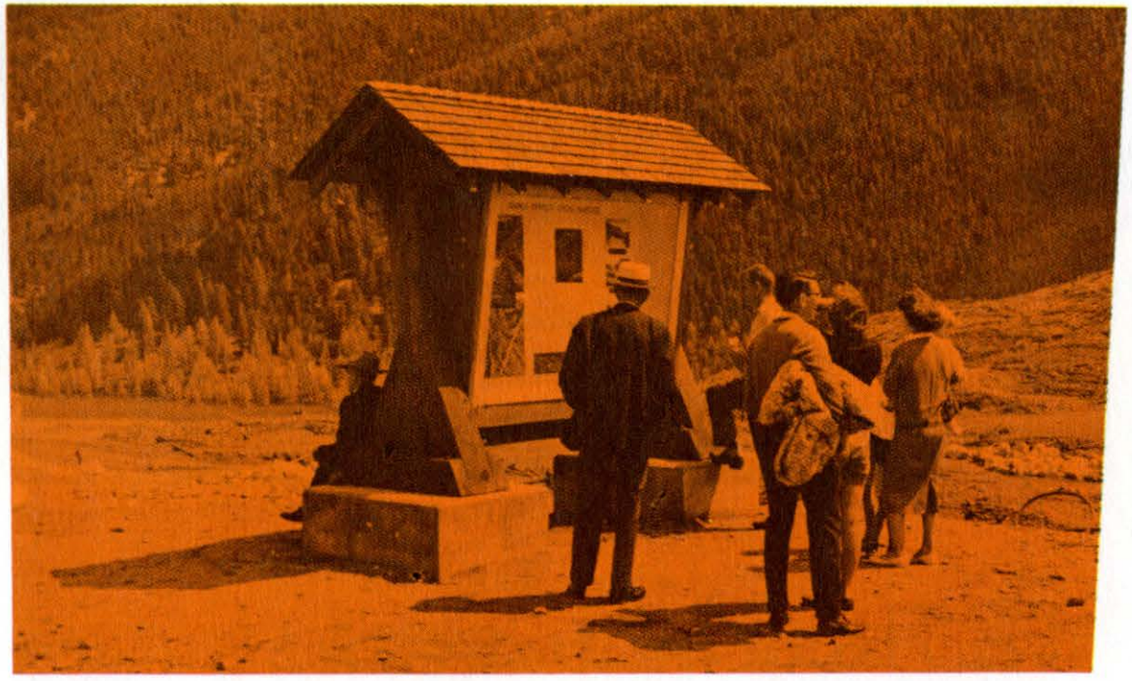
EARTHQUAKE AREA

Madison River Canyon

Your visit to the Madison River Canyon Earthquake Area

GALLATIN National Forest · BOZEMAN, MONTANA



Whether you stay an hour or a week, your visit to Madison River Canyon Earthquake Area in southwestern Montana should be interesting and pleasant. Natural beauty, lots of fishing, and the easy-to-see effects of one of the world's stronger earthquakes makes this one of the West's outstanding attractions.

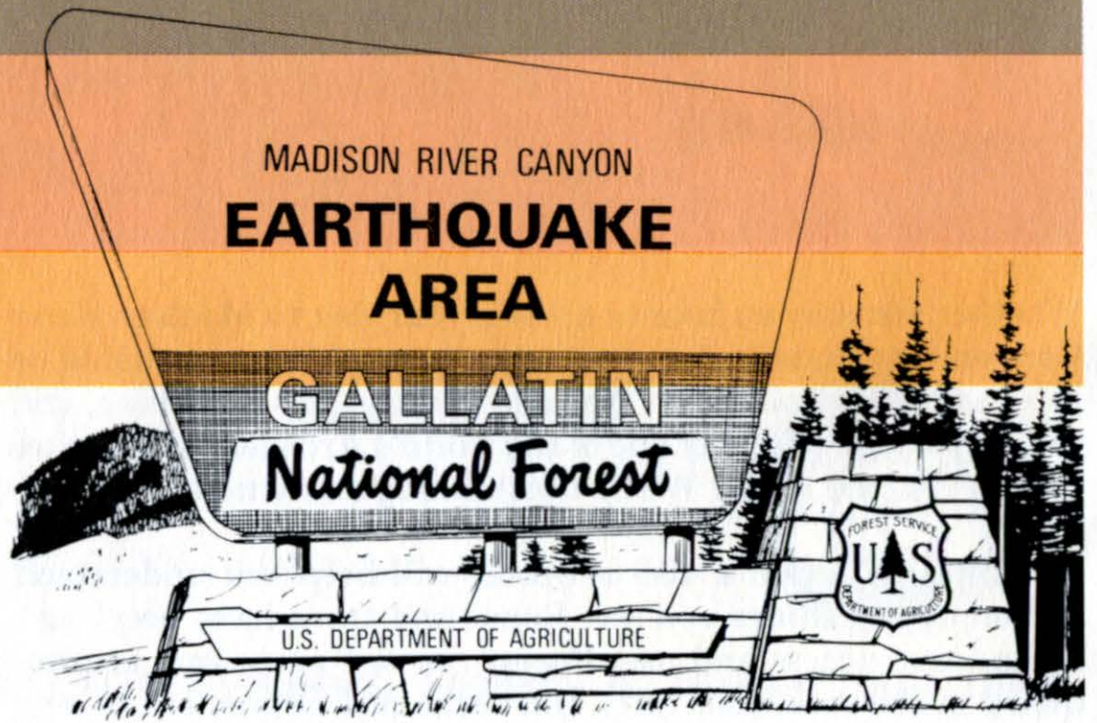
Signs, displays and a visitor center will help you understand and enjoy the things you see. Roads and trails have been built to improve access and use. Forest Service personnel are stationed in the area from early June until mid-September to help interpret the natural phenomena and to give you other information or assistance.

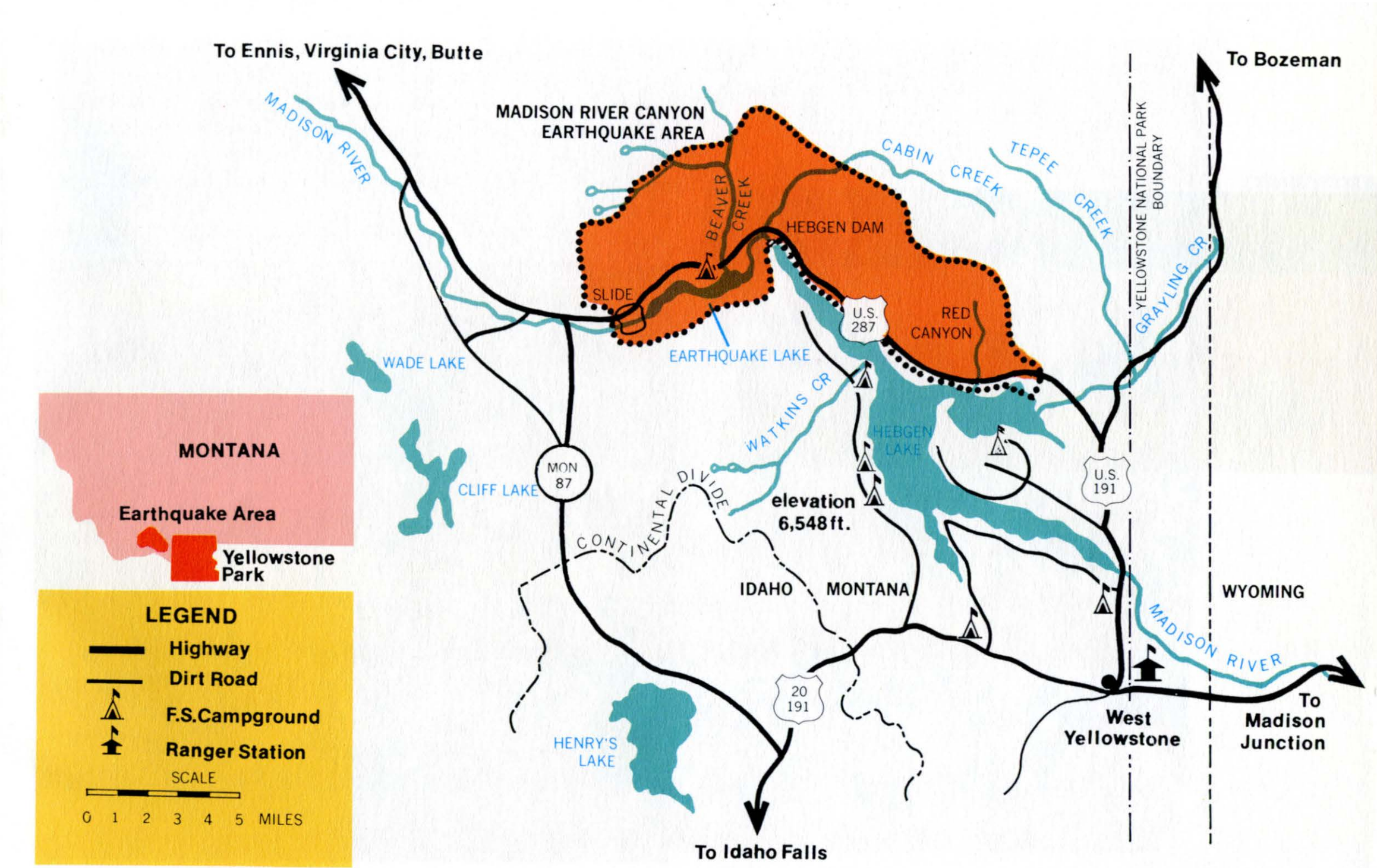
Fences, railings and signs cannot do the whole job of protecting visitors or guarding natural features. These devices serve as reminders of the need for caution, especially with children.

Watch for other traffic, park off the road, and have a pleasant tour . . . and please be careful with fire.■

This 37,800-acre tract has been set aside as a geological area by the U.S. Department of Agriculture, Forest Service, to preserve for public enlightenment and scientific study the many phenomena resulting from the August 17, 1959 earthquake.

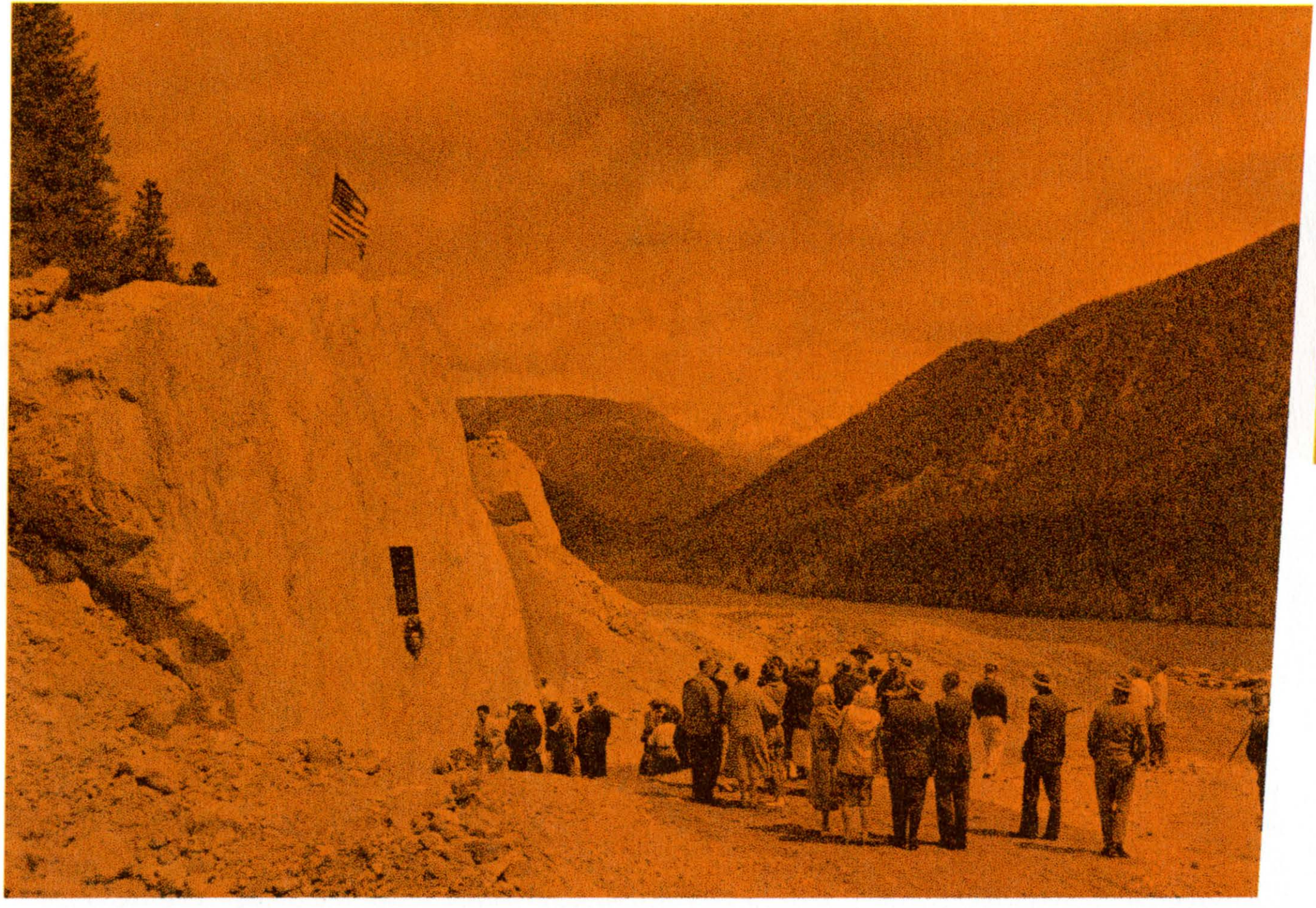
You can drive to the Earthquake Area on either U.S. Highway 287 or 191. The sketch at the right shows the new highway along Earthquake Lake which permits travel between these two main highways, and gives access to all points of interest in the Earthquake Area.■




To Ennis, Virginia City, Butte
To Bozeman
MADISON RIVER
MADISON RIVER CANYON EARTHQUAKE AREA
BEAVER CREEK
CABIN CREEK
TEPEE CREEK
YELLOWSTONE NATIONAL PARK BOUNDARY
GRAYLING CR
HEBGEN DAM
SLIDE
U.S. 287
RED CANYON
EARTHQUAKE LAKE
WADE LAKE
WATKINS CR
HEBGEN LAKE
MON 87
CLIFF LAKE
CONTINENTAL DIVIDE
elevation 6,548 ft.
U.S. 191
IDAHO
MONTANA
WYOMING
MADISON RIVER
20 191
HENRY'S LAKE
West Yellowstone
To Madison Junction
To Idaho Falls
MONTANA
Earthquake Area
Yellowstone Park
LEGEND
Highway
Dirt Road
F.S.Campground
Ranger Station
SCALE
0 1 2 3 4 5 MILES

THE SLIDE

The most spectacular single feature left by the violent 1959 earthquake is the huge slide across the Madison River near the west end of the area. Rocks and earth – enough to fill one-fifth of the Panama Canal, enough to fill the Rose Bowl heaping full ten times – smashed down into Madison Canyon. A paved road leads to the Visitor Center, Vista Point and displays on top of the slide.■



A NEW LAKE

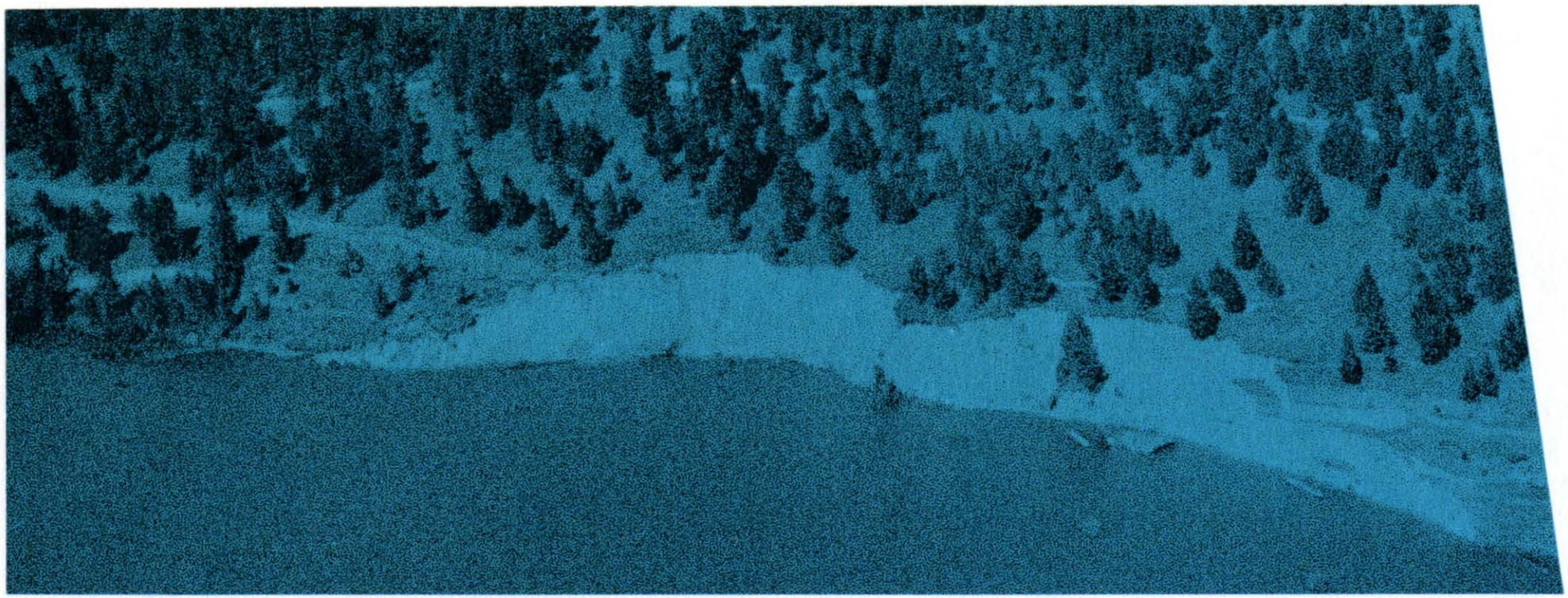
The jumbled mass of slide rocks and earth completely blocked the river and caused it to form Earthquake Lake. Before engineers dug a channel through the slide, the new lake was a potential flood threat to towns and ranches downstream. A ring of trees killed by flooding was exposed to view when the channel lowered the lake. You can see Earthquake Lake from the slide, from Beaver Creek Campground and from U.S. Highway 287 which follows along its north shore.■

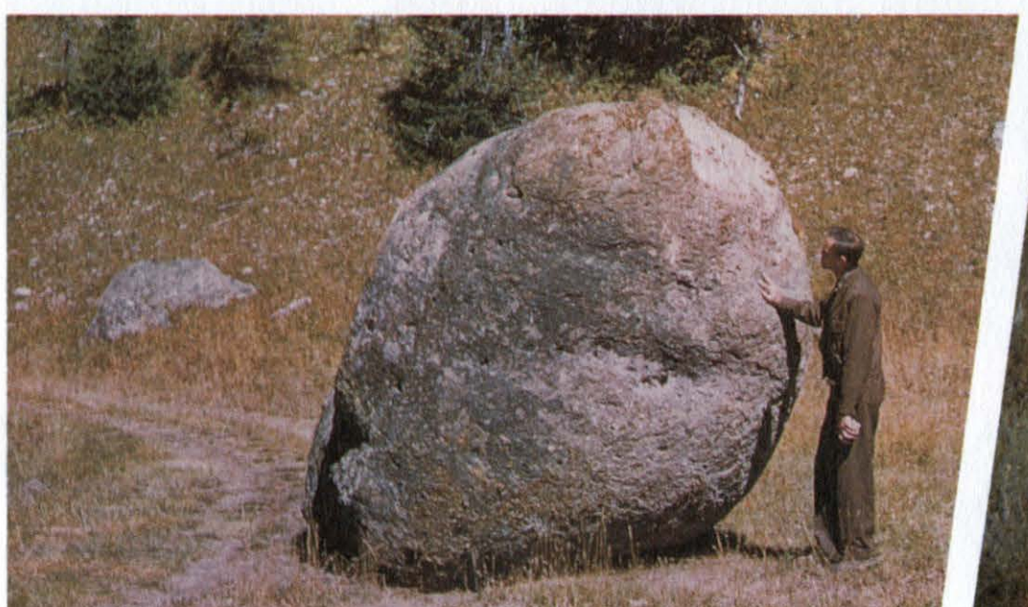
AN OLD LAKE

Upstream from the slide and the site of Earthquake Lake, violent shocks lowered the north shore of Hebgen Lake. The shocks sent huge waves crashing up and down the lake and over the dam. In several places large sections of highway plunged into the lake. Fault scarps, where the earth fractured and dropped, parallel the northeast lake shore for several miles. At Cabin Creek, just downstream from Hebgen Dam, there is an excellent close-up view of the Hebgen Lake fault scarp. A restroom, parking lot, campground and information signs are located at Cabin Creek. You can drive the length of Hebgen Lake on highway 287 which has been reconstructed through the earthquake area.■

A SHAPING HAND

The violence of the earthquake was expressed in many ways. You may see numerous subtle as well as dramatic changes in the landscape. The large boulder is one of untold numbers which vaulted down when the earth shook. One fault scarp is nearly 15 miles long; being less conspicuous than the "slip" shown here, it can be missed by the casual observer. Shorter scarps can be seen in many places. Trails and side roads lead to several such points of interest. ■





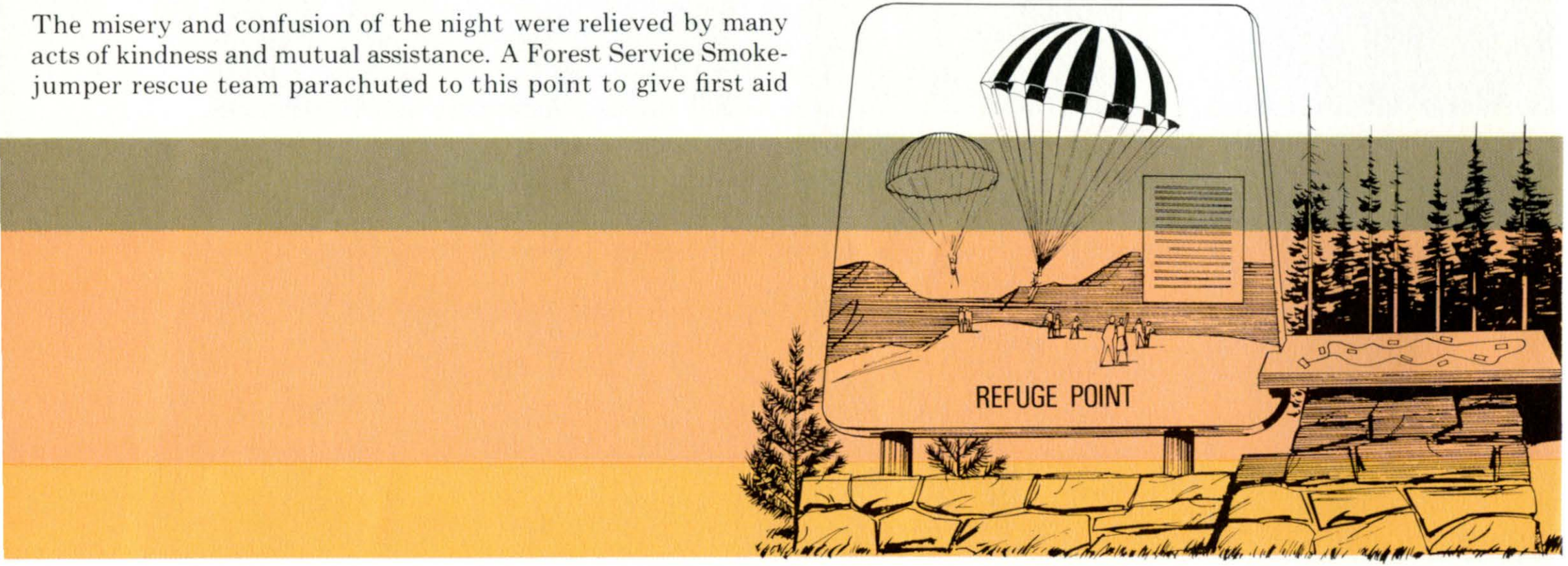
A REFUGE AND A MEMORIAL

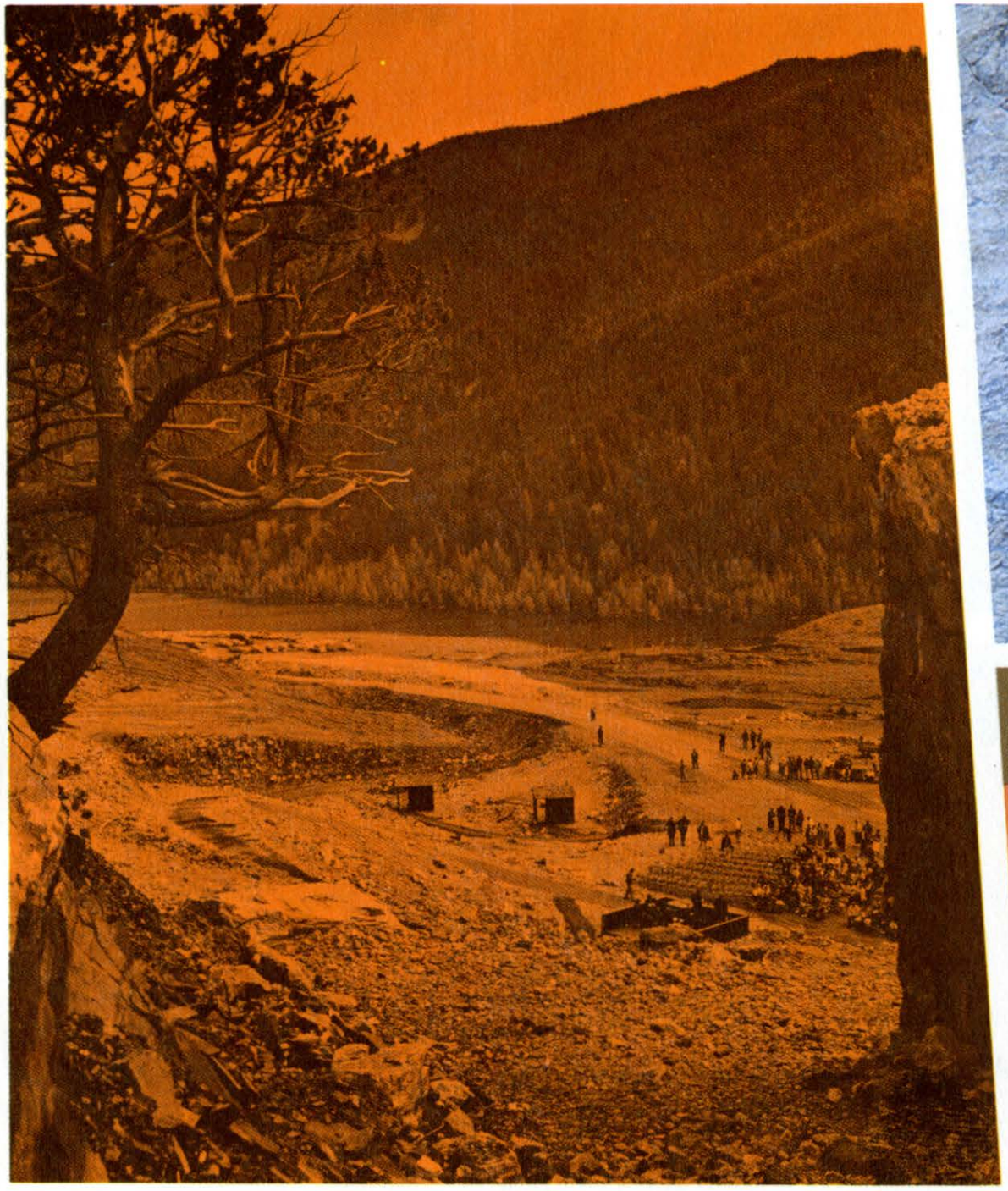
On the night of the earthquake about 250 people were camped in the Madison River Canyon. Their escape was blocked by the highway disconnection at Hebgen Lake and the huge slide at the mouth of the canyon.

Realizing they were trapped, most of the people gathered on the ridge behind this sign.

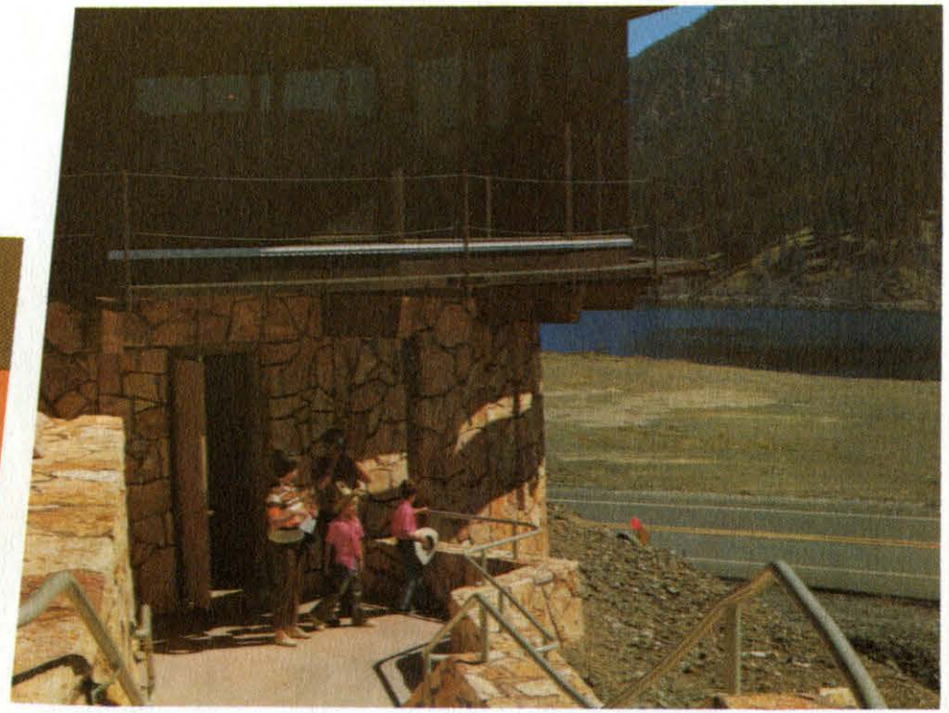
The misery and confusion of the night were relieved by many acts of kindness and mutual assistance. A Forest Service Smokejumper rescue team parachuted to this point to give first aid and to prepare the injured for evacuation. They were flown out by U.S. Air Force and Forest Service contract helicopters.

The earthquake brought suffering and tragedy. For some there was final peace and a majestic resting place shaped by the same power that shapes the earth and the destiny of men. On August 17, 1960, one year after the earthquake, the area was dedicated "in memory of the events which took place and as a dramatic example of mountain-building and earth-shaping forces." It was dedicated "for all its values . . . all its resources, its geologic history and its deep human meanings." The huge boulder shown on page 5 and just visible on the extreme right here, bears a plaque in memory of the 28 persons who lost their lives.■






THIS MONOLITH IS A PART OF THE RUBBLE
CAUSED BY THE EARTHQUAKE OF AUGUST 17, 1959.
IT IS DEDICATED TO THE MEMORY OF THE MEN,
WOMEN AND CHILDREN WHOSE LIVES WERE
LOST AS A RESULT OF THE EARTHQUAKE.
IN MEMORIAM



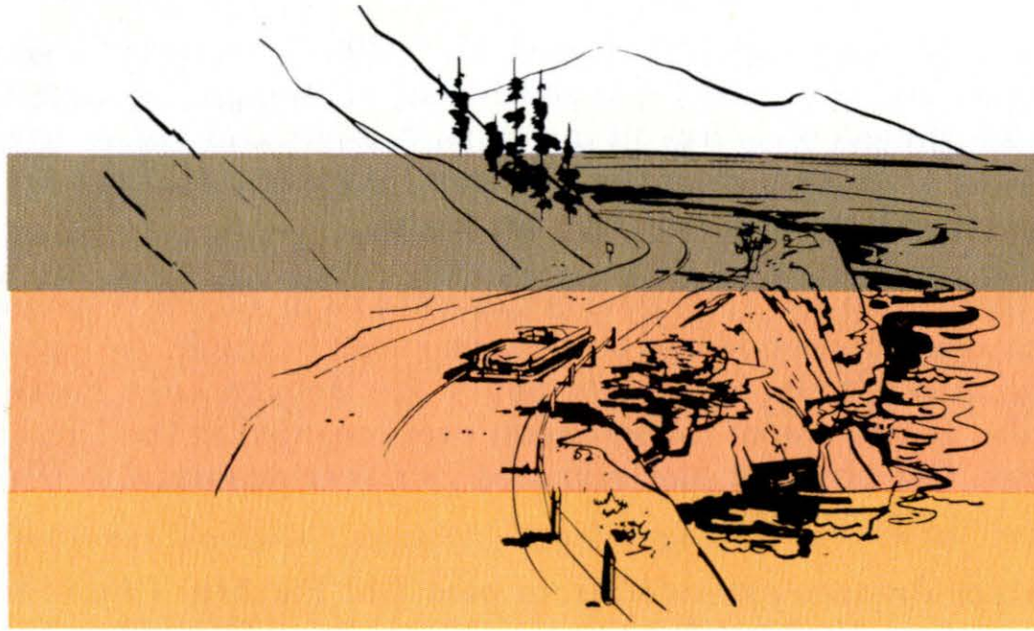
visitor center

The beautiful observatory, a working seismograph and intriguing displays highlight the visitor center. Scheduled talks, in the observatory, explain the drama of earthquake.

Other displays, signs and interest trails are located throughout the area to help you enjoy your visit.

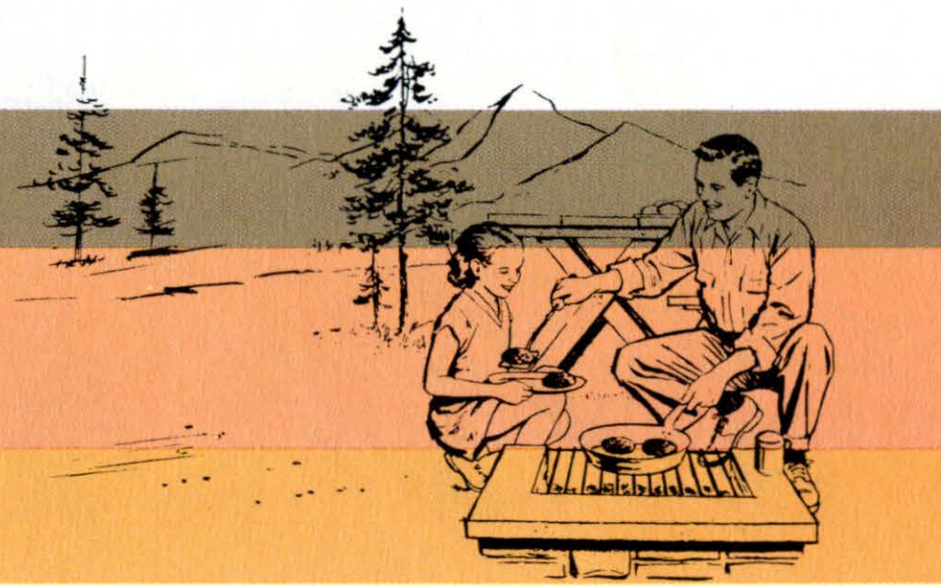
Casual photographers may find these hints helpful: photograph glass-encased displays close up and at an angle; take the meter reading with the meter held *on* the glass. To photograph wooden signs, take the meter reading 12 to 18 inches from the sign rather than from the camera.■

roads and trails



Most major earthquake features can be seen from the canyon highway. Spur roads lead to private ranches, lodges, quake features and to fishing areas. (A state fishing license is required.) Foot paths lead from several parking areas to overlooks and points of interest near the slide and the head of Earthquake Lake. Longer trails afford opportunities to enjoy more remote features, scenery, and wildlife. One trail leads up Cabin Creek from the highway. Another leads from a dirt road in Kirkwood Creek to a badly fractured area. The Red Canyon trail leads from the end of a dirt road to Red Canyon Fault. It is advisable to consult a Forest Ranger before taking dirt roads or the longer trails.■

accommodations



You will find accommodations of various types available in the vicinity of the Madison River Canyon Earthquake Area. Garages, cafes, motels, hotels, commercial campgrounds, stores and other facilities located at several towns within a two-hour drive of the area. During the busier summer months it may be advisable to make arrangements for commercial sleeping accommodations in advance.

The Beaver Creek and Cabin campgrounds are located in the Earthquake Area. Several others are on the south shore of Hebgen Lake or within short distances to the east or west. Campground locations are shown on Forest Service maps, available in the Earthquake Area and Ranger Stations at Ennis and West Yellowstone.■

access

The Madison River Canyon is in a popular vacation area easily reached from major routes in Montana, Idaho and Wyoming. Local access is by way of U.S. Highway 191 between Idaho Falls, Idaho, and Bozeman, Montana; by U.S. Highway 287 from Butte, Ennis and Virginia City, Montana. Current highway maps and local inquiry will be helpful in planning a visit to the area. Commercial airlines serve several towns in the region. Light aircraft facilities and charter services are available at some towns in the surrounding area. Commercial highway carriers serve many of these communities, and automobile rentals are available.■

THE QUAKE

It was near midnight on August 17, 1959. The quiet of a soft summer night lay gently over southwestern Montana. Hundreds of vacationers were asleep in camps, trailers and lodges near Hebgen Lake and along the Madison River. At 11:37 the first heavy shock smashed through the night.

Mother Earth was reshaping her mountains in violent response to an agony of deep-seated tensions no longer bearable. An eight-state area felt the first heavy jolt of the Hebgen Lake Earthquake. It was one of the strongest ever recorded in the United States. One physicist has estimated its power was equal to that of 2,500 atomic bombs.

Surface damage extended from near Old Faithful Geyser in Yellowstone National Park westward for about fifty miles. The area of heaviest visible damage is near the two large faults in the Gallatin National Forest and includes the slide, slipouts and scarps pictured on preceding pages. But that first shock was only the beginning. Major aftershocks and hundreds of tremors shook the mountains and plateaus of southwestern Montana and northwestern Wyoming for weeks.

Soon after the main shock, escape from the canyon was blocked. At dawn a plane made a reconnaissance flight; rescue units from many agencies were soon on the move. Forest Service smokejumpers parachuted into the canyon to give aid and to set up communications. Air Force and Forest Service helicopters removed the injured. By evening bulldozer roads had been built; the immediate emergency was over and all who wished to leave were able to get out of the canyon. ■

EARTH SHAPING

The surface of the earth is shaped by forces which lift, lower, or twist its crust, and by the weathering of water and air. Aside from its profound and tragic effects upon man and his works, the Hebgen Lake Earthquake was merely a repetition of common earth-shaping processes. Stresses and strains in the vicinity of Hebgen Lake were suddenly released by fault movements. The center, or focus, of the first and strongest shock was about 20 miles underground near Red Canyon Creek. Its magnitude of 7.1 compares with the 8.2 magnitude of the San Francisco 'quake.

Two large blocks of the earth's crust appear to have been broken and tilted toward the north. Hebgen Lake occupies part of the larger of these two blocks. The Hebgen fault scarp north of the highway and along the north lake shore marks the northernmost edge of this block. The smaller Red Canyon block lies north of Hebgen Lake and is bounded on three sides by the arch-shaped Red Canyon fault scarp.

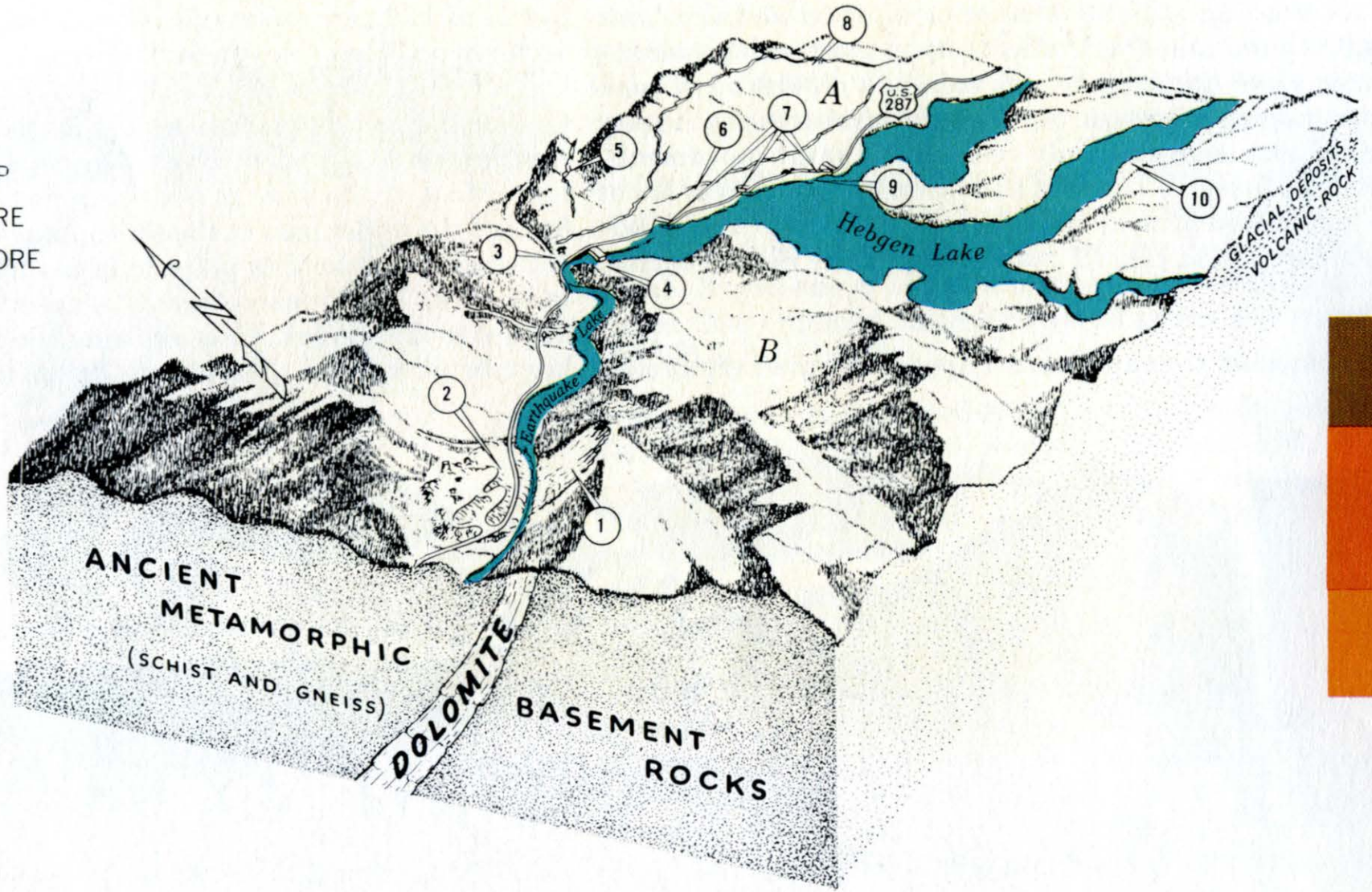
One of the most awesome results is the landslide which filled the mouth of Madison River Canyon to depths of 200 to 400 feet. Most of the slide is mica-rich metamorphic rocks which formed the upper part of the south ridge before the slide. These soft rocks were held in place by a natural wall of harder dolomite rock. The 'quake evidently caused this retaining wall of harder rock to break, thus allowing the soft rock to slide. The large boulders atop the slide are dolomite.■

1. SLIDE
2. VISITOR CENTER
3. CABIN CREEK
4. HEBGEN DAM
5. WEST FORK SCARP
6. HEBGEN SCARP
7. HIGHWAY SLIPOUT
8. RED CANYON SCARP
9. SUNKEN LAKE SHORE
10. EMERGED LAKE SHORE

A. RED CANYON FAULT BLOCK

B. HEBGEN LAKE FAULT BLOCK

PERSPECTIVE VIEW



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