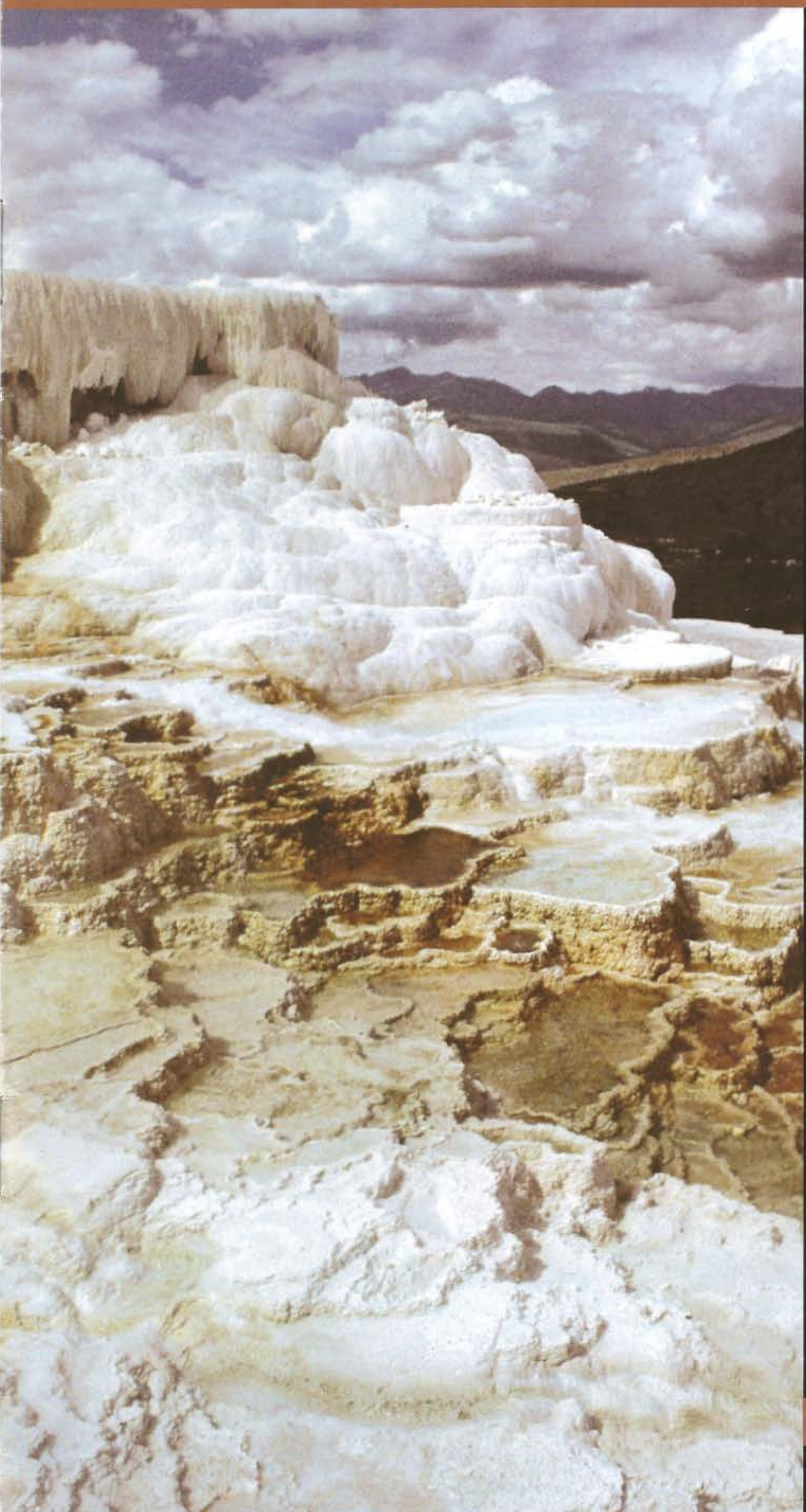
Mammoth Hot Springs Trail Guide

Including Lower Terraces and Upper Terrace Drive



NATIONAL PARK SERVICE

Yellowstone National Park

50¢ donation

DANGER
STAY ON WALKWAYS

Hot Water • Thin Crust

Protect Yellowstone's Treasures

Hydrothermal features are fragile rarities of nature. Yellowstone preserves the largest collection of hydrothermal features on the planet. You have an unparalleled opportunity to view hot springs, geysers, mudpots, and fumaroles in a natural setting.

Change takes place naturally in a hydrothermal area, but people can disrupt these processes and cause irreparable damage. Rocks, sticks, and other objects thrown into a hydrothermal feature may be permanently cemented in place, choking off water circulation and ending all activity.

For the sake of all who follow, never throw objects into any feature. Stay on established walkways for your safety and to protect fragile formations that have formed over thousands of years.

It is illegal to collect any natural or cultural objects or to remove, deface, or destroy any plant, animal, or mineral in Yellowstone National Park. Do not smoke in or bring pets into Yellowstone's hydrothermal areas. Bring drinking water; take out all trash.

While viewing or photographing the area, protect your camera, glasses, and binocular lenses from hydrothermal heat and spray.

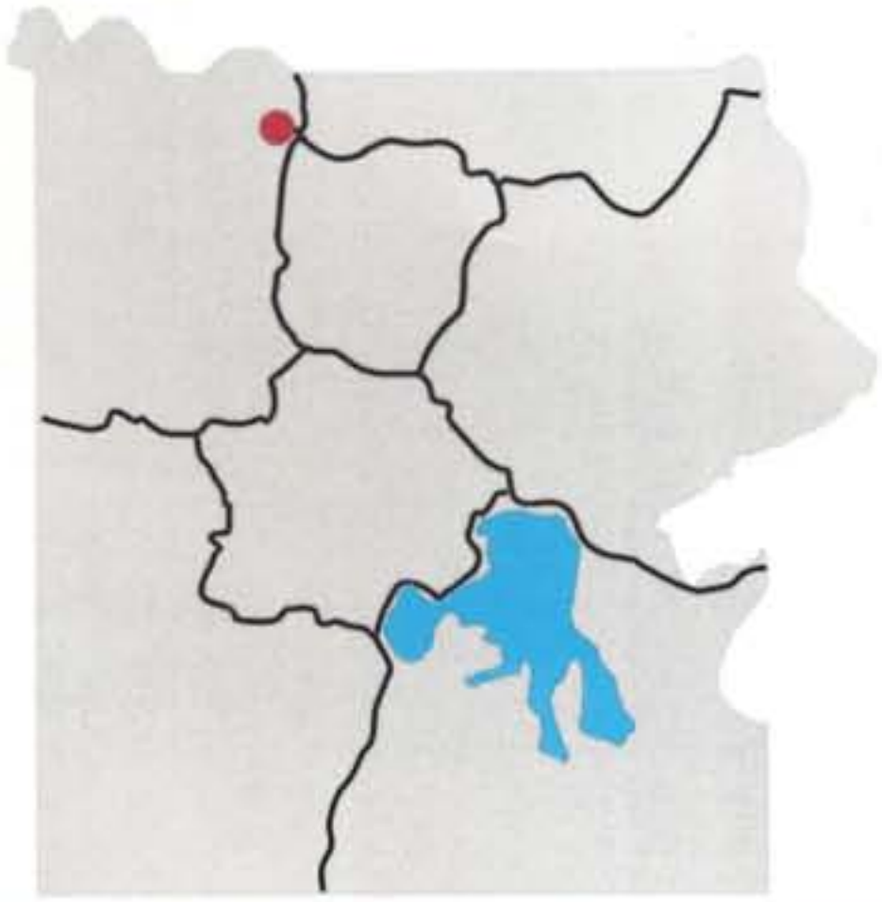
Toxic Gases exist in Yellowstone. Dangerous levels of hydrogen sulfide and carbondioxide have been measured in some hydrothermal areas.
If you feel sick, leave the location immediately.

Help preserve Yellowstone for the future.

Terrace Makers

Mammoth Hot Springs

- Limestone is the dominant underlying rock here instead of rhyolite, which is dominant in the park's other major hydrothermal areas.
- This area is one of the world's best examples of travertine-depositing hot springs.
- It's also one of the park's most dynamic hydrothermal areas; its features constantly change.
- Inactive terraces underlie most of this area, including the hotel and Albright Visitor Center.
- Maximum water temperature is 163°F/73°C.



For hundreds of years, Shoshone and Bannock people collected minerals from Mammoth Hot Springs for white paint. These minerals contribute to the beautiful terrace structures, along with heat, a natural "plumbing" system, water, and limestone.

The volcanic heat source for Mammoth Hot Springs remains somewhat of a mystery. Scientists have proposed a number of sources, including the large magma chamber underlying the Yellowstone Caldera, or perhaps a smaller heat source closer to Mammoth.

At Mammoth, a network of fractures and fissures form the plumbing system that allows hot water from underground to reach the surface. The water comes from rain and snow falling on the surrounding mountains and seeping deep into the earth where it is heated. Small earthquakes may keep the plumbing open.

Limestone, deposited here millions of years ago when a vast sea covered this area, provides the final ingredient. Hot water with dissolved carbon dioxide makes a solution of weak carbonic acid. As the solution rises through rock, it dissolves calcium carbonate, the primary compound in limestone. At the surface, the calcium carbonate is deposited in the form of travertine, the rock that forms the terraces of Mammoth Hot Springs.

Primal Colors

Thermophiles (heat-loving microorganisms) create tapestries of color where hot water flows among the terraces. Colorless and yellow thermophiles grow in the hottest water; orange, brown, and green thermophiles thrive in cooler waters. Colors also change with the seasons.

Living Sculpture

These terraces are like living sculptures, shaped by the volume of water, the slope of the ground, and objects in the water's path. They change constantly, and sometimes overnight—**but the overall activity of the entire area and the volume of water discharge remain relatively constant.**

Here, as in few other places on earth, rock forms before your eyes.

Canary Spring

Mammoth Hot Springs

Mile
0 1/8 1/4 3/8
0 1/4 1/2
Kilometer

Beaver Ponds Trail
Old Gardiner Road (one-way, unpaved)
to campground (around corner) and North Entrance (5 mi/8km)
Mammoth Hot Springs Hotel
Albright Visitor Center
Historic Fort Yellowstone self-guiding tour begins here
to Tower-Roosevelt (18 mi/29 km)
Liberty Cap
Opal Terrace
Palette Spring
Cleopatra Terrace
Lower Terraces
Minerva Terrace
Overlook
New Blue Spring
Mound & Jupiter Terraces
New Highland Terrace
Prospect Spring
Main Terrace
Trail Springs
Canary Spring
Highland Terrace
Dryad Springs
Grassy Spring
Orange Spring Mound
Trail Rides
Upper Terraces
Bath Lake
Angel Terrace
White Elephant Back Terrace
to Norris (19 mi/30 km)

Upper Terrace Drive

This one-way road is narrow, winding, with limited parking. Trailers, buses, and motor homes are prohibited. Park these vehicles at the entrance and enjoy the Upper Terraces on foot. Please stay on the road or boardwalks.

In this area of rapidly changing hydrothermal activity, thin crusts conceal scalding water. Formations and fragile plants are easily destroyed by careless walking. Protect yourself and these fragile features; stay on the road, boardwalks, and in designated pullouts.

Legend

- Boardwalk, may require assistance
- Stairs or steep grade
- Designed to meet federal guidelines for wheelchair-accessibility
- Backcountry trail
- Road
- Hydrothermal Feature
- Parking
- Restrooms
- Food
- Store
- Service Station
- Lodging
- Information
- Medical Clinic
- Post Office
- Trail Rides
- Picnic Area
- Telephone

North

Lower Terraces

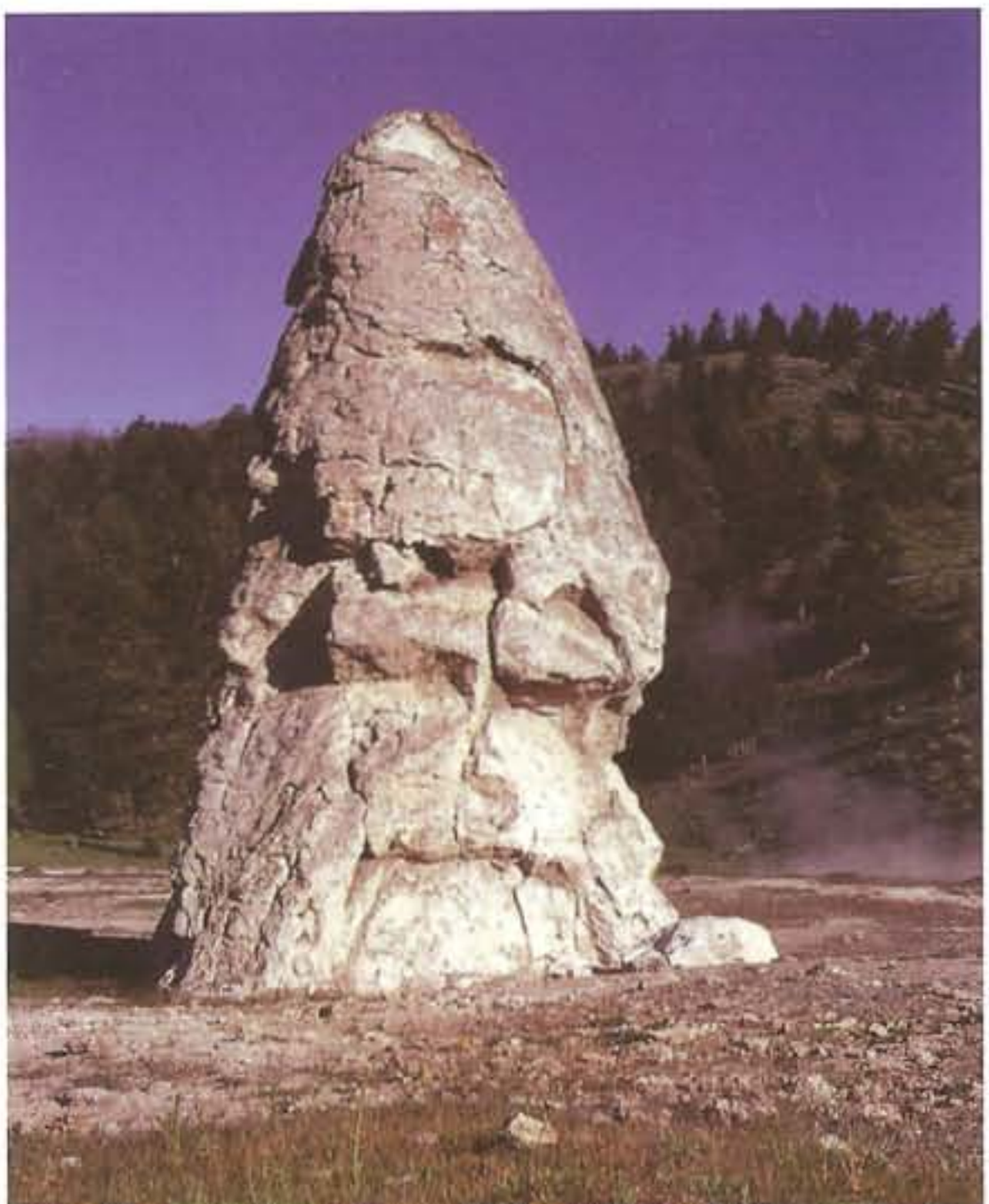
You can reach these terraces from boardwalks at their base or from Upper Terrace Drive. Some sections of boardwalk are wheelchair-accessible (see map); the rest of the area has stairs or steep grades due to the terrain.

Opal Terrace

Look for this terrace across the road from the main trails—it plays an unusual role in Mammoth. In 1926, Opal began depositing up to one foot (0.3 m) of travertine per year. Its periodic growth threatens the historic house next door, which was designed by Robert Reamer and built in 1908 as an example of Frank Lloyd Wright's Prairie Style architecture. The National Park Service strives to protect both historic and natural resources—a challenge here.

Liberty Cap

Across the road from Opal Terrace stands the 37-foot (11 m) Liberty Cap, which was created by a hot spring that was active in one location for a long time. Its internal pressure was sufficient to raise the water to a great height, allowing mineral deposits to build slowly and continuously for perhaps hundreds of years.



Liberty Cap was named in 1871 by the Hayden Survey because it resembled the peaked knit caps symbolizing freedom and liberty during the French Revolution.

Palette Spring

Water flows in crisscrossing patterns down a steep ridge where colorful thermophiles create a changing palette dominated by hues of orange and brown. This effect is much the same as an artist would achieve by allowing watercolors to run down a vertical surface.

Minerva Terrace

Activity shifts dramatically around this terrace. The cascades of travertine beside the boardwalks were formed in the 1990s. Some years, they are dry. Whatever its level of activity, you can see why Minerva Terrace was named for the Roman goddess of artists and sculptors. Its ornate travertine formations create the look of layer cakes and lace-edged pools. In the dry areas, you can clearly see the many layers and the varying depths.

Jupiter and Mound Terraces

These terraces display cycles of activity typical of Mammoth Hot Springs. In 1937, Mound Terrace was called "the most beautifully colored spring." Inactive for decades, its weathered travertine shows new patterns where chunks of the soft rock have broken or fallen. Recently, Mound Terrace began flowing again. In the 1980s, Jupiter Terrace flowed heavily and overtook boardwalks several times.

Additional steps take you to the Upper Terraces, which you can also reach by car.

Liberty Cap

Upper Terrace Drive

The entrance to the Upper Terrace Drive is two miles (3.2 km) south of the Albright Visitor Center on the Grand Loop Road. This one-way scenic drive winds for 1½ miles (2.4 km) among hot springs and travertine formations.

Trailers, buses, and motor homes are prohibited on the drive due to limited parking and a narrow, winding roadway. Park these vehicles in the lot beside the Grand Loop Road, then enjoy the Upper Terraces on foot. Please stay on the road and boardwalks.

Overlooks

The first large parking areas offer views of Main, Minerva, and Cleopatra terraces. Also look for the red-roofed buildings of historic Fort Yellowstone, built and occupied by the U.S. Army while here from 1886 to 1918. (A self-guiding tour of the fort begins at the Albright Visitor Center.) Walkways lead to the Lower Terraces, to overlooks of Main Terrace, and to Canary Spring.

Main Terrace

You can view this large terrace and its colorful springs from several vantage points. To your left, follow the boardwalk to an overlook of New Blue Spring. One of the best examples of the area's dynamic character, New Blue Spring shifts activity frequently and can become active or inactive several times in one year.

An overlook leads to a view of the entire Main Terrace; at the far right you can see Canary Spring. At the beginning of the trail to Canary Spring, a short spur trail takes you to a view of Cupid Spring, which has resumed activity recently. Continue on the trail to benches where you can relax and watch the waters and colors of Main Terrace. (This platform is also wheelchair-accessible, see map.)

Orange Spring Mound

Canary Spring

You will likely find flowing hot water, new travertine formations, and shade as you walk alongside Canary Spring. Imagine you were here in the late 1800s, a time when yellow filamentous bacteria was prominent. Today, the spring exhibits the orange, brown, and green seen in other hot springs of the area. See the map for the location of the wheelchair-accessible trail to this site.

From the parking area, look south to Highland Terrace, which recently resumed activity.

Prospect Spring

This spring was active next to the road in the mid-1990s. In the mid-2000s, activity shifted toward the trees. And it may have shifted again by the time you visit.

New Highland Terrace

Tree skeletons stand as monuments to a landscape created in the 1950s. This area has been inactive since the 1980s. Perhaps future visitors will see New Highland rejuvenated.

Orange Spring Mound

This spring flows from several vents from its top and side. Its striking colors come from the thermophiles living in the hot water.

New Highland Terrace

Bath Lake

Bath Lake was a popular swimming hole until it dried up in 1926. It filled again after the 1959 Hebgen Lake Earthquake and remained a lake through the 1970s. By then bathing in hydro-thermal features was illegal because it destroys fragile formations and changes their activity.

White Elephant Back Terrace

Water laden with calcium carbonate has flowed from a fissure to build this ridge, which an early tour guide thought resembled the back of an elephant. Activity constantly shifts here.

Angel Terrace

The dramatic presence of this feature comes from abundant water, white formations, and colorful thermophiles that thrive in hot water. Angel Terrace was dry and crumbling for decades, but resumed activity in 1985. Some of the other dormant features you have seen on this drive may one day flow again too.

For More Information

www.nps.gov/yell

If you would like to learn more about geology and hydrothermal features, these and other items are sold by the Yellowstone Association in visitor centers:

Geysers: What They Are & How They Work, T. Scott Bryan

Life at High Temperatures, Dr. Thomas Brock

Interpreting the Landscape of Grand Teton and Yellowstone National Parks, John N. Good and Kenneth L. Pierce

Seen & Unseen: Discovering the Microbes of Yellowstone, Kathy Sheehan et al.

Windows into the Earth: The Geologic Story of Yellowstone and Grand Teton National Parks, Robert B. Smith and Lee J. Siegel

DVDs: *Yellowstone: A Symphony of Fire and Water*
The Complete Yellowstone

Photos: Cover (Minerva), NPS/Schmidt; Canary, NPS/Dunmire; elk, NPS/Peaco; Liberty Cap, NPS/Suderman; Orange Spring Mound, NPS/Suderman; New Highland Terrace, C. Duckworth