

# YELLOWSTONE RESOURCES & ISSUES

# 2009



Division of  
Interpretation



Yellowstone  
National Park



National  
Park Service

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In this book, you will find concise information about the park's history, natural and cultural resources, and issues. This material was provided and reviewed by National Park Service staff.

### How the Book Is Organized

The book is organized to serve our staff and the public who are interested in more than the basics. Thus, the book begins with "Park Facts," followed by "Frequently Asked Questions" and a brief introduction.

Readers can obtain more detailed information in the chapters that follow.

### How the Chapters Are Organized

- Summary box containing key facts
- Main text providing overview of subject
- Resource list for more information

Some material is repeated in the book to accommodate users with varying needs.

### Updating the Information

Information about Yellowstone constantly changes; the information provided here is current as of January 2009. You can find updates and comprehensive information on the park's official website ([www.nps.gov/yell](http://www.nps.gov/yell)), in park publications and exhibits, or by asking the park's interpretive rangers who staff the visitor centers.

We welcome your feedback and comments.

Arrows  
point to new

or changed  
information



# PARK FACTS

## GEOLOGY

An active volcano  
1,000–3,000 earthquakes annually  
More than 10,000 hydrothermal features  
More than 300 active geysers  
One of the world's largest calderas at  
45 x 30 miles  
Approximately 290 waterfalls,  
15 ft. or higher, flowing year-round  
Tallest waterfall in the front country:  
Lower Falls of the Yellowstone River at  
308 ft.

## YELLOWSTONE LAKE

131.7 square miles of surface area  
141 miles of shoreline  
20 miles north to south  
14 miles east to west  
Average depth: 140 feet  
Maximum depth: 410 feet

## WILDLIFE

67 species of mammals, including:  
7 species of native ungulates  
2 species of bears  
322 species of birds (148 nesting species)  
16 species of fish (5 non-native)  
6 species of reptiles  
4 species of amphibians  
1 threatened species: Canada lynx  
1 endangered species: gray wolf (delisted and  
relisted in 2008)

## FLORA

7 species of conifers  
Approximately 80% of forest is comprised of  
lodgepole pine  
Approximately 1,500 species of native  
vascular plants  
More than 210 species of exotic (non-native)  
plants  
186 species of lichens  
At least 406 species of thermophiles (only 1%  
of hydrothermal areas inventoried)

## CULTURAL RESOURCES

Approximately 1,600 archeological sites  
More than 300 ethnographic resources  
(animals, plants, sites)  
26 associated Native American tribes  
More than 24 sites, landmarks, and districts  
on the National Register of Historic Places  
1 National Historic Trail  
More than 900 historic buildings  
More than 379,000 cultural objects and  
natural science specimens  
Thousands of books (many rare),  
manuscripts, periodicals  
90,000 historic photographs

## VISITORS

2008: 3,675,379 visits to the park  
2007–2008 winter: 294,357 visits

## FACILITIES

9 visitor centers, museums, and contact  
stations  
9 hotels/lodges (2,000+ hotel rooms/cabins)  
7 NPS-operated campgrounds (450+ sites)  
5 concession-operated campgrounds  
(1,700+ sites)  
More than 1,500 buildings (NPS and  
concessions)  
52 picnic areas  
1 marina  
13 self-guiding trails

## ROADS AND TRAILS

5 park entrances  
466 miles of roads (310 miles paved)  
More than 15 miles of boardwalk  
Approximately 1,000 miles of backcountry  
trails  
92 trailheads  
301 backcountry campsites

## EMPLOYEES

Approximately 800 people work for the  
National Park Service at peak summer  
levels; about 400 year-round  
Approximately 3,500 people work for  
concessioners at peak summer levels

*World's first  
national park*  
*A designated World  
Heritage Site  
and Biosphere  
Reserve*  
*\* 3,472 square miles  
or 8,987 sq. km*  
*\* 2,221,766 acres or  
899,139 hectares*  
*63 air miles north to  
south (102 km)*  
*54 air miles east to  
west (87 km)*  
*96% in Wyoming,  
3% in Montana,  
1% in Idaho*  
*Highest Point:  
11,358 ft.  
(Eagle Peak)*  
*Lowest Point: 5,282  
ft. (Reese Creek)*  
*Larger than  
Rhode Island &  
Delaware  
combined*  
*Approximately 5%  
of park covered  
by water; 15% by  
grassland; and  
80% by forests*  
*Precipitation ranges  
from 10 inches  
(26 cm) at the  
north boundary  
to 80 inches (205  
cm) in the south-  
west corner*  
*Temperatures:  
Average at  
Mammoth:  
January: 9°F  
July: 80°F*  
*Records:  
High: 99°F, 2002  
(Mammoth)  
Low: -66°F, 1933  
(West Entrance,  
Riverside  
Station)*

\* *About park square mileage and acreage: No area figures for the park have been scientifically verified. The figures used here have been used for many years and in different references. They differ from the park's master deed, which also contains unverified figures. Efforts to confirm the total park area continue.*





# FREQUENTLY ASKED QUESTIONS

## How did Yellowstone get its name?

Yellowstone National Park is named after the Yellowstone River, the major river running through the park. According to French-Canadian trappers in the 1800s, they asked the name of the river from the Minnetaree tribe. They responded “Mi tse a-da-zi,” which literally translates as “Rock Yellow River.” (Historians do not know why the Minnetaree gave this name to the river.) The trappers translated this into French as “Roche Jaune” or “Pierre Jaune.” In 1797, explorer-geographer David Thomson used the English translation—“Yellow Stone.” Lewis and Clark called the Yellowstone River by the French and English forms. Subsequent usage formalized the name as “Yellowstone.”

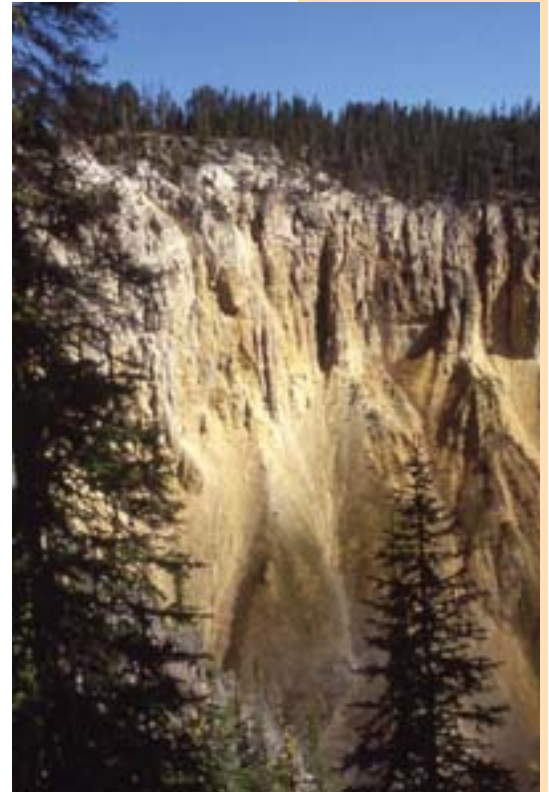
## Did other national parks exist before Yellowstone?

Some sources list Hot Springs in Arkansas as the first national park—it was set aside in 1832, forty years before Yellowstone was established—but it was actually the nation’s oldest national reservation, set aside to preserve and distribute a utilitarian resource (hot water), much like our present national forests. In 1921, an act of Congress established Hot Springs as a national park.

Other sources argue Yosemite was the first national park, but it was actually a state park. In 1864, Congress set aside the area surrounding the Yosemite Valley and the Mariposa Grove of Big Trees and gave them to the state of California to administer for public use and recreation. In 1890, Congress established Yosemite as a national park 18 years after it established Yellowstone National Park.

## Is Yellowstone the largest national park?

No. More than half of Alaska’s national park units are larger, including Wrangell–St. Elias National Park and Preserve, which is the largest unit in the National Park System (13 million acres). Until 1994,



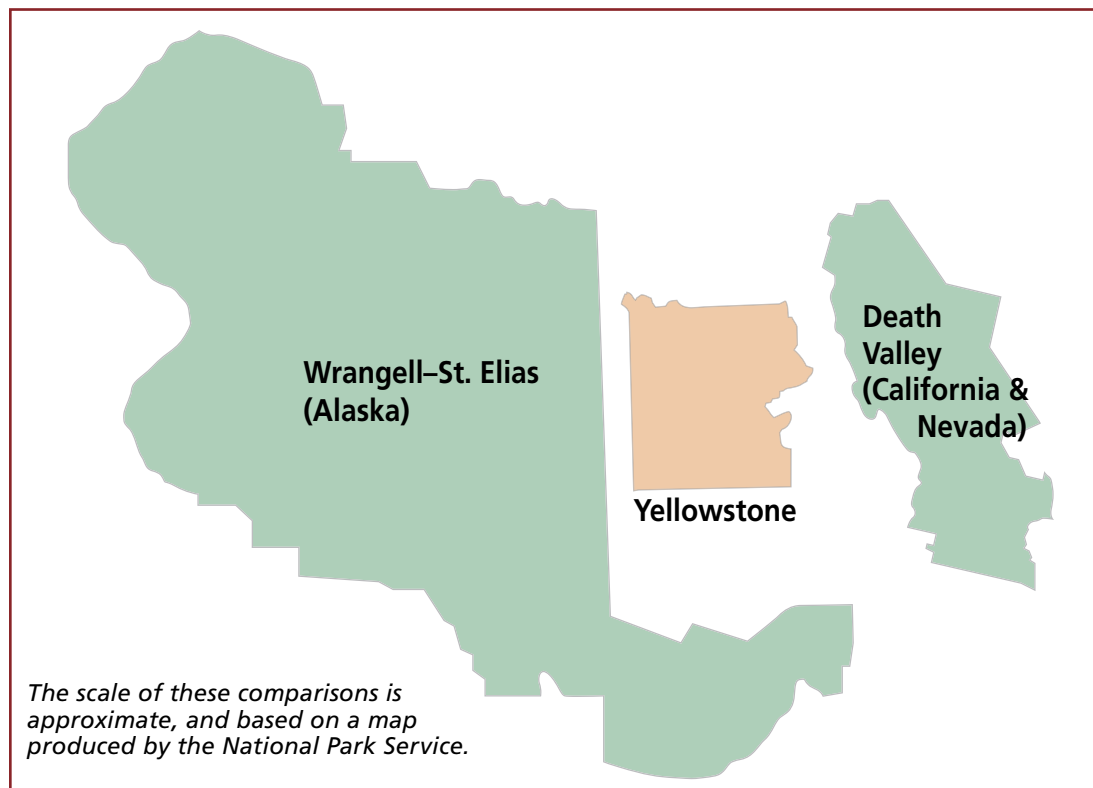
*The golden walls of the Grand Canyon of the Yellowstone River, above. Yellowstone is sometimes confused with Yosemite National Park (below), which is in California and was not the first national park.*



## FAQ: General



The Man and the Biosphere Program designates Yellowstone as a Biosphere Reserve & World Heritage Site. To find out more: [www.cr.nps.gov/worldheritage](http://www.cr.nps.gov/worldheritage) [whc.unesco.org/](http://whc.unesco.org/) [www.unesco.org/mab](http://www.unesco.org/mab)



Yellowstone (at 2.2 million acres) was the largest national park in the contiguous United States. That year Death Valley National Monument was expanded and became a national park—it has more than 3 million acres.

### Does Yellowstone include a federally designated wilderness?

No. Most of the park was recommended for this designation in 1972, but Congress has not acted on the recommendation. (See Chapter 8, “Wilderness.”)

### Why is Yellowstone called a Biosphere Reserve and a World Heritage Site?

The United Nations designated Yellowstone National Park as a Biosphere Reserve and a World Heritage Site because of the worldwide significance of its natural and cultural resources. These designations have nothing to do with how Yellowstone is managed—the United Nations has no authority to dictate federal land management decisions in the United States—nor do they change the fact that Yellowstone is under the legal authority of the United States of America.

The October 26, 1976, United Nations designation of Yellowstone as a Biosphere Reserve stated:

Yellowstone National Park is recognized as part of the international network of biosphere reserves. This net-

work of protected samples of the world’s major ecosystem types is devoted to conservation of nature and scientific research in the service of man. It provides a standard against which the effect of man’s impact on the environment can be measured.

The September 8, 1978, United Nations designation of Yellowstone as a World Heritage Site, requested by U.S. President Richard Nixon and Congress, stated:

Through the collective recognition of the community of nations . . . Yellowstone National Park has been designated as a World Heritage Site and joins a select list of protected areas around the world whose outstanding natural and cultural resources form the common inheritance of all mankind.

### What is the difference between a national park and a national forest?

National parks are administered by the Department of the Interior and national forests by the Department of Agriculture. The National Park Service is mandated to preserve resources unimpaired, while the Forest Service is mandated to wisely manage resources for many sustainable uses. Six national forests surround Yellowstone National Park, shown in the map on page 48.

**How many rangers work in Yellowstone?**

Park rangers perform duties in interpretation, education, resource management, law enforcement, emergency medical services, and backcountry operations. In Yellowstone, approximately 180 rangers work in the park during the peak summer season; less than 100 year-round. Other park employees perform duties in research, maintenance, management, administration, trail maintenance, fire management, and fee collection.

**Is Yellowstone the most visited national park?**

No. Great Smoky Mountains National Park has the most visitors—more than nine million. The Grand Canyon and Yosemite also receive more visits than Yellowstone.

**Is Yellowstone open in winter?**

Yes. You can drive into the park through the North Entrance year-round. At Mammoth, you can take self-guiding tours of Fort Yellowstone and the Mammoth Terraces, join a guided walk or tour, crosscountry ski, snowshoe, ice skate (sometimes), rent a hot tub, soak in the Boiling River, watch wildlife, attend ranger programs, and visit the Albright Visitor Center. You can also arrange for tours to Norris Geyser Basin, Old Faithful, and the Grand Canyon of the Yellowstone River.

From Mammoth, you can drive past Blacktail Plateau, through Lamar Valley, and on to Cooke City, Montana. You may see coyotes, bison, elk, wolves, eagles, and other wildlife along the way. You can also stop to crosscountry ski or snowshoe a number of trails that begin along this road.

If the interior of the park is open for winter use, you can tour the lower half of the park by guided snowmobile or snowcoach trips.



You can also stay at Old Faithful Snow Lodge, from which you can walk, snowshoe, or ski around the geyser basin; take shuttles to crosscountry ski trails; or join a tour to other parts of the park such as West Thumb, Hayden Valley, and the Grand Canyon of the Yellowstone River.

**Can we swim in Yellowstone's rivers and lakes?**

Swimming is not recommended because most lakes and streams are extremely cold. Firehole Canyon, near Madison Junction, has a swimming area popular in summer. Boiling River, north of Mammoth Hot Springs, is one of the few legal thermal soaking areas; soaking is allowed during daylight hours only and at your own risk.

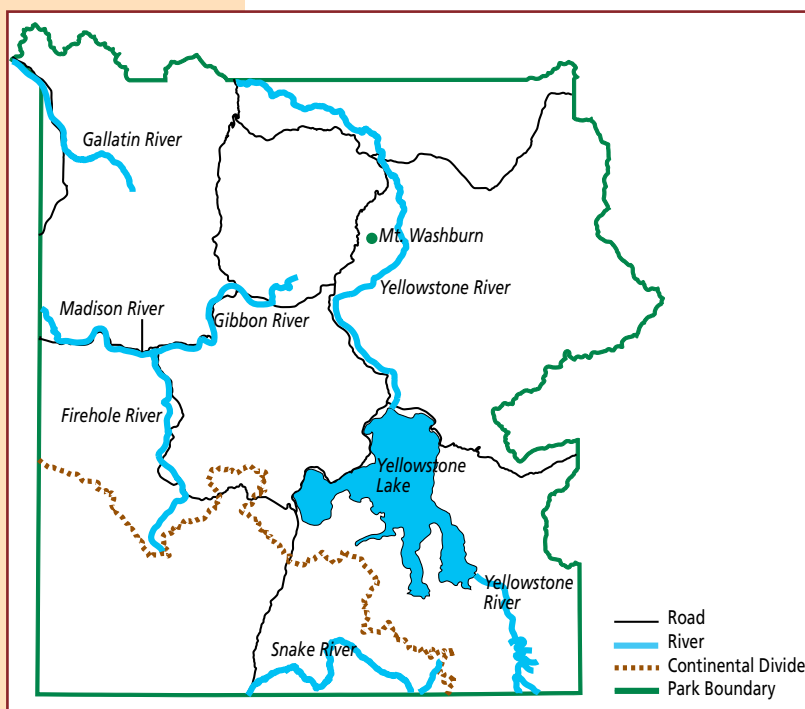
## FAQ: Geography

### What is the highest peak in the park?

Eagle Peak in the southeastern part of Yellowstone is the highest at 11,358 ft.

### What is the Continental Divide?

Think of the Continental Divide as the crest of the continent. Theoretically, when precipitation falls on the west side of the Divide, it eventually reaches the Pacific Ocean. When it falls on the east side of the Divide, it eventually reaches the Atlantic Ocean. In Yellowstone (as elsewhere), this ridgeline is not straight. You cross the Continental Divide three times between the South Entrance and Old Faithful. Craig Pass is the highest crossing, at 8,262 feet.



### How cold is Yellowstone in winter?

Average winter highs are 20–30°F; average lows are 0–9°F. The record low was –66°F (–54°C) at Riverside Ranger Station, near the West Entrance, on February 9, 1933.

### Where does the Yellowstone River flow?

The river begins outside the park on Younts Peak and flows into Yellowstone Lake. It leaves the lake at Fishing Bridge, and continues north-northwest until it leaves the park near Gardiner, Montana. The Yellowstone River continues north and east through Montana and joins the Missouri River just over the North Dakota state line.

### Does the Missouri River begin here?

No, but its three tributaries begin in the Greater Yellowstone area. The Jefferson

begins in the Centennial Mountains, west of the park. The Madison River forms inside the park at Madison Junction, where the Gibbon and Firehole rivers join. The Gallatin River also begins inside the park north of the Madison River. It flows north through Gallatin Canyon and across the Gallatin Valley, joining the Madison and Jefferson rivers at Three Forks, Montana, to form the Missouri River.

### Does the Snake River begin here?

Yes, the Snake River—a major tributary of the Columbia River—has its headwaters just inside Yellowstone on the Two Ocean Plateau, at a point on the Continental Divide. The river flows through Idaho and joins the Columbia in Washington. The Snake River is 1,040 miles long; 42 miles of it are in Yellowstone National Park.

### How did Mt. Washburn form?

At 10,243 feet, this peak can be seen from many locations in the park. It is a remnant of an extinct volcano from the Absaroka Volcanics of about 50 million years ago. The volcano was literally cut in half by a volcanic eruption 640,000 years ago. (See next page and Chapter 3.) Only the northern part of the original volcano is still visible.

### How did the Grand Canyon of the Yellowstone River form?

Scientists continue to evolve their theories about its formation. Hydrothermal activity existed here at least before the Yellowstone Caldera eruption. After that eruption, lava flows and volcanic tuffs buried the canyon area; but hydrothermal gases and hot water weakened the rock. The river eroded this rock, carving the canyon. Glaciation also contributed to forming the canyon: Melt waters helped shape and deepen the canyon.

### How did Yellowstone Lake form?

The lake's main basin is part of the Yellowstone Caldera, which was formed 640,000 years ago; West Thumb was formed by a later, smaller eruption. The arms of the lake were formed by uplift along fault lines and sculpting by glaciers. Some geologists speculate that Yellowstone Lake once drained south to the Snake River. The lake now drains north at Fishing Bridge. Some scientists consider LeHardys Rapids to be the geologic northern boundary of the lake because the periodic rise and fall of that site appears to control lake outflow.

See chapters 2–4 for more information about geography & geology in Yellowstone.

### Is Yellowstone a volcano?

Yes. Within the past two million years, many volcanic eruptions have occurred in the Yellowstone area—three of them major.

### What is the caldera line on the park map?

The caldera line (*see at right*) marks the rim of the Yellowstone Caldera, created by a massive volcanic eruption approximately 640,000 years ago. Subsequent lava flows filled in much of the crater, and it is now measured at 30 x 45 miles. Its rim can best be seen from the Washburn Hot Springs overlook, south of Dunraven Pass. Gibbon Falls, Lewis Falls, and Flat Mountain Arm of Yellowstone Lake are part of the rim.

### Is Yellowstone's volcano still active?

Yes. The park's numerous hydrothermal features attest to the heat still beneath this area. Earthquakes—1,000 to 3,000 per year—also reveal activity below ground. The Yellowstone Volcano Observatory (YVO) monitors an array of signals to track this activity.

### Where can I see volcanic flows?

Almost everywhere you look in Yellowstone! Prominent locations include Sheepsteer Cliff (columnar basalt); Tuff Cliffs (ashfall); Virginia Cascades (ashfall, lava); Firehole Canyon (lava); Mt. Haynes and Mt. Jackson, along the road between Madison and West Entrance (columnar rhyolite, Lava Creek tuff); north of Tower Fall (several different basalt formations); Obsidian Cliff.

### What is a supervolcano?

Some scientists consider Yellowstone to be a “supervolcano,” which refers to an eruption of more than 240 cubic miles of magma. Two of Yellowstone's three major eruptions met the criteria. (*See Chapter 3.*)

### Will the Yellowstone volcano erupt soon?

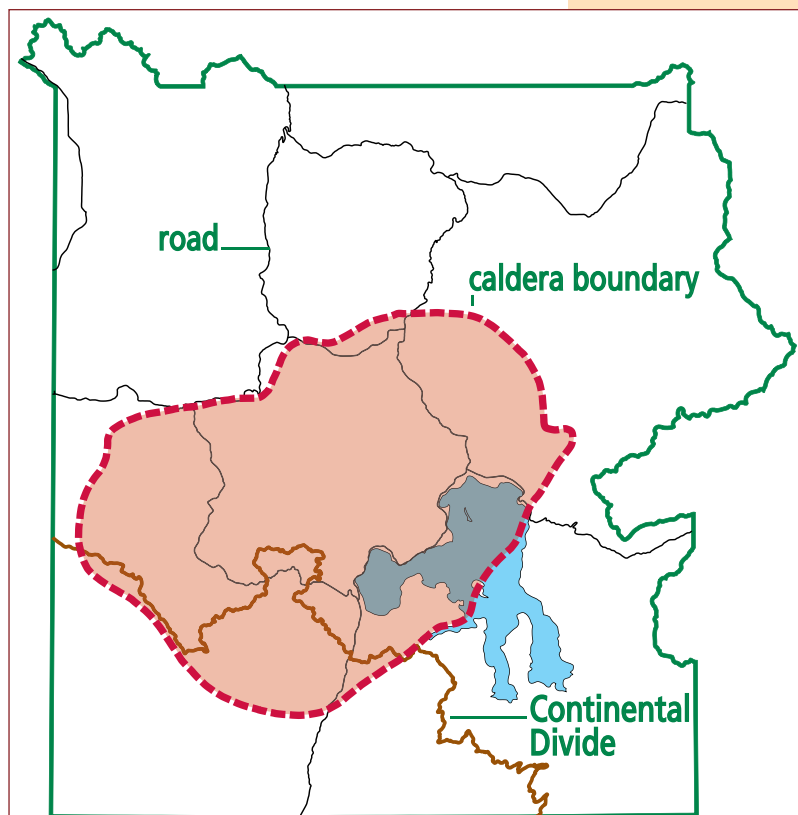
Current geologic activity at Yellowstone has remained relatively constant since scientists first started more than 30 years ago. Though another caldera-forming eruption is theoretically possible, it is very unlikely in the next thousand or even 10,000 years. Scientists have also found no indication of an imminent smaller eruption of lava.

### How do scientists know the Yellowstone volcano won't erupt?

Scientists from the Yellowstone Volcano Observatory (YVO) watch an array of moni-

tors in place throughout the region. These monitors would detect sudden or strong movements or shifts in heat that would indicate increasing activity. No such evidence exists at this time.

In addition, YVO scientists collaborate with scientists from all over the world to study the hazards of the Yellowstone volcano. To view current data about earthquakes,



ground movement, and stream flow, visit the YVO website at [volcanoes.usgs.gov/yvo/](http://volcanoes.usgs.gov/yvo/).

### What is Yellowstone National Park doing to stop or prevent an eruption?

Nothing can be done to prevent an eruption. The temperatures, pressures, physical characteristics of partially molten rock, and immensity of the magma chamber are beyond human ability to impact—much less control.

### If Old Faithful Geyser quits erupting, would that be a sign the volcano is about to erupt?

All geysers are highly dynamic, including Old Faithful. We expect Old Faithful to change in response to the ongoing geologic processes associated with mineral deposition and earthquakes. Thus, a change in Old Faithful Geyser will not necessarily indicate a change in volcanic activity.

## FAQ: Hydro- thermal Geology



### Why are geysers in Yellowstone?

Yellowstone's volcanic geology provides the three components for geysers and other hydrothermal features: heat, water, and a natural "plumbing" system. Magma beneath the surface provides the heat. Ample rain and snowfall supply the water. The water seeps several thousand feet below the

surface where it is heated. Underground cracks and fissures form the plumbing. Hot water rises through the plumbing to surface as hydrothermal features in Yellowstone. Geysers occur when that plumbing is constricted. (See Chapter 3.)

### What exactly is a geyser basin?

A geyser basin is a geographically distinct area that contains a "cluster" or array of hydrother-

mal features that may include geysers, hot springs, mudpots, and fumaroles. These distinct areas often (but not always) occur in topographically low places because hydrothermal features tend to be concentrated around the margins of lava flows and in areas of faulting.

### Where can I see mudpots?

Small areas of mudpots occur at West Thumb Geyser Basin, Fountain Paint Pot, and Artist Paintpots. The largest group of mudpots can be found at Mud Volcano, at the southern end of Hayden Valley. Here, you'll find some of the most acidic features in the park, including Sulphur Caldron with a pH of 1–2.

### What is the most active thermal area in the park?

Scientists consider Norris Geyser Basin to be the hottest, oldest, and most dynamic of Yellowstone's *active* hydrothermal areas. The highest temperature yet recorded in any Yellowstone hydrothermal area was measured in a scientific drill hole at Norris: 459°F just 1,087 feet below the surface. Norris shows evidence of having had hydrothermal features for at least 115,000 years. The features in the basin change often, with

frequent disturbances from seismic activity and water fluctuations. Norris is so hot and dynamic primarily because it sits on the intersection of three major faults, two of which intersect with a ring fracture from the Yellowstone Caldera eruption 640,000 years ago.

### What is the oldest thermal area in the park, active or inactive?

Terrace Mountain, at Mammoth Hot Springs, is a dormant thermal area that has been dated to 400,000 years old.

### Why can't I bring my dog on geyser basin trails?

Dogs do not seem to recognize the difference between hot and cold water. Dogs have died diving into hot springs. They also disturb wildlife and are prohibited from all park trails. In the few places pets are permitted, they must be leashed at all times. Ask at a visitor center where you can safely and legally walk a pet.

### Is it really dangerous to walk off the boardwalks in geyser basins?

YES! Geyser basins are constantly changing. Boiling water surges just under the thin crust of most geyser basins, and many people have been severely injured (second and third degree burns) when they have broken through the fragile surface. Some people have died from falling into hydrothermal features.

### Why can't I smoke in the geyser basins?

Litter of any kind can clog vents, thus altering or destroying hydrothermal activity. Cigarette butts quickly accumulate if smoking is allowed. Also, sulfur deposits exist in these areas, and they easily catch fire, producing dangerous—sometimes lethal—fumes.

### Were Native Americans afraid of geysers?

Native Americans in general were not afraid of geysers. Many of the associated tribes of Yellowstone say their people have used the park as a place to live, to collect food and other resources, and as a passage through to the bison hunting grounds of the Great Plains. Archeologists and historians have also uncovered ample evidence that people lived in and visited Yellowstone for thousands of years before historic times. See Chapter 1 for more about Native Americans in Yellowstone.

### **Did glaciers ever cover Yellowstone?**

Yes, Yellowstone has experienced glaciers many times. Scientists estimate that 25,000 years ago, for example, most of the park was under 4,000 feet of ice. (See page 64.) During this glacial era, called the Pinedale, glaciers flowed down from the Beartooth Plateau and other high country, following river corridors such as the Lamar, Yellowstone, and Madison. The glaciers retreated and advanced several times at least, and finally retreated 13,000–14,000 years ago.

### **Where can I see their evidence?**

#### **Grand Canyon of the Yellowstone River:**

The current canyon dates back to the end of the last glaciation, 13,000–14,000 years ago. Melt waters associated with the last glaciation carved the current V-shaped valley.

**Hayden Valley:** The valley was filled by a lake at least once and, consequently, contains fine-grained lake sediments that are now covered with glacial till left from the most recent glacial retreat 13,000–14,000 years ago. Because glacial till contains many different grain sizes, including clay and a thin layer of lake sediments, water cannot percolate quickly into the ground. Thus, Hayden Valley is marshy and has few trees.

**Norris Geyser Basin:** The Ragged Hills, which are northwest of Porcelain Basin, are thermally altered kames (hills of glacial debris) formed as glaciers receded. The underlying hydrothermal features melted remnants of ice and caused masses of debris to be dumped, which were then altered by steam and hot water.

**Tower Fall area:** North of Tower Fall, sediments between layers of basalts may show evidence of the oldest known glaciation in Yellowstone. Plus, glacial boulders from the last major glaciation of Yellowstone—the Pinedale—rest atop the youngest basalt.

**Lamar Valley:** The glacial ponds and huge boulders (erratics) between the Lamar and Yellowstone rivers were left by the retreating glaciers, as were several moraines (ridges of debris).

**Madison Valley,** west of Seven Mile Bridge: Glacial moraines, glacial outwash, and recent Madison River deposits can be seen.

**Mammoth Hot Springs:** Thermal kames, including Capitol Hill and Dude Hill, are major features of the Mammoth area. East of Mammoth, streams at the edge of glaciers

formed the small, narrow valleys where Floating Island Lake and Phantom Lake are found. In Gardner Canyon, the old bed of the Gardner River is covered by glacial till.

**Swan Lake Flat:** South of Mammoth, this area was glaciated and is now meadows and wetlands where people often see elk, bison, sometimes grizzlies and wolves, and water



birds. Electric Peak, to the northwest (and in photo above) was also carved by glaciers.

**Upper Geyser Basin:** Glacial deposits underlying this and other area geyser basins store the water necessary for geysers to occur and allow the water to percolate up from depth.

**Fountain Flats:** The Porcupine Hills are thermal kames.

## FAQ: The Fires of 1988



Visitors came throughout the summer of 1988.

### How much of the park burned in 1988?

The 1988 fires affected 793,880 acres or 36 percent of the park. Five fires burned into the park that year from adjacent public lands, including the largest, the North Fork fire. It started accidentally and burned more than 410,000 acres.

### How were weather conditions different than in previous years?

Yellowstone usually experiences afternoon showers three or four days each week during the summer, but in 1988 no measurable rain fell for almost three months. The most severe drought in the park's recorded history occurred that summer. Also, a large number of lightning strikes came with a series of dry storm fronts. This lightning started many of the fires and storm fronts stoked them with particularly high

and sustained winds.

### Could the fires have been put out?

It is possible that the few fires that started in early June might have been extinguished. However, between 1972 and 1987, the average fire had gone out naturally after burning only one acre. So, while the early fires were monitored closely and some were contained from going out of the park, the history of fire behavior in Yellowstone, coupled with an abnormally wet spring, suggested these fires would go out as previous fires had. After July 15, all fires were fought aggressively from the moment they were detected. Despite the largest firefighting effort in the history of the nation, weather finally contained the fires when snow fell in September.

### Did Yellowstone's fire management policy change after the fires of 1988?

After the fires of 1988, a national policy review team examined the national fire policy again, and concluded that natural fire policies in national parks and wilderness areas were basically sound. It also recommended improvements that were incorporated into the National Park Service's fire policy of June 1990 and into Yellowstone National Park's fire management plan of 1992. *For more about the evolution of fire policy and where it stands today, see Chapter 6.*

### How does fire benefit Yellowstone?

Fires are a natural part of the Northern Rockies ecosystem. Vegetation in the Greater Yellowstone Ecosystem has adapted to fire and in some cases may be dependent on it. Fire promotes habitat diversity by removing the forest overstory, allowing different plant communities to become established, and preventing trees from becoming established in grassland. Fire increases the rate that nutrients become available to plants by rapidly releasing them from wood and forest litter and by hastening the weathering of soil minerals. This is especially important in a cold and dry climate like Yellowstone's, where decomposition rates are slower than in more hot and humid areas.

In addition, the fires of 1988 provided a rare natural laboratory for scientists to study the effects of fire on an ecosystem.

### Why doesn't the park remove burned trees?

Burned trees and those that have died for other reasons still contribute to the ecosystem. For example, dead standing trees provide nesting cavities for many types of animals; fallen trees provide food and shelter for animals and nutrients for the soil. However, park managers will remove dead or burned trees that pose safety hazards along roads or in developed areas.

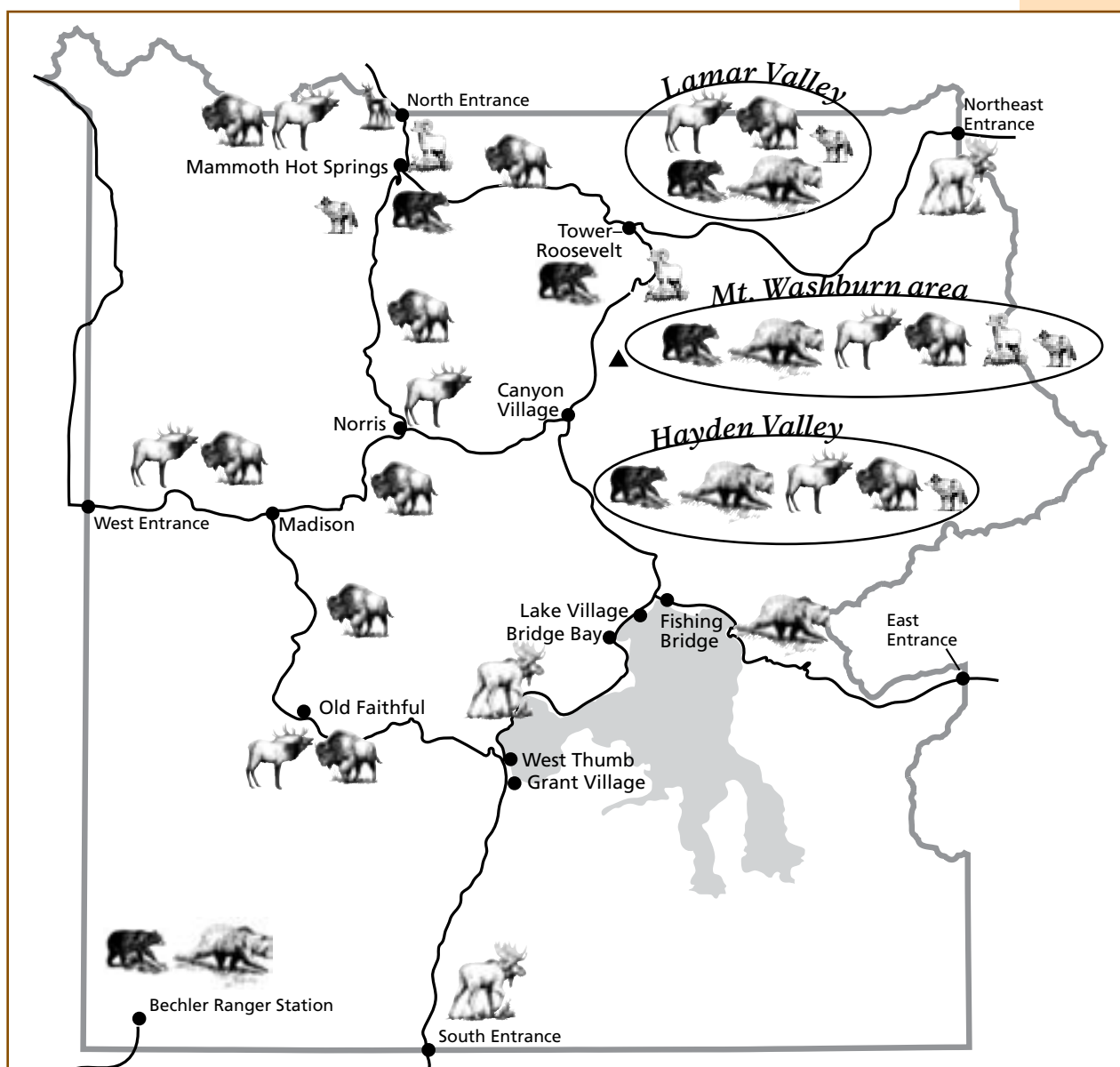


**Where can I see wildlife?**

It helps to know the habits and migration patterns of the animals you want to see and the habitats in which they live. For example, bighorn sheep are adapted to live on steep terrain; so you might see them on cliffs in the Tower area. Osprey eat fish, so you would expect to see them along rivers. Bison graze on grasses and sedges, and mate in August, so you are likely to see them in big, noisy herds in the Hayden and Lamar valleys.

Hydrothermal basins provide important habitat for wildlife. For example, many bison and elk live in the Old Faithful area year-round. In the winter, they take advantage of the warm ground and thin snow cover. Both black and grizzly bears visit these areas during the spring when winter-killed animals are available.

Rangers at the visitor centers can tell you more about where wildlife have been seen recently.



Animal illustrations © Zachary Zdinak

## FAQ: Wildlife, General



Drawing © Zachary Zdinak

### Where are the bears?

People who visited Yellowstone prior to the 1970s often remember seeing bears along roadsides and within developed areas of the park. Although observing these bears was very popular with park visitors, it was not good for the people or the bears. (See Chapter 8.) In 1970, the park initiated an

intensive bear management program to return the grizzly and black bears to feeding on natural food sources and to reduce bear-caused human injuries and property damage. The measures included installing bear-proof garbage cans and closing

garbage dumps in the park.

Bears are still sometimes seen near roads and they may be viewed occasionally in the wild. Grizzly bears are active primarily at dawn, dusk, and night. In spring, they may be seen around Yellowstone Lake, Fishing Bridge, and the East Entrance due to the trout spawning creeks in these areas. In mid-summer, they are most commonly seen in the meadows between Tower–Roosevelt and Canyon, and in the Lamar Valley. Black bears are most active at dawn and dusk, and sometimes during the middle of the day. Look for black bears in open spaces within or near forested areas. Black bears are most commonly observed between Mammoth, Tower, and the Northeast Entrance.

### Are grizzly bears considered threatened or endangered?

The Yellowstone grizzly population was removed from the federal threatened species list in 2007. However, scientists will continue to monitor the long-term recovery goals for grizzly bears. (See Chapter 8.)

### What is the difference between a bison and a buffalo?

In North America, both terms refer to the American bison; the scientific name is *Bison bison*. Early European explorers called this animal by many names. Historians believe that the term “buffalo” grew from the French word for beef, “boeuf.” Some people insist that the term “buffalo” is incorrect because the “true” buffalo exist on other

continents and are only distant relatives. However, “buffalo” is used for less formal, everyday use; “bison” is preferred for scientific use. In this book, we use “bison.”

### Where are good birding locations?

That depends on what kind of birds you want to see, what time of day you are looking, and where you are in the park.

Hayden Valley is one of the best places to view water birds and birds of prey. Shore birds feed in the mud flats at Alum Creek. Sandhill cranes often nest in the valley. Ducks, geese, and American white pelicans cruise the river. Bald eagles and osprey hunt for fish along the river; northern harriers fly low looking for rodents in the grasses. Great gray owls are sometimes seen searching the meadows for food (these birds are sensitive to human disturbance).

Blacktail Lakes, between Mammoth and Tower Junction, and the Madison River west of Madison Junction are also good places to look for birds.

### Why is fishing lead-free in Yellowstone?

Birds, such as loons, waterfowl, cranes, and shorebirds, are vulnerable to lead poisoning. While we can do little about natural hazards, we can minimize the effects of lead on these species. Yellowstone National Park bans most lead tackle. (Terminal tackle must be lead-free; sinkers used to fish for deep-dwelling lake trout are permissible because they are too large to be ingested.)

See Chapter 7 for more information about wildlife in Yellowstone, and Chapter 8 for more about issues involving wildlife.

### How big is the Grand Canyon of the Yellowstone River?

This huge canyon is roughly 20 miles long, more than 1,000 feet deep, and 1,500 to 4,000 feet wide.

### What causes the different colors in the canyon?

You could say the canyon is “rusting.” The colors are caused by oxidation of iron compounds in the rhyolite rock, which has been hydrothermally altered (“cooked”). The colors indicate the presence or absence of water in the individual iron compounds. Most of the yellows in the canyon result from iron and sulfur in the rock. (See Chapter 3.)

### Where can I see the canyon and falls?

**North Rim Drive:** Accessible walkways at the Brink of the Lower Falls Trail lead to views of both waterfalls. You can also see the Lower Falls from Lookout, Red Rock, and Inspiration points.

**South Rim Drive:** See the Lower Falls at Artist Point, from Uncle Tom’s Trail, and from a few places along the South Rim Trail; see the Upper Falls from two viewpoints at Uncle Tom’s Point.

You can also see the brink of the Upper Falls from a viewing area on the Grand Loop Road south of Canyon Junction, between the entrances to North and South Rim drives.

### Is there a place where I can see both falls at once?

No. The canyon bends between the Upper and Lower falls, so there is no location where they can be seen at the same time.

### How tall are the falls?

Upper Falls: 109 ft.; Lower Falls: 308 ft.

### How much water goes over the falls?

The volume varies from 63,500 gallons per second at peak runoff to 5,000 gallons per second in the late fall.

### What causes the green stripe in the Lower Falls?

A notch in the lip in the brink makes the water deeper and keeps it from becoming turbulent as it goes over the edge.

### Can I get to the bottom of the canyon?

Only one trail in this area leads to the bottom of the canyon—Seven Mile Hole Trail, a strenuous, steep round trip of 11 miles.



### This area has a point and a trail named after “Uncle Tom”; who was he?

“Uncle Tom” Richardson was an early concessioner in the canyon area. From 1898–1905, he guided visitors to the canyon bottom down a steep trail using rope ladders. (This is the present Uncle Tom’s Trail, which descends partway into the canyon via steep steel steps.)

### What animals can I see in this area?

Inside the canyon, look for osprey soaring over the river or perched on their five-foot diameter nests. Generally, six to ten osprey nests are occupied in the canyon near Canyon Village. They nest here from late April until late August or early September. Also look for ravens, bald eagles, and swallows.

Away from the canyon, look for mule deer, moose, red foxes, grizzly and black bears, coyotes, Steller’s jays, and great gray owls. During July, a variety of butterflies feast on the abundant flowers in the meadows.

Hayden Valley, which begins approximately 5 miles south of Canyon Junction, is one of the best places in the park to view a wide variety of large mammals. Grizzly bears are often seen in the spring and early summer when they may be eating winter-killed animals or preying upon elk calves. Large herds of bison may be viewed in the spring, early summer, and during the rut in August. Coyotes can almost always be seen in the valley; wolves are also sometimes seen.

Mt. Washburn is another excellent place for viewing wildlife. Bighorn sheep and mar-mots can be seen on its slopes in the summer. Wolves and black and grizzly bears are sometimes seen. Elk and bison frequent the valley north of the mountain, and coyotes are often seen there too.

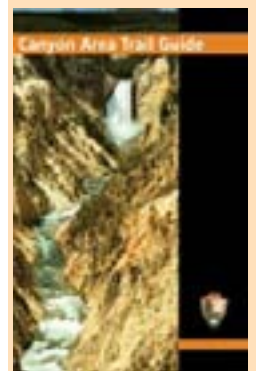
## FAQ: Canyon Village Area

•  
**Grand Canyon  
of the  
Yellowstone  
River**

•  
**Mount  
Washburn**

•  
**Hayden Valley**

Views of  
waterfalls



Pick up the Canyon Area Trail Guide at visitor centers or at viewpoints in the Canyon area. 50¢ donation requested.

Yellowstone Resources  
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## FAQ: Fishing Bridge & Lake



### Where does the Yellowstone River begin? Where does it end?

It begins on the slopes of Younts Peak in the Absaroka Mountains southeast of the park and completes its 671-mile run by joining the Missouri River near the Montana/North Dakota border. Its waters then travel to the Mississippi River and into the Atlantic Ocean at the Gulf of Mexico. It is the longest undammed river in the United States.

### How big is Yellowstone Lake? How deep? Is it natural?

The lake is natural and has 131.7 square miles of surface area and 141 miles of shoreline; it is 20 miles long by 14 miles wide. Its deepest spot is about 410 feet; its average depth is 140 feet. The lake's basin has an estimated capacity of 12,095,264 acre-feet of water. Because its annual outflow is about 1,100,000 acre-feet, the lake's water is completely replaced only about every eight to ten years. Since 1952, the annual water level fluctuation has been less than six feet.

### Is Yellowstone Lake the largest lake in the world?

No, but it is the largest lake at high elevation (above 7,000 feet) in North America.

### Why can't we fish from Fishing Bridge?

Overfishing for cutthroat trout here contributed to their decline in the lake. The trout also spawn here. For these reasons, fishing is prohibited from the bridge.

### What happened to the old campground at Fishing Bridge?

The National Park Service campground was located where bears came to fish, and many human/bear conflicts occurred. It was closed in 1989. A recreational vehicle park, operated by a concessioner, still exists in the area. Only hard-sided camping units or RVs are allowed at this campground.

### How cold is Yellowstone Lake?

During late summer, Yellowstone Lake becomes thermally stratified with several water layers having different temperatures. The topmost layer rarely exceeds 66°F, and the lower layers are much colder. Because of the extremely cold water, survival time for anyone in the lake is estimated to be only 20 to 30 minutes. In winter, ice thickness on Yellowstone Lake varies from a few inches to more than two feet with many feet of snow on top of the ice.

### What's that smell at Mud Volcano?

That "rotten egg" smell comes from hydrogen sulfide gas. Sulfur, in the form of iron sulfide, gives the features their many shades of gray.

### What animals can I see in this area?

The lake is home to the largest population of Yellowstone cutthroat trout in North America. You can see these trout and longnose suckers from Fishing Bridge. *See chapters 7 and 8 for more about aquatic life in the lake.* Also look for white pelicans, bald eagles, osprey, and a variety of ducks and other water birds.

In spring, you might be able to see trout leaping upstream at LeHardys Rapids, three miles north of Fishing Bridge.

The Fishing Bridge area, including Pelican Valley to the north and east, is especially significant to bears and other wildlife because lake, river, and terrestrial ecosystems merge here to create a diverse natural complex. Bears visit numerous streams in the spring and early summer to eat spawning trout. A bison herd winters in Pelican Valley, and individuals can be seen throughout the area. Moose used to be seen in the Yellowstone Lake area much more than they are today; look along water edges and in marshes. At Bridge Bay Marina, look for river otters.

### Historic Areas & Structures

*Fishing Bridge  
Trailside Museum*

*Lake Fish  
Hatchery Historic  
District including  
Lake Lodge*

*Lake Hotel*

*See Chapter 1 for  
more information  
on historic areas in  
the park.*



Pick up the *Mud Volcano Area Trail Guide* at visitor centers or at the area. 50¢ donation requested.

*Yellowstone Resources  
& Issues 2009*

### How did Madison Junction get its name?

Here, the Gibbon River joins the Firehole River to form the Madison River. (The Gibbon River flows from Grebe Lake through the Norris area to Madison Junction. The Firehole River starts south of Old Faithful and flows through the park's major hydrothermal basins north to Madison Junction.) The Madison joins the Jefferson and the Gallatin rivers at Three Forks, Montana, to form the Missouri River.

### What forms the cliffs around Madison Junction?

Part of what you see is the rim of the Yellowstone Caldera, plus later lava flows. National Park Mountain is actually part of the lava flows. Some of these lava flows come down to the road through Firehole Canyon, approximately one mile south of Madison Junction. Gibbon Falls, four miles north of the junction, drops 84 feet over a remnant of the caldera rim. (See Chapter 3.)

### Why is the bridge between Madison and the West Entrance called "Seven Mile Bridge"?

Seven Mile Bridge is located midway between (and seven miles from both) the West Entrance and Madison Junction. This landmark serves as a convenient reference point and separates the rugged lava-lined Madison Canyon east of the bridge from gentle hills to the west.

### What is happening to so many of the young lodgepole pines in the dense stands west of Seven Mile Bridge?

**Why are the needles turning orange?**  
Scientists have determined that no disease or insect is causing the problem. They think the trees are showing effects of cumulative drought stress and low winter snow pack. These conditions can cause "winter burn"—trees can't absorb enough water, and parts of the trees begin to die. New growth usually replaces the dead needles.

### What animals can I see in this area?

Along the Madison River, approximately 100 elk live year-round. The meadows adjacent to the this and the Gibbon rivers are prime elk calving areas in the spring. During the fall rut, elk frequent the meadows from Seven Mile Bridge to Madison Junction.

During spring, fall, and winter, herds of



bison favor the same meadows. Bison often use the entrance road to travel from one foraging area to another. In summer, they move to Hayden Valley, their traditional summer habitat and breeding area.

Bald eagles have nested in a tree about one mile west of Seven Mile Bridge in recent years; they fledged one young in 2008. They may nest nearby in the future. Several pairs of ospreys also nest along the Madison. You might also see trumpeter swans, Canada geese, mallards, Barrow's goldeneyes, and other water birds.

### Is the story about National Park Mountain true?

The legend, which you can read about on page 27 and at the Madison Information Station, tells of explorers camping here in 1870 and deciding Yellowstone should be set aside as a national park. It is a wonderful legend, but it isn't true. Explorers did camp at the junction in 1870, but they apparently did not discuss the national park idea.

They camped in a location where people have camped for thousands of years. Archeologists have found campfire remnants, obsidian flakes, and bone fragments dating back at least 10,000 years.

## FAQ: Madison & West Yellowstone Areas

### Historic Areas & Structures Madison Trailside Museum

See Chapter 1 for more information on historic areas in the park.

## FAQ: Mammoth Hot Springs Area

### Historic Areas & Structures

*Mammoth Hot  
Springs Historic  
District*

*Fort Yellowstone  
Historic Landmark  
District*

*Obsidian Cliff  
National Historic  
Landmark*

*U.S. Post Office*

See Chapter 1 for  
more information on  
historic areas in the  
park.

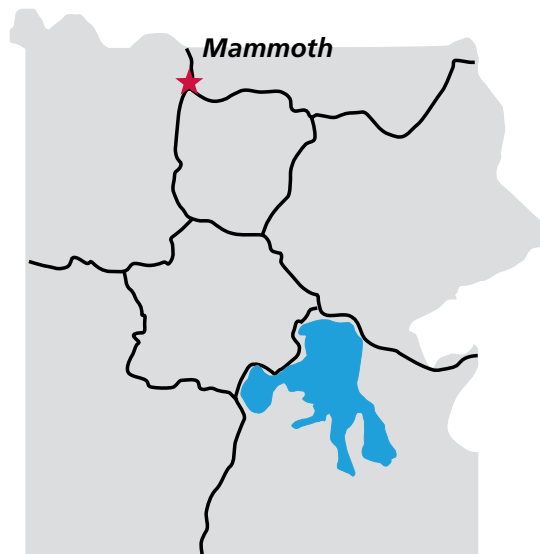
### Also here:

*Administrative  
Headquarters  
of Yellowstone  
National Park*



Pick up the *Mammoth Area Trail Guide* at visitor centers or at the terrace trailheads. 50¢ donation requested.

*Yellowstone Resources  
& Issues 2009*



### Is Mammoth Hot Springs in the Yellowstone Caldera?

No, it lies north of the caldera. However, the heat for its hot springs may come from the magma chamber that heats the rest of Yellowstone.

### Why are the dry springs so white?

Limestone, a form of calcium carbonate, underlies this area. Thermal waters dissolve the mineral, which is redeposited at the surface to form travertine. This rock is naturally white; colors in the hot springs come from heat-loving microorganisms called thermophiles. (See chapters 3 and 4.)

### Are the springs drying up?

No, the overall activity and volume of water discharge remain relatively constant, but you don't see it because most of the water flows underground.

### How was Bunsen Peak formed?

At 8,564 feet high, Bunsen Peak (south of Mammoth) is an intrusion of igneous material (magma) formed approximately 50 million years ago. (See Chapter 3.) Bunsen Peak and the "Bunsen burner" were named for physicist Robert Wilhelm Bunsen. He was involved in pioneering geyser research in Iceland. His theory on geyser activity was published in the 1800s, and it is still considered accurate.

### What were these old buildings?

Some of these historic buildings were built by the U.S. Army from 1891 to 1918, when it managed the park. (See Chapter 1.) Visitors can walk a self-guiding trail through Fort Yellowstone, a National Historic Landmark District.

### Can we soak in the hot springs?

No. You may soak in bodies of water fed by runoff from hydrothermal features, such as

at "Boiling River" two miles north of Mammoth. It is open during daylight hours and is closed during times of high water.

### What is the 45th parallel?

On the road between the North Entrance and Mammoth, a sign marks the 45th parallel of latitude, which is halfway between the Equator and the North Pole. Contrary to popular belief, the majority of the Montana/Wyoming state line does not follow the 45th parallel through the park.

### What forms the canyon north of Mammoth?

The canyon is the face of Mt. Everts, 7,841 feet high. It is made up of layered sandstones and shales—sedimentary deposits from a shallow inland sea, 70–140 million years ago. Fossils have been found here. Its steep cliffs—eroded by glaciers, floods, and landslides—provide habitat for bighorn sheep.

Mt. Everts was named for explorer Truman Everts, a member of the 1870 Washburn Expedition who became lost in the wilderness. He was found east of the mountain, near Blacktail Plateau, and was mistaken for a black bear and nearly shot.

### Why is Obsidian Cliff a National Historic Landmark?

For centuries Native Americans came to this cliff to make projectile points and other tools from obsidian, which fractures into round, sharp pieces. Obsidian from this site has been found as far east as Ohio, providing evidence of its trade value.

Also, in the 1920s, a wayside exhibit structure was built here, one of the first of its kind in Yellowstone.

### What animals can I see in this area?

Elk live here all year, and are wild and unpredictable. Each year visitors are chased, trapped, and sometimes injured by elk. Bull elk also sometimes attack cars during the autumn mating season, or rut.

Uinta ground squirrels form large colonies every summer in front of the visitor center and among the hotel cabins.

South of Bunsen Peak is Swan Lake Flat, where visitors often see elk, bison, and sometimes grizzlies and wolves. It is also an excellent place for watching cranes, ducks, and other birds.

Visitors often see bighorn sheep in the canyon north of Mammoth Hot Springs.

### Is Norris Geyser Basin within the Yellowstone Caldera?

Norris is close to the caldera, but not in it. East of Norris, on the road to Canyon, you come close to the caldera rim on Virginia Cascade Drive. The waterfall is formed by the Gibbon River as it crosses the Lava Creek Tuff, which occurred after the caldera collapsed. This is a great place to see lava flows and ash deposits up close. South of Norris, you'll cross the caldera rim at Gibbon Falls.

### When does Echinus Geyser erupt?

Once very predictable, Echinus's eruptions can vary from hours to days.

### When will Steamboat Geyser erupt?

Steamboat's major eruptions (more than 300 feet high) are unpredictable and often many years apart. Its most recent major eruption occurred May 2005. Its frequent "minor phase" eruptions eject water 10 to 40 feet high.

### Why is Norris so colorful?

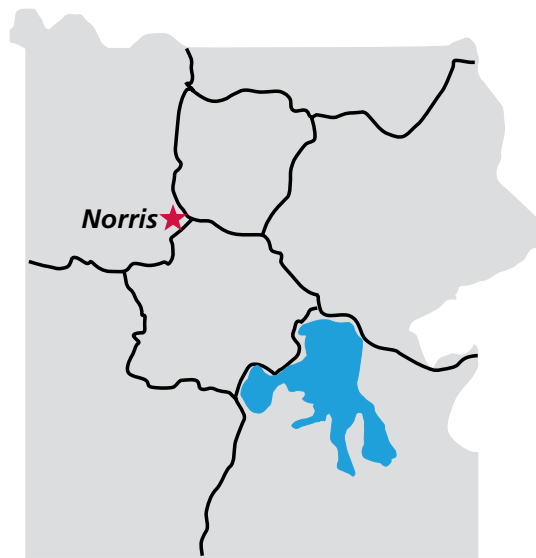
The colors here, like in other hydrothermal areas, are due to combinations of minerals and life forms that thrive in extreme conditions. At Norris, silica or clay minerals saturate some acidic waters, making them appear milky. Iron oxides, arsenic, and cyanobacteria create the red-orange colors. *Cyanidium* grows bright green. Mats of *Zygonium* are dark purple to black on the surface where they are exposed to the sun, bright green beneath. Sulfur creates a pale yellow hue. (See Chapter 4.)

### What is the "disturbance" at Norris that people talk about?

Periodically, Norris Geyser Basin undergoes a large-scale basin-wide thermal disturbance lasting a few days to a few weeks. Water levels fluctuate, temperatures and pH change, color changes, and eruptive patterns change throughout the basin. No one is sure what causes a disturbance. It might be caused by a massive fluctuation in the underground reservoirs providing water to the basin's features. In the fall, this could happen when decreased surface water mixes with water from deep underground, which holds more silica and clogs the cracks and crevices that supply water, thereby creating a "disturbance" as pressure builds.

### How did Norris get its name?

The area was named for Philetus W. Norris, the second superintendent of Yellowstone,



who provided early detailed information about the hydrothermal features. Two historic buildings remain in this area: The Norris Geyser Basin Museum and the Museum of the National Park Ranger, which is housed in the Norris Soldier Station, one of the only remaining soldier stations in the park. (See Chapter 1.)

### Did Roaring Mountain used to roar?

Visitors during the late 1800s and early 1900s would say so. Roaring Mountain is a large, acidic hydrothermal area (solfatara) with many fumaroles. The number, size, and power of the fumaroles were much greater than today. The fumaroles are most easily seen in the cooler, low-light conditions of morning and evening.

### What will I see on Virginia Cascade Drive?

This one-way drive east of Norris is an older portion of the Grand Loop Road that passes lava flows, ash deposits, and the 60-foot high Virginia Cascade. The waterfall is formed by the Gibbon River as it drops over the edge of a lava flow.

### Are mudpots in this area?

Yes, at Artists Paintpots, which is 3.8 miles south of Norris Junction. The trail to the mudpots is steep, and one mile round-trip.

### What animals can I see in this area?

Black and grizzly bears are sometime seen. Grizzlies feed on carcasses of elk and bison that died in the hydrothermal areas during the winter.

Norris is one of the few areas in the park where sagebrush lizards live. They can survive here due to warmth of hydrothermal activity. Listen for chorus frogs in spring.

Killdeer are found in the basin year-round taking advantage of the brine flies and other insects that live in the warm waters.

## FAQ: Norris Area

### Historic Areas & Structures

*Norris Soldier Station (now the Museum of the National Park Ranger)*

*Norris Geyser Basin Museum*

See Chapter 1 for more information on historic areas in the park.



Pick up the *Norris Area Trail Guide* at visitor centers or at Norris. 50¢ donation requested.

*Yellowstone Resources & Issues 2009*

## FAQ: Old Faithful Area

•  
Upper,  
Midway, &  
Lower Geyser  
Basins

### Historic Areas & Structures

*Nez Perce National  
Historic Trail*

*Old Faithful Inn*

*Old Faithful  
Historic District*

*General store  
north of the Old  
Faithful Inn*

*Queen's Laundry,  
begun in 1881 but  
never finished, in  
Sentinel Meadows*

*See Chapter 1 for  
information on his-  
toric areas.*



Pick up the *Old Faithful Area Trail Guide* at visitor centers or at area geyser basins. 50¢ donation requested.

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### How often does Old Faithful Geyser erupt; how tall is it; how long does it last?

The average interval between eruptions of Old Faithful Geyser changes; as of January 2009, the usual interval is 90 minutes  $\pm$  10 minutes, with intervals ranging from 51 to 120 minutes. Old Faithful can vary in height from 106 to more than 180 feet, averaging 130 feet. Eruptions normally last between 1½ to 5 minutes and expel from 3,700 to 8,400 gallons of water. At the vent, water is 204°F (95.6°C).

### Is Old Faithful Geyser as “faithful” as it has always been?

Since its formal discovery in 1870, Old Faithful has been one of the more predictable geysers. Over time, the average interval between Old Faithful's eruptions has increased, in part due to ongoing processes within its plumbing. Changes also result from earthquakes. Prior to the Hebgen Lake Earthquake (1959), the interval between Old Faithful's eruptions averaged more than one hour. Its average interval increased after that earthquake and again after the 1983 Borah Peak Earthquake, centered in Idaho. In 1998, an earthquake near Old Faithful lengthened the interval again; subsequent earthquake swarms further increased intervals.

### How can you predict it, if it changes so much?

Old Faithful Geyser has been analyzed for years by mathematicians, statisticians, and dedicated observers. We know a relationship exists between the duration of Old Faithful's eruption and the length of the following interval. During a short eruption, less water and heat are discharged; thus, they rebuild again in a short time. Longer eruptions mean more water and heat are

discharged and they require more time to rebuild. Currently, staff uses eruption data from a temperature logger to determine the interval.

### What else can I see at this geyser basin?

The Upper Geyser Basin has 150 geysers in one square mile, plus hundreds of hot springs. Five large geysers are predicted regularly by the interpretive ranger staff. You can reach them and other features on boardwalks that loop through this basin. Walk or drive to nearby Black Sand Basin and Biscuit Basin to view their features.

### What will I see at Midway Geyser Basin?

This geyser basin, 6 miles north of the Old Faithful area, is small but spectacular. Excelsior Geyser is a 200 x 300 foot crater that constantly discharges more than 4,000 gallons of water per minute into the Firehole River. Grand Prismatic Spring, Yellowstone's largest hot spring, is 200–330 feet in diameter and more than 121 feet deep.

### Can I see mudpots in this area?

You'll see all four types of thermal features (geysers, hot springs, fumaroles, and mudpots) at Fountain Paint Pot, 8 miles north of Old Faithful and 2 miles north of Midway Geyser Basin. Be sure to drive the Firehole Lake Drive, where you can walk past hot cascades, hot springs large and small, and view geysers such as White Dome and Great Fountain.

### What animals can I see in this area?

Hydrothermal basins provide important habitat for wildlife in the Old Faithful area. Bison and elk live here year-round. In the winter, they take advantage of the warm ground and thin snow cover. Both black and grizzly bears are seen, especially during the spring when winter-killed animals are available. Yellow-bellied marmots are frequently seen in the rocks behind Grand Geyser and near Riverside Geyser. Thermophiles live in the runoff channels of hot springs and geysers, providing food for tiny black ephydrid flies. The flies, in turn, lay their eggs in salmon colored clumps just above the water surface where they are then preyed upon by spiders. Killdeer also feast on the adult flies.



### Why is this area called "Tower"?

The area is named for its major waterfall, Tower Fall, which is named for the tower-like rock formations at its brink.

### How tall is Tower Fall?

132 feet.

### Old pictures show a big boulder at the brink of Tower Fall. When did it fall?

W.H. Jackson's photograph in 1871 clearly shows the boulder (*see page 35*). For more than a century, visitors wondered when it would fall. It finally did in June 1986.

### Can I hike to the bottom of Tower Fall?

No, the lower part of the trail is closed because of severe erosion. You can walk past the Tower Fall Overlook  $\frac{3}{4}$  mile, ending with a view of Tower Creek flowing into the Yellowstone River. If you have heart, lung, or knee problems, you may want to enjoy the view from the overlook.

### What formed the rock columns in the canyon north of Tower Fall?

The rock columns were formed by a basaltic lava flow that cracked into hexagonal columns as it slowly cooled. You can see other basalt columns at Sheepeater Cliff along the Gardner River between Mammoth and Norris.

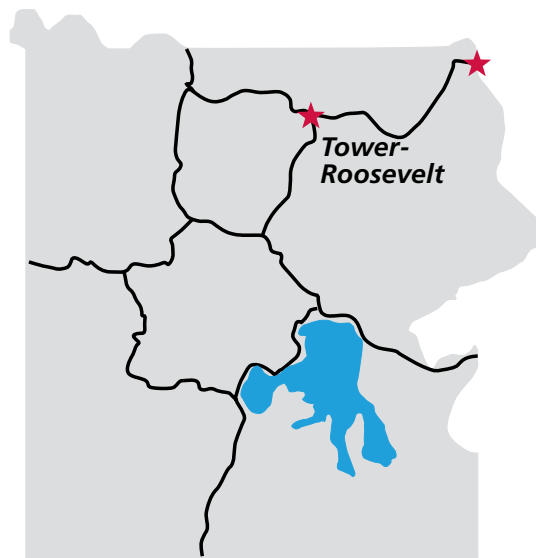
### How did the Petrified Tree become petrified?

The Petrified Tree, west of Tower Junction, is an excellent example of an ancient redwood. Petrification of this and other trees occurred for two main reasons. They were buried rapidly by volcanic deposits and mudflows 45–50 million years ago, which minimized decay. The volcanic deposits also contributed high amounts of silica to the groundwater. Over time, the silica precipitated from ground water, filled the spaces within the trees' cells, and petrified the trees.

In Yellowstone, glacial ice, running water, and wind have uncovered vast areas of petrified trees. You can see some of these areas from the road that follows the base of Specimen Ridge, east of Tower Junction.

### Did Teddy Roosevelt really stay at Roosevelt Lodge?

No, but President Theodore Roosevelt camped nearby during his visit to Yellowstone in 1903. The lodge opened in



1920. The area is registered as the Roosevelt Lodge Historic District. (*See Chapter 1.*)

### What animals can I see in this area?

Elk, bison, deer, and pronghorn thrive in the grasslands of this area, known as the northern range. In fact, some of the largest wild herds of bison and elk in North America are found here. The northern range is critical winter habitat for these large animals, which in turn provide food for several packs of wolves. Coyotes are also common, and an occasional bobcat, cougar, or red fox is reported.

The gorge and cliffs between the junction and Tower Fall provide habitat for bighorn sheep, osprey, peregrine falcons, and red-tailed hawks.

Both grizzly and black bears are sighted throughout the area, particularly in the spring. Black bears are more commonly seen around Tower Fall and Tower Junction. Grizzlies are sometimes seen in the Lamar Valley and on the north slopes of Mt. Washburn, particularly in the spring when elk are calving. Road pullouts provide excellent places from which to watch wildlife.

## FAQ: Tower-Roosevelt Area

•  
Lamar Valley

•  
Northeast  
Entrance  
Road

### Historic Areas & Structures

Lamar Buffalo  
Ranch

Northeast  
Entrance Station

Roosevelt Lodge  
Historic District

*See Chapter 1 for  
more information on  
historic areas in the  
park.*

Yellowstone Resources  
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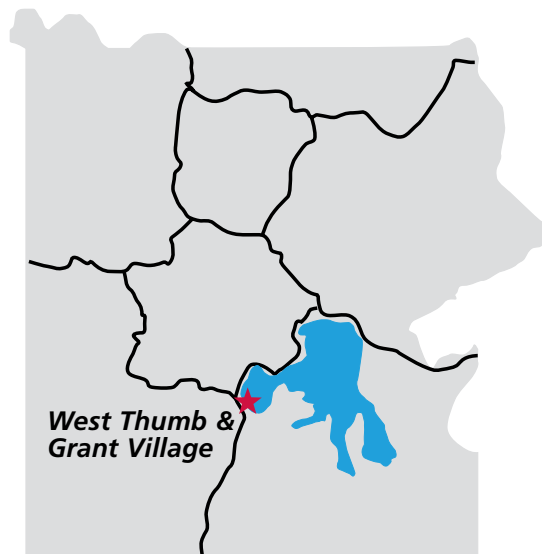
## FAQ: West Thumb & Grant Village Area

New West  
Thumb date



Pick up the *West Thumb Area Trail Guide* at visitor centers or at the trail. 50¢ donation requested.

Yellowstone Resources  
& Issues 2009



### Why is this area called West Thumb?

Yellowstone Lake resembles the shape of a human hand; West Thumb is the large western bay that would be the thumb. The bay is a caldera within a caldera. It was formed by a volcanic explosion approximately 180,000 years ago. The resulting caldera later filled with water forming an extension of Yellowstone Lake.

West Thumb is also the largest geyser basin on the shore of Yellowstone Lake—and its hydrothermal features lie under the lake too. The heat from these features can melt ice on the lake's surface.

### How did Fishing Cone get its name?

People learned they could stand on this shoreside geyser, catch a fish in the cold lake, and cook it in the hot spring. Fortunately for anglers, this geyser has only two years of known eruptions: In 1919, it erupted frequently to 40 feet and in 1939 to lesser heights. Fishing here is now prohibited.

### How hot are the springs at West Thumb?

Temperatures vary from less than 100°F to just over 200°F.

### How deep are Abyss & Black pools?

Abyss is about 53 feet deep; nearby Black Pool is 35–40 feet deep.

### The mudpots here aren't like they used to be. What happened?

Like all hydrothermal features, the West Thumb Paint Pots change over time. During the 1970s and 1980s, they were less active; they became more active in the 1990s.

### What happened to the development at West Thumb?

West Thumb was center of visitor activity until the 1980s. Early visitors would arrive

at West Thumb via stagecoach from the Old Faithful area. They could continue on the stagecoach or board the steamship “Zillah” to reach the Lake Hotel.

Later, a gas station, marina, photo shop, store, cafeteria, and cabins were built here. They were removed in the 1980s to protect the hydrothermal features and improve visitor experience. Grant Village now provides most of these facilities. West Thumb still has restrooms, picnic tables, and a bookstore and information station in the historic ranger station.

### Why does Grant Campground open so late in the year?

Grizzly and black bears frequent this area in spring when cutthroat trout spawn in five streams here. To protect bears and people, the campground opens after most of the spawn is over.

### Isn't there a unique lake nearby?

That's Isa Lake, at Craig Pass. At one time, it was probably the only lake on Earth that drained naturally backwards to two oceans, the east side draining to the Pacific and the west side to the Atlantic. If this still occurs, it is only at the peak of snow melt after winters with deep snowfall.

### What's that big lake you see south of Craig Pass?

Shoshone Lake is the park's second largest lake, and is thought to be the largest lake in the lower 48 states that cannot be reached by road. Its maximum depth is 205 feet and it has an area of 8,050 acres. The Shoshone Geyser Basin contains one of the highest concentrations of geysers in the world—more than 80 in an area 1,600 x 800 feet.

### What animals can I see in the West Thumb area?

In addition to the bears that frequent this area in spring (*see above*), elk cows and their new calves are often seen here in May and June. Bald eagles and osprey dive into the bay to catch cutthroat trout. Other birds include ravens, common loons, and bufflehead and goldeneye ducks.

In winter, pine marten are sometimes seen. River otters pop in and out of holes in the ice; coyotes and bald eagles eat their fish scraps.

# INTRODUCTION

## The Beginning of an Idea

*One of the most enduring legends of Yellowstone National Park involves its beginning. In 1870, explorers gathered around a campfire at the junction of two pristine rivers, overshadowed by the towering cliffs of the Madison Plateau. They discussed what they had seen during their exploration and realized that this land of fire and ice and wild animals needed to be preserved. Thus, the legend goes, the idea of Yellowstone National Park was born.*



It is a wonderful story—and a myth. But those men were real, and so is this land they explored. Thanks to their reports and the work of explorers and artists who followed, the United States Congress established Yellowstone National Park in 1872. The Yellowstone National Park Protection Act says “the headwaters of the Yellowstone River . . . is hereby reserved and withdrawn from settlement, occupancy, or sale . . . and dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people.” In an era of expansion throughout the young nation, the federal government had the foresight to set aside land deemed too valuable to develop.

For the following 18 years, Yellowstone was “the national park.” Then in 1890 Congress established three more national parks: Sequoia, General Grant (now part of Kings Canyon), and Yosemite. Mount Rainier followed in 1899. In 1906, Congress passed the Antiquities Act, which gave the president authority to establish national monuments. By 1914, the United States had 30 national parks and monuments, each managed separately and administered by three different federal departments—Interior, Agriculture, and War. No unified policy or plan provided for the protection, administration, and development of these parks and monuments.

The management of Yellowstone from 1872 through the early 1900s, which is described in Chapter 1, helped set the stage for the creation of an agency whose sole purpose was to manage the national parks. Promoters of this idea gathered support from influential journalists, railroads likely to profit from increased park tourism, and members of Congress. The National Park Service Organic Act was passed by Congress and approved by President Woodrow Wilson on August 25, 1916:

There is created in the Department of the Interior a service to be called the National Park Service, [which] . . . shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations . . . by such means and measures as conform to the fundamental purpose to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

### TWO “ORGANIC ACTS”

*The laws creating Yellowstone National Park and the National Park Service are both called “The Organic Act” because each was significant enabling legislation. However, the name most often refers to the law that created the National Park Service. To avoid confusion, we refer to the laws by their names as listed in the U.S. Code Table of Popular Names: The Yellowstone National Park Protection Act and The National Park Service Organic Act.*

# Today's National Park System

## Units in the National Park System

Total, as of January 2009: 391

81 Historic sites

73 Monuments

58 Parks

42 Historical parks

28 Memorials

24 Battlefield parks & sites, & military parks

20 Preserves & reserves

18 Recreation areas

15 Rivers, wild & scenic rivers, & riverways

14 Lakeshores & seashores

4 Parkways

3 Scenic trails

11 Sites of other designation

For a detailed list of NPS units, visit [www.nps.gov/pub\\_aff/refdesk/index.html](http://www.nps.gov/pub_aff/refdesk/index.html)

The National Park Service (NPS) manages approximately 83 million acres in 49 states, the Virgin Islands, Puerto Rico, Guam, and American Samoa. Delaware is the only state without a unit in the national park system.

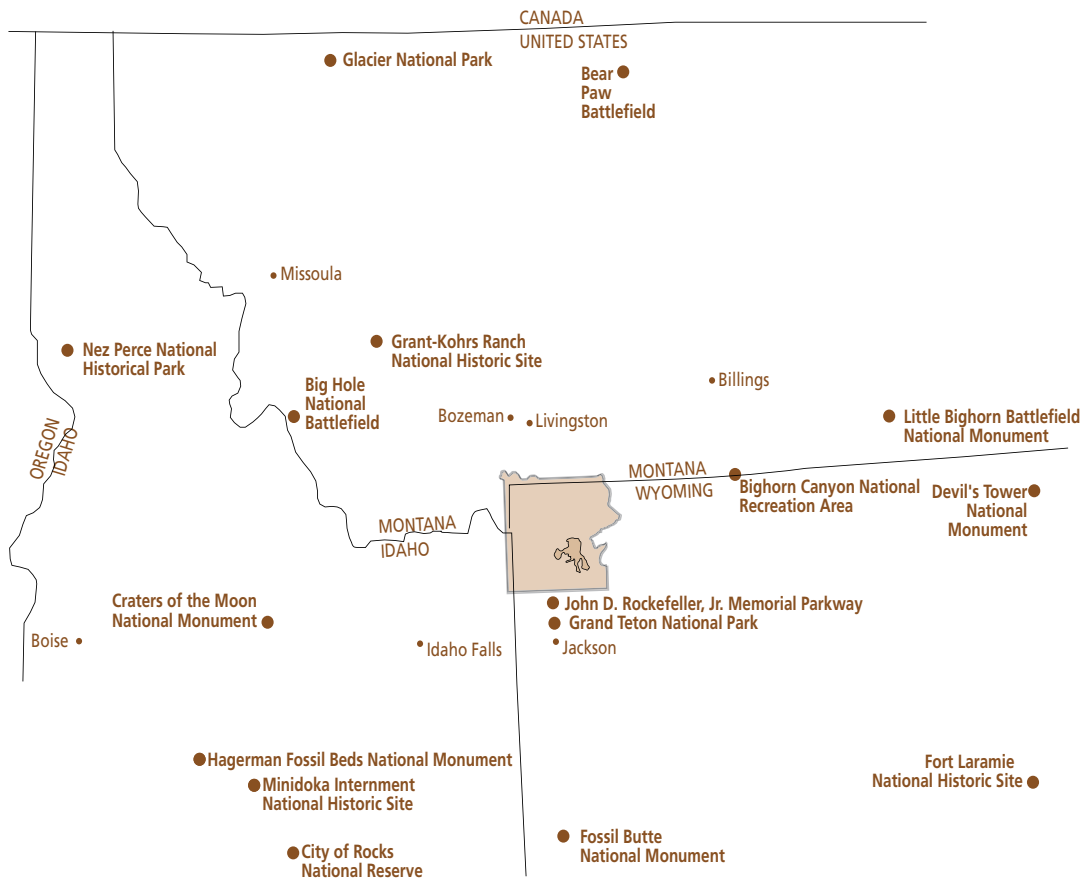
- National parks are the oldest, most well known part of the system and are usually areas of spectacular natural scenery relatively untouched by human development. National parks are established by acts of Congress.
- National monuments are areas of historic or scientific interest established by presidential proclamation.
- National historical parks and national historic sites are both set aside to

commemorate some facet of the history of the people of those areas.

- Many national memorials fit the description for national historical parks or sites, but some of these are also set aside because of important historical issues not specifically linked to the site of the memorial, such as Mt. Rushmore and Vietnam Veterans.

Most other types of National Park System units are well defined by their titles.

## National Park Units Near Yellowstone



## Implementing the NPS Mission Systemwide

The NPS Mission Statement expresses the dual responsibility of preserving parks in their natural state (or, at historical areas, to preserve a scene as nearly as it appeared on a certain date), and making these areas accessible for public use and enjoyment. These two fundamental goals can be incompatible and present difficult choices; two policies provide some direction:

- **Natural resources** (plants, animals, water, air, soils, topographic features, paleontologic resources, and esthetic values such as scenic vistas, natural quiet, and clear night skies) are managed to maintain, rehabilitate, and perpetuate their inherent integrity. Native species that have been exterminated should be reintroduced and exotic species eliminated, if possible. Livestock grazing, hunting, and resource extraction are prohibited in National Park System areas, with a few exceptions.
- **Cultural resources** (prehistoric and historic structures and resources, landscapes, archeologic resources, ethnographic resources, and museum collections) are preserved.

### Individual Parks

To implement these policies, each park unit prepares a General Management Plan/Master Plan that outlines management zones. In Yellowstone:

- **Natural zones** (most of Yellowstone National Park) protect natural resources and values. All components and processes of park ecosystems, including the natural abundance, diversity, and ecological integrity of the plants and animals, should be maintained. Change is recognized as an integral part of functioning natural systems, and interference is allowed only under special circumstances such as emergencies when human life and property are at stake.
- **Cultural or historic zones**, such as Fort Yellowstone, preserve cultural resources. Where compatible with cultural resource objectives, the policies for natural zones will be followed. Any action that will adversely affect cultural resources will be undertaken only if there is no reasonable alternative, and

*The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.*

all reasonable measures to limit adverse effects will be taken, including recovery of data and salvage of materials.

- **Development zones**, such as the Old Faithful area, allow for visitor use. Roads, walks, buildings, and other visitor and management facilities may occupy much of the zone and the natural aspect of the land may be altered. However, if a park manager determines that a resource is or would become impaired by public use or development, the manager may limit public use or close a specific area.

### International Leadership

The National Park Service example has inspired countries around the world to establish more than 100 national parks—modeled in whole or part on Yellowstone National Park and the National Park Service idea. Additionally, NPS lends its experienced staff to other countries to evaluate park proposals, management plans, and resource issues.

As the first national park, Yellowstone also continues to be a leader in developing and implementing policies in the National Park Service, such as the benefits-sharing policies described in Chapter 8.



## Mission Statement: Yellowstone National Park

*Preserved within Yellowstone National Park are Old Faithful and the majority of the world's geysers and hot springs. An outstanding mountain wildland with clean water and air, Yellowstone is home of the grizzly bear and wolf and free-ranging herds of bison and elk. Centuries-old sites and historic buildings that reflect the unique heritage of America's first national park are also protected. Yellowstone National Park serves as a model and inspiration for national parks throughout the world. The National Park Service preserves, unimpaired, these and other natural and cultural resources and values for the enjoyment, education, and inspiration of this and future generations.*

## Purpose Statement

Yellowstone, the world's first national park:

- preserves geologic wonders, including the world's most extraordinary collection of geysers and hot springs and the underlying volcanic activity that sustains them;
- preserves abundant and diverse wildlife in one of the largest remaining intact wild ecosystems on Earth, supporting unparalleled biodiversity;
- preserves an 11,000-year-old continuum of human history, including the sites, structures, and events that reflect our shared heritage; and
- provides for the benefit, enjoyment, education, and inspiration of this and future generations.

## Significance of Yellowstone National Park

- International symbol of natural preservation.
- A Biosphere Reserve and a World Heritage Site. (See page 10.)
- Contains approximately half of the world's hydrothermal features—more than 10,000—including the world's largest concentration of geysers—more than 300.
- Home of the world's tallest active geyser, Steamboat, which erupts to more than 300 feet.
- One of the few places in the world with active travertine terraces.
- Hydrothermal features are habitats for microbes that are providing links to primal life, origins of life, and astrobiology; plus they are proving useful in solving some of our most perplexing medical and environmental problems. (See Chapter 8.)
- With the restoration of the gray wolf in 1995, the park now contains all the large mammal species known to be present when European Americans first arrived.
- As of January 2009, home to one endangered species—the gray wolf, and one threatened species—the Canada lynx.
- Home to one of the largest concentrations of elk in the world. (Rocky Mountain National Park also has a large concentration of elk.)
- Only place in the U.S. where bison have existed in the wild since primitive times. The early legislation that protected these bison, the Lacey Act of 1894, was a precursor to the Endangered Species Act.
- Site of one of the largest volcanic eruptions in the world, which left behind one of the largest calderas. (See Chapter 3.)
- Site of the spectacular Grand Canyon of the Yellowstone River. (See Chapter 3.)
- Location of largest lake above 7,000 feet in North America—Yellowstone Lake. (See Chapter 3.)
- Source of two great North American rivers: two of the three forks of the Missouri River, and the Snake, which is part of the Columbia River system. The Yellowstone River, which begins just south of the park, is the longest free-flowing river in the U.S.