



Yellowstone and Grand Teton

Yellowstone gets you thinking about the bubbling that occurs there—just below the earth’s surface. Grand Teton wows you with its jagged peaks that shoot abruptly into the sky.

About his time spent in the two national parks, our friend Ken Mayhew said, “I’ve never been to places where I’ve enjoyed myself so much...from beginning to end.” Here’s what he enjoyed most:

- a smooth-water rafting trip down the Snake River past the dramatic Teton Range
- a chuckwagon dinner followed by a delightful western stage show
- seeing and learning about geysers, fumaroles, hot springs, mud pots and terraces in one of the few “hot spots” on earth
- seeing buffalo, elk, moose, deer, eagles and other animals in their wild state
- hiking and driving through gorgeous scenery that’s being protected by the National Park Service for everyone’s enjoyment.

Visit for four days, anytime mid-May through mid-September. Better yet, add another day or two and enjoy an authentic Old West experience in nearby Cody, Wyoming (see the Fall 2010 *Pathfinder Newsletter*).

Pathfinder Newsletter

Winter 2011

Guided Tours of Cities, Towns, and National Parks in the American West

by the authors of *Seven Perfect Days in Northern California*,
Seven Perfect Days in Arizona and *Seven Perfect Days in Colorado*

The Day Before Day One

You'll probably fly into Jackson Hole Airport and have some time in the afternoon to enjoy the town of Jackson, which lies ten miles (16 km) south of the airport. We recommend the following activities before dinner, depending upon your interests and time available:

About seven miles (11 km) from the Airport, you'll come upon the **National Museum of Wildlife Art** (www.wildlifeart.org/) on the right side of the road. There, you'll have access to 14 galleries/51,000 square feet (4,700 square meters) of fine art—paintings and sculptures—that are focused on wildlife and landscapes by the likes of Albert Bierstadt, George Catlin, Georgia O'Keefe, Charles Russell and others. You can also get a bite to eat in the museum's café. Open Mon.-Sat. 9am to 5pm, Sunday 11am to 5pm.

Across the road from the museum, you'll see the 25,000-acre (10,120 hectare) **National Elk Refuge** (www.fws.gov/nationalelkrefuge/), which is the winter home of some 5,000 *wapiti* (the American Indian name for elk). The elk come down from higher and harsher elevations to be fed. Visitors can get close to the elk via horse-drawn sleighs. The U.S. Fish & Wildlife Service manages the elk refuge and is the lead agency for the visitor center, which is about one mile (3.2 km) closer to town, on your left.

The sod-roofed **Jackson Hole & Greater Yellowstone Visitor Center** is located at 532 N. Cache. Staffed by people from seven government, non-profit, and private agencies, it's a one-stop information center for Yellowstone and Grand Teton National Parks, the National Elk Refuge, the Jackson Hole Chamber of Commerce and the Bridger-Teton National Forest (www.fs.fed.us/jhgyvc/). There, you'll find outstanding dioramas and displays featuring the plants, animals and geology of those entities as well as books and helpful pamphlets. Open daily: 8am to 7pm from Memorial Day (about May 30) through September 30, and 9am to 5pm from October 1 through the end of May.

Jackson Town Square is just a mile south of the visitor center at the corner of Cache St. and Broadway (www.jacksonholenet.com/attractions/jackson_hole_town_square.php). You'll know you're there when you see the elk antler arches on the four corners of the square. They're made of real antlers that male elk shed once each year. We're not shoppers, but we did enjoy these establishments on, or just off, the square: The Legacy Gallery (74 N. Cache), A Touch of Class (fine gifts and jewelry, 10 W. Broadway) and Under the Willow Photo Gallery (50 S. Cache). The Million Dollar Cowboy Bar (and Steakhouse), at 25 N. Cache is a very interesting place, with its cowboy décor, historic bar and saddle barstools. You may also be interested in the Jackson Square Shootout that's held at 6:00 pm Monday through Saturday during the summer at the corner of Cache and Broadway.

Bar J Chuckwagon Supper & Western Music Show

There are plenty of traditional restaurants in Jackson Hole, but we chose the Bar J because the combination of western food, western music and western atmosphere makes for a wonderful evening. To get to the Bar J, drive west about four miles (6.5 km; seven to ten minutes) on Broadway and Highway 22 toward Wilson, then turn right on Highway 390 toward Teton Village. You'll find the Bar J about one mile north of Highway 22, on your left.

The Bar J is open Memorial Day through September. Reservations are strongly recommended (800-905-2275 or 307-733-3370). The gates open at 5:30pm and dinner is served at 7:00. Arrive early for the best seats. (www.barjchuckwagon.com/index.html)

You'll have a choice of BBQ beef, chicken breast, BBQ beef and chicken combo, BBQ pork rib or a 12-ounce ribeye steak. All meals are very tasty and include baked potato, beans, applesauce, biscuits, spice cake and coffee or lemonade. Prices range from \$20 to \$30 and include the meal, show, tax and gratuity. You'll go through a line and be served on a miner's tin plate. Believe it or not, all 750 dinner guests are served in about 25 minutes!

As for the entertainment, just sit back and enjoy. The Bar J Wranglers are among the best western singing groups in the country. Their songs, fiddling, yodeling and comedy are just plain fun for all ages. Our friend Ken Mayhew (more on him later) reacted this way: "It was unbelievable; as good as any show we've ever seen. It was so enjoyable, so down to earth, we laughed until tears ran down our faces. It was high quality stuff...and the food was very good, too!"

Lodging in Jackson Hole

We recommend the Painted Buffalo Inn (400 W. Broadway, www.paintedbuffaloinn.com, 800-288-3866) in Jackson. The reviews are mixed on TripAdvisor.com, but our experience was very good and we loved the location close to Jackson's Town Square as well as the reasonable cost. Otherwise, check with the Jackson Chamber of Commerce at www.jacksonholechamber.com/lodging, 307-733-3316, or at 112 Center St., Jackson.

Day One

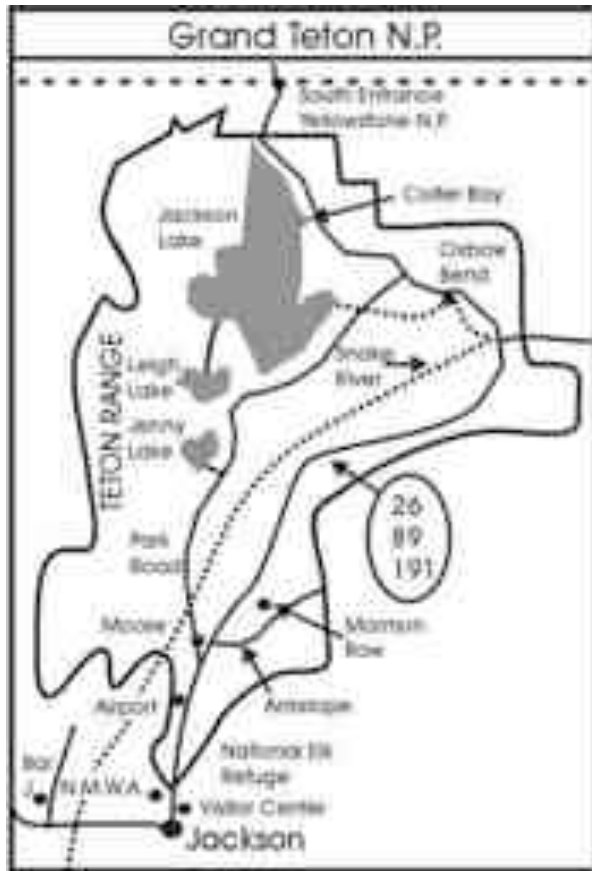
Today, you'll work your way 60 miles (96 km) north to the entrance of Yellowstone National Park and then 40 additional miles (64 km) to your night's lodging in the Old Faithful area. Along the way, you'll enjoy spectacular views of the Teton Range, a special photo opportunity, a smooth-water rafting trip down the Snake River, lunch at Dornan's, stops at two lakes and a great museum of American Indian artifacts that were once owned by John D. Rockefeller, Jr.

Two key things to keep in mind as you proceed with this day are: *the pickup time for the rafting trip is 10am (if that's the one you chose) and your reservation time for dinner is...fill in the blank. You did make dinner reservations when you booked your room, didn't you? Food establishments in Yellowstone are very scarce, so advance reservations are essential. See below for the telephone number to call.*

As you drive north on combined Highway 26/89/191, and on Teton Park Road, you'll be paralleling the Teton mountain range, which is 60 miles long (96 km), and 10 miles wide (16 km). Since the elevation of the valley floor is 6,500 feet (1,980 m) and the average of the mountains peaks is 11,700 feet (3,570 m), they stand more than a mile high. (More on their elevations shortly.) Three additional facts and we'll quit with the technical information: the Tetons are mostly granite; there are no foothills, which adds to the drama of the mountains; and the range is about eight million years old (in contrast, the Rocky Mountains are about 65 million years old).

If you look around, you'll see that the valley is surrounded by mountains. The early trappers called this a "hole," because they came down into it from higher elevations. David Edward Jackson was one of those trappers, and the valley was originally called "Jackson's Hole." The

Tetons are on the west side of the valley, of course; the mountains on the east side are called the Gros Ventre (pronounced *grow-vont*).



Thirteen miles (21 km) north of Jackson, you'll come to Moose Junction. If the day is clear and the sun is shining on the Tetons, go by Moose Junction, about one-half mile (.8 km), and turn right on Antelope Flats Road. In about another mile, you'll come upon the remnants of a Mormon community called the Mormon Row Historic District. On your left, you'll find the Moulton barn, perhaps the most-photographed structure in Jackson Hole. Try your hand at composing a picture worthy of hanging in your home. Don't forget to include the Tetons...that's the whole purpose of this shot, of course.

Smooth-Water Rafting on the Snake

Next, return to Moose Junction, turn right and follow the signs to the parking area for the raft-launching site, just north of the bridge on the Snake River. It's here that you'll be picked up by your rafting company and to here that you'll return after the float trip. We had a wonderful experience with Barker-Ewing Float Trips; you can check them out at www.barkerewing.com. Other

companies are listed on the Jackson Hole Chamber of Commerce website at www.jacksonholechamber.com/summer_fun. That site also lists white-water rafting companies that operate in rougher water on the Snake River south of Jackson.

You'll be transported by van ten miles north on Highway 26/89/191 to the launch site, where the raft will be slid from your trailer into the water. And then you'll be off on a sublime two-hour trip down the Snake. (See the middle photo on page 1.)

The two dominant features of this trip are, of course, the river and the Tetons. As to the latter, what can you say except they're spectacular. The tallest peak is Grand Teton at 13,770 feet (4,197 m) in elevation. The next two tallest peaks—they're to the left of Grand Teton—are Middle Teton (12,804 ft./3,902 m) and South Teton (12,514 ft./3,814 m). French-Canadian voyagers involved in the fur trade called them *les Trois Tetons* (the three breasts). The base of the mountains is about six miles (10 km) distant from the river. We hope you brought your camera!

And, yes, in case you're wondering, these peaks are often climbed. Grand Teton has 18 separate routes to the top, and climbers from around the world tackle them between June and mid-September.

Listen closely to your guide as you float down the Snake...and ask a lot of questions. You'll learn some interesting things about the geology, plants, animals and birds of the region, and probably see some interesting fauna along the way.

Here's one couple's reaction to this float trip: They are Ken and Fran Mayhew, our friends from Macon, Georgia, who joined us for our research trip to Grand Teton, Yellowstone and Cody. They said, "The rafting was awesome...the scenery was phenomenal...the guide was wonderful...and it was very relaxing."

Dornan's for Lunch

To get to Dornan's from the float trip parking lot, turn left (east), recross the bridge and take the next left.

Because of the fabulous view of the Tetons from its large windows or outside deck, Dornan's is our second most-favorite lunch spot in the American West. (Number one is Scoma's seafood restaurant on Fisherman's Wharf in San Francisco.) And the sandwiches are very good, too...but who cares, with that view to look at!



Craig Thomas Discovery and Visitor Center

To get to Grand Teton's primary visitor center (you'll also see the visitor centers at Jenny Lake and Colter Bay), turn right from Dornan's, cross the bridge for the third time and turn left into the center's parking lot.

The first thing that will strike you from the outside is how architecturally-pleasing this visitor center is, with its innovative design, its primarily-log structure and its good use of windows. Inside, you'll be able to watch a 25-minute film about the national park's geology, wildlife and mountaineering produced by the Discovery Channel, as well as see interesting animal and people exhibits, see some excellent fine art in the Art Gallery, walk on three fifteen-foot glass screens that play a video of a river in three seasons, participate in a ranger-led program (if the timing works for you), and browse the center's extensive bookstore. Open June through September from 8am to 7pm and the rest of the year from 9 to 5, except 9-2 from November 25 to December 24; www.nps.gov/greete/index.htm; 307-739-3399. To answer your question, Craig Thomas was a Wyoming politician who was a strong advocate for Grand Teton National Park.

Enjoy the Highlights of the Park

Now, it's time to enter the national park, which you can do shortly by turning left out of the parking lot, passing Moose-Wilson Road, and driving through the Moose Entrance Station.

Here's a tip: national park entrance fees are usually \$25 per car for a seven-day visit. If you are a U.S. citizen or permanent resident 62 years of age or older, you are eligible for the Interagency Senior Pass (formerly the Golden Age Passport, which still works). It costs only \$10 at the entrance gate and gives you lifetime access to all U.S. National Parks and National Monuments—including Grand Teton and Yellowstone. Up to three passengers who are with you will be admitted free of charge.

After eight miles (13 km) of stunning scenery along the base of the Teton Range, you'll come to **Jenny Lake**, considered one of America's most beautiful lakes. If you're on an extended trip and enjoy hiking, consider the 6.5 mile (10.5 km) Jenny Lake Loop, or hike to Inspiration Point for a view of the lake at 7,200 feet (2,200 m). Or, for a fee, you can take the Lake Shuttle



Boat from the east shore near the visitor center to the west shore where canoes and kayaks can be rented by the hour or by the day.

Twelve miles farther north, you'll come to Jackson Lake Junction where the park road meets Highway 26/89/191. Turn right and less than a mile later pull into the **Oxbow Bend** turnout. There, you'll have another opportunity to get a picture worth framing for your walls at home. On a clear day in September, with the Snake River in the foreground, the aspen trees a bright yellow-gold, and the Tetons beautifully prominent in the background, this is a sight to behold. If you have binoculars with you, there's a possibility that you may spot an eagle, an osprey or a moose on the opposite shore.

Now, return to Jackson Lake Junction and turn right. About five miles (8 km) north, you'll arrive at the **Colter Bay Visitor Center**.

Time out for a bit of history: In 1807 and 1808, John Colter, who was one of the 30 members of the 1804-1806 Lewis and Clark Expedition, wanted to explore more of the area that he had seen during the expedition. He is believed to be the first

non-American Indian to see what are now Grand Teton and Yellowstone National Parks. The stories he brought back about geysers and other geothermal features were not believed and the area he explored was jokingly referred to as "Colter's Hell."

Be sure to see the lovely cove and marina behind the building, but the primary attraction at the Colter Bay Visitor center is the **Indian Arts Museum**. This collection was donated to the national park by John D. Rockefeller, Jr. in 1976. As presented in the museum, its purpose is to showcase American Indian culture and crafts. Beautifully displayed throughout the two floors of the museum, the collection includes colorful sashes, headdresses, moccasins, and women's clothing, jewelry, musical instruments, toys, games, weapons, shields, tools, bowls, baskets, bags and other authentic artifacts.

By the way, in order to protect and preserve the land, Rockefeller bought up a lot of Jackson Hole property and turned it over to the Federal Government to be used by the national park.

Are you keeping track of the time? You've got about an hour and a half drive from the Colter Bay Visitor Center to Old Faithful (see the maps on pages 4 and 8). Don't hurry; it's a very nice drive.

The Drive to Old Faithful

There are three features that are worth noting about this drive. The first is that the roads throughout the park, like this one, are two-lane and in excellent condition. You'll notice from the map that the roads inside the park are in a figure-eight shape; all-together, they're called the Grand Loop Road. The second is that you'll be crossing the Continental Divide three times in Yellowstone...because it weaves back and forth through the park. Watch for the road signs that identify the Divide, from which water flows either to the Pacific Ocean or to the Atlantic.

The third feature is the trees. About 80 percent of the trees in Yellowstone are lodgepole pines, so-named because of their tall, straight, slim trunks that were used by American Indians as the structure for their teepees. Then, of course, there are the 795,000 acres of lodgepole pines (36 percent of the park!) that were burned in the massive 1988 Yellowstone fires. You'll see many of them on this drive and be saddened. But, look on the bright side: over time, such natural disasters result in a rejuvenation of the forest, and you can actually see that happening at ground level, in between the burned tree trunks. Lodgepoles can procreate only when heat or fire melts the pitch on their cones and releases their seeds.

Yellowstone Lodging and Dinner Reservations

Our plan for you is to spend three days enjoying and learning about Yellowstone. That probably necessitates accommodations for four nights, two of which we recommend be in the Old Faithful area, one in Canyon Village and one in the Yellowstone Lake area. Alternatively, you can end the last day early and drive to Cody or back to Jackson for your night's lodging and dinner.

The primary booking agent for lodging in Yellowstone is Xanterra Parks and Resorts. We recommend that you: 1) read the rest of this issue to decide where you want to stay each night; 2) make your reservations as far in advance as possible, since Yellowstone is a very popular place; 3) spend some time on Xanterra's website looking over your choices (www.yellowstonenationalparklodges.com/ (pull down on the Lodging button to Summer Lodges); and 4) telephone for your reservations at 1-866-439-7375 (toll free) or 307-344-7311. Xanterra can book you into Old Faithful Inn, Old Faithful Lodge (cabins), and Old Faithful Snow Lodge in the Old Faithful area, into Canyon Lodge and Cabins in Canyon Village, and into Lake Hotel in the Yellowstone Lake Area. They'll cost more than you might wish, but we think they're worth it.

We recommend that you have Xanterra make your dinner reservations at the time you make your room reservations. Park popularity = do it soon and do it all.

Here's a downer if you're addicted to our modern electronic world: The National Park Service views Yellowstone as a place to "get away from it all"; therefore, there are no televisions, radios, air conditioning or Internet hookups in the park. The only cell phone service available at the time we were there was through Verizon. Swimming pools are not available either. In our view, this is a small tradeoff for what you get at Yellowstone.

Day Two

Today, you'll learn the basics of Yellowstone's "natural plumbing system" via the visitor center and ranger walks in the Old Faithful area.

Knowing nothing about hydrothermal activity, we thoroughly enjoyed our onsite research of the Yellowstone phenomenon. If you'd enjoy starting from scratch like we did, we suggest that you not read the following eight paragraphs until this evening. Or you can read the paragraphs and be a more discerning listener during the ranger walks.

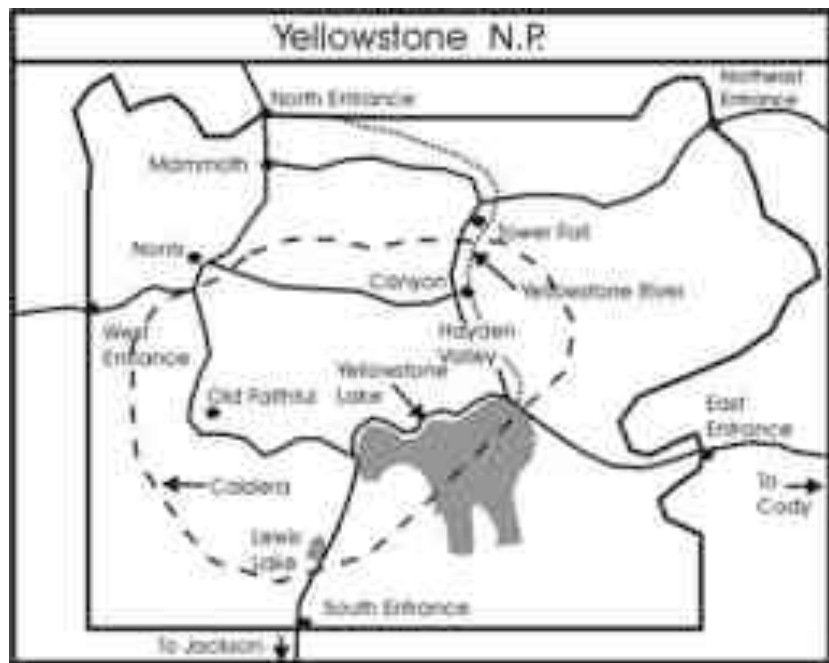
Yellowstone's Caldera and Geothermal Features

Yellowstone is one of the most dynamic, natural places on earth, it has the world's greatest concentration of hydrothermal (hot water) features, and it is the location of the world's tallest geyser. The understanding of what makes Yellowstone "tick" begins with the caldera (collapsed crater) of the super-volcano that, according to scientists, has experienced three massive eruptions: about 2.1 million years ago, 1.3 million years ago and 640,000 years ago. It ranges from 30 to 45 miles wide (48 to 73 km) and covers most of the southwestern and central portions of the park. It's an area larger than the state of Rhode Island. *As hard as it is to imagine, you are now standing inside the caldera on top of the volcano!* This caldera is one of only 30 "hotspots" in the world, where magma is close to the surface of the earth. Others are concentrated primarily in the areas of Hawaii, the Galapagos Islands, Iceland and the island of Réunion in the Indian Ocean.

The elevation in Yellowstone averages about 8,000 feet (2,440 m) above sea level. It does seem odd, doesn't it, that geyser activity occurs at such a high elevation? Geologists tell us that the land here is about 2,000 to 3,000 feet (600-900 m) higher than it would normally be because the underlying magma has pushed it up to that level. (In other words, without the magma uplift, the elevation would be close to that of Jackson Hole valley.) Magma is super-hot liquid rock that's close to the crust in and near Yellowstone's caldera.

Heat from the magma and water from rain and heavy winter snowfalls (which percolates deep into the earth) are the primary contributors to geyser, hot spring, mudpot and fumarol activity.

Another underlying phenomenon is earthquakes. The National Park Service records the earthquake activity at Yellowstone and reports 2,000-3,000 per year. Most are of very low intensity. Their significance to the Yellowstone phenomenon is that earthquakes cause fractures in the



underlying rock—through which water and steam escape the earth’s crust. In other words, the rock underfoot is constantly shifting, ever so slightly, opening new vents and closing others over time. And, also important, earthquakes keep open the geyser constrictions that would otherwise be closed by depositing silica.

There are more than 300 active **geysers** here, which makes Yellowstone the place with the most active geysers in the world. The most famous Geyser is, of course, Old Faithful. Beneath Old Faithful and the other geysers, there is a constriction in the rock that prevents superheated water and steam from escaping the earth in a continuous flow. Instead, it gets bottled up below the stricture by large steam bubbles and is released when the pressure gets so strong that the bubbles and constriction can’t contain it any longer.

Most **hot springs** are pools of water, on the surface of the land, that are heated to just above the boiling point, which is 199 degrees Fahrenheit (92.8 C) at this elevation. There are no constrictions in the rock below and the water isn’t superheated, so the water rises to the surface freely rather than erupting as happens with geysers. Hot springs are often colorful because of microorganisms in the water.

Fumeroles are simply steam vents that contain very little water. As with hot springs, there is no stricture to hold back the steam and gases, so the flow is steady, although it’s often weak. There are an estimated 4,000 fumeroles in Yellowstone National Park. You’ll see them everywhere you drive or walk.

Mudpots are hot springs that have a limited supply of water, as well as hydrogen sulfide gas. As the boiling water and gas come to the surface the gas turns into sulfuric acid, which turns rock into mud. Because of the presence of hydrogen sulfide, mudpots have a distinct rotten egg smell.

Now it’s time to learn more about these forces and features by spending the day in the visitor center and on walks with rangers. (We’ll see and learn about terraces tomorrow at Mammoth Hot Springs.)

Old Faithful Geyser

If an eruption of Old Faithful is to take place soon, we’d expect you to go directly to see that most famous of all geysers—even before going into the visitor center or taking a ranger-led walk of the geyser area.

This is truly an awe-inspiring sight. (See the photo on page 1.) Old Faithful’s eruptions are legendary. Nowadays, the eruptions occur approximately every 90 minutes...throughout the day and night, every day, every week, every month, every year. Very few geysers are as regular or as dramatic as Old Faithful.

At this point you’re probably asking, how long do Old Faithful’s eruptions last, and how high into the air does it shoot water and steam...right? The answers are: eruptions vary between two and four minutes and, on average, water and steam shoot 130 feet (40 m) high. The intervals between eruptions have lengthened over the years, probably due to earthquake activity. The park service rangers can estimate the next eruption time (within 10 minutes) by the length of the prior eruption. There are two basic ways to learn when the next eruption will occur: the time is posted in the visitor center, and, watch for people to gather at the benches in front of the geyser.

There's a bit of an optical illusion as you stand at the benches: Old Faithful is farther away than it appears...300 feet/100 yards (91 m). The mound that surrounds the blow hole is composed of sinter and geyselite, which are two different forms of silica that were deposited by the water emitted from the geyser.

Do you want to see the next eruption of Old Faithful, from your computer? Just click here to watch several web cams trained on the geyser:

www.nps.gov/yell/photosmultimedia/webcams.htm. They broadcast pictures at 12-second intervals. Also, our friends/companions Ken and Fran suggest that, as they did, you give this link to folks back home, position yourself near where the walks cross, and telephone them so they can see you in near real-time, waving from Old Faithful.

Old Faithful Visitor and Education Center

Except for seeing Old Faithful first, we suggest that you start your exploration of Yellowstone here. The Old Faithful Visitor and Education Center, new in August 2010, provides an excellent orientation to Yellowstone National Park in general and to its approximately 10,000 fascinating hydrothermal features. It's in the visitor center that you'll get your first introduction to the features that are described above.

Via interactive exhibits, videos and display panels (in English, French, German, Spanish and Japanese), you'll also learn about the underlying rock in the Old Faithful area (rhyolite), the microorganisms that inhabit the hydrothermal features, acidity and how it affects the park's features, and the scientific investigations that are under way in four areas of the park. Be sure to see the video about hydrothermal activity under Lake Yellowstone; it's tucked away in the back right corner of the center. There is also a Young Scientist Room for children (which adults will also enjoy) that includes a functioning, life-size geyser model and interactive displays that entertain as well as educate. And there's an auditorium where a 16-minute park orientation film is shown during the summer and where a film about geysers is shown the rest of the year.

This first national park in the world was established in 1872 and now averages more than three million visitors per year. Here are two telephone numbers and the URL that will get you to more information about the park: 307-344-7381, 307-344-2751, and www.nps.gov/yell/planyourvisit/index.htm. The park is open 365 days a year; summer hours are 8am to 8pm; check the website for hours at other times of the year.

For lunch, we recommend the cafeteria in the Old Faithful Lodge, to the right of the visitor center as you face the geyser. Or, walk to Old Faithful Inn (to the left as you face the geyser), have lunch, and admire this beautiful and classic lodging.

Ranger-Led Programs in the Old Faithful Area

The best way to learn about Yellowstone's hydrothermal features is by taking narrated walks with rangers. You'll find the programs listed and described—for each of the major visitor locations in the park—in “Yellowstone Today,” the park's monthly newspaper, which you received as you entered the park. In summertime, it's wise to carry water, wear sunglasses and a hat, and use sunscreen on this 1-1/2 hour walk.

We particularly liked two ranger-led walks here in the Upper Geyser Basin: Morning on Geyser Hill and Geyser Discovery Stroll. It was on these walks that we learned about Yellow-

stone's underground "natural plumbing system"—cracks and fissures below hydrothermal features that super-heated water travels through from as deep as 10,000 feet (3,050 m)—and how geysers, hot springs and fumarols (steam vents) work.



On the Geyser Discovery Stroll, you'll see Castle Geyser, which vents steam almost all the time, and has a major eruption about every 10-12 hours when it shoots water and steam about 50 to 90 feet into the air (15-27 m) for 20 to 30 minutes. By now, you know that the geyser's cone is made of sinter and geyserite. You're also likely to see buffalo close by during this walk.

We're choosing to not give you any more detail about what you'll see and hear during these walks. We don't want to dampen your sense of discovery. The same holds true for your experiences at Norris Geyser Basin and Mammoth Hot Springs tomorrow, and at Grand Canyon of the Yellowstone and Mud Volcano the next day.

Trying to describe this day in the Old Faithful area, Celia said, "It's like an out-of-body experience. It's something you don't see every day. *This shows us the origin of our world. It's astounding.*"

Day Three

If you chose to make hotel reservations at Canyon Lodge in Canyon Village or at Lake Hotel in the Yellowstone Lake area, don't forget to pack up before you leave Old Faithful!

To get to **Norris Geyser Basin**, drive northwest 33 miles (53 km) to Norris Junction. (See the map on page 8). Norris has the distinction of being the location of the world's tallest active geyser, of having very hot underground temperatures with rapidly changing hydrothermal features, and of having many colorful hot springs. Blue, yellow, brown, rust, red, emerald green and dark green heat-loving microorganisms and algae abound here. The best way to see Norris' features is by joining the mid-morning walk with a ranger. As with yesterday's ranger walks, it's wise to carry water, wear sunglasses and a hat and use sunscreen on this 1-1/2 hour walk.

If you're unable to make the ranger walk, pick up a copy of the Norris Geyser Basin Trail Guide in the small museum at the entrance. It describes Norris' hydrothermal features and contains a trail map with the features shown. *Be sure to stay on the boardwalks and paths; as with ice on a lake, it's possible that the dirt surface will collapse under you and send you into boiling water.*

It's unlikely that you'll see a major eruption of Steamboat Geyser, because those eruptions are totally unpredictable and could occur months, and even years, apart. When it does erupt, the water and steam shoot more than 300 feet high (91 m) for up to 40 minutes—two to three times higher than Old Faithful. You may see something more frequent from this geyser: water being ejected from 10 to 40 feet (3-12 m) into the air.

About four miles (6.5 km) north of Norris, you'll come upon a phenomenon on the right side of the road called "Roaring Mountain." There, you'll see many fumarols at work, steaming and hissing out of rock well above you. Stop, observe and enjoy.

Seventeen miles (27 km) farther on, you'll come to **Mammoth Hot Springs**.

Our guess is that you'll be ready for lunch when you arrive. If so, we suggest that you head for the Terrace Grill on the west side of the road, next to the Mammoth Hot Springs Hotel. The Terrace Grill is basically a fast-food restaurant with lots of seating that serves tasty sandwiches and burgers.

After lunch, walk the equivalent of two blocks north to the **Albright Visitor Center**, watch the 18-minute orientation film, browse the visitor center's exhibits which focus on the human history of the park, enjoy the historic paintings and photographs by Thomas Moran and William Henry Jackson (respectively) and *pick up three trail guides: "Mammoth Hot Springs," "Canyon Area" and "Mud Volcano."* You'll need the Mammoth guide, because it's unlikely that you'll be able to make the 15-minute ranger talk, Tales of the Travertine, at 11am. You'll need the other two guides tomorrow. You can learn more about the Albright Visitor Center at www.nps.gov/yell/planyourvisit/mammothvc.htm.

Before you head toward the Mammoth trails, take a few minutes for a self-guided walking tour of Fort Yellowstone, which lies immediately south of the Albright Visitor Center. Here, you'll see red-roofed buildings which include a troop barracks, guardhouse, chapel, post exchange, and officer housing that were used by the U.S. Army for policing and administering Yellowstone National Park from 1886 to 1916 when the National Park Service took over to "protect and preserve" Yellowstone. It's here that we saw two young male elk jousting.

We recommend that you use the "Mammoth Hot Springs Trail Guide" to both walk and drive the several terraces that make up this interesting hydrothermal location. What you will *not* see here are geysers and mudpots; the underground water temperatures are not hot enough to generate the force that those hydrothermal features require.

What makes these hot springs different from what you've already seen is that they carry



liquefied rock—calcium carbonate, the primary component of limestone—to the surface and deposit it as step-like travertine terraces. As with the hot springs at Norris Geyser Basin, tiny microorganisms, called thermophiles, and algae add many different colors to the rock as it's deposited—up to one foot per

year (.3 m)—resulting in the dramatic terraces that you see. In other words, you are actually seeing Earth form new rocks before your eyes, instead of over millions of years! The two most interesting features to us were Palette Spring and Minerva Terrace.

Next, use the map on page 8 to get yourself to Canyon Village: go east from Mammoth to Roosevelt/Tower Junction and south to Canyon. If time permits, make a stop at **Tower Fall**, which can be viewed from behind the general store. The fall is 132 feet in height (40 m) and can be seen either from an overlook or at the bottom of the fall, following a steep half-mile switch-back hike (*not recommended if you have heart or breathing difficulties*).

When you reach the junction with the road to Norris, turn left, then right into the parking lot where you'll find Canyon Lodge.

Day Four

Today, you'll spend some time in the visitor center, tour the dramatic Grand Canyon of the Yellowstone, traverse the serene and wildlife-rich Hayden Valley, see active mudpots, and enjoy beautiful spots on the Yellowstone River and Yellowstone Lake.

The **Canyon Visitor Education Center** is not just worthwhile; "It's great—comparable to the visitor center at Old Faithful!" said our friend and traveling companion, Ken Mayhew. (See the YouTube video at www.youtube.com/watch?v=MWFnQp4djlE.) On two floors, the focus here is on geology, volcanoes and glaciers. There is an excellent, room-size, three-dimensional topographic model of Yellowstone, there are state-of-the-art interactive exhibits, the animal dioramas are realistic, and the movie, which focuses on the geology of Yellowstone, is very worthwhile. Be sure to pick up a copy of the "Grand Canyon Trail Guide," if you don't already have one, and check the timing of the two ranger walks, Artist Point Talk (multiple times) and Walking the Edge (once, in mid-afternoon). The visitor center is open daily year-round, but because snow on the roads is not plowed from October through April, access then is only by over-the-snow vehicles. Automobile access is possible the rest of the year, and visitor center hours then are 8:00am to 7:00pm.

Next, follow the map in the trail guide to see all the viewpoints on the north and south rims of the **Grand Canyon of the Yellowstone**. Lower Falls Overlook, Grand View, Inspiration Point, Upper Falls and Artist Point lookouts should not be missed. (See the right-hand photo on page 1.) If you have binoculars with you, look for osprey, bald eagles, ravens, swallows and hydrothermal features in the canyon. For the best picture-taking, try to visit Artist Point in the morning or early afternoon. Many visitors to Yellowstone enjoy the one-mile round-trip hike down Uncle Tom's Trail to see the canyon and Lower Falls from below; but *be forewarned that this is a strenuous walk and that, because of the elevation, it's not recommended if you have heart, lung or other health conditions*. If you are a hiker, in good health and have the time, you might want to consider the rim and other hiking trails in the area.

When you're ready for lunch, we recommend the dining room and cafeteria in the Canyon Lodge building, next to the gift shop. It serves good food at reasonable prices.

We found the Walking the Edge ranger talk to be especially enjoyable and educational. Here are just a few of the facts we learned from the ranger, the visitor center and the trail guide: the canyon is about 20 miles (32 km) long and stretches from Upper Falls to Tower Fall; the

width ranges from 1,500 feet to 4,000 feet (450-1,200 m), the depth is from 800 to 1,200 feet (245-365 m), and the Upper and Lower Falls are 109 feet (33 m, 10 stories) and 308 feet (93 m, 30 stories) high, respectively. Our ranger guide also told us that the falls are at the edge of hard volcanic rock and that the rock below the falls is softer rhyolite that is more easily-erodible. And he said that 36,000 gallons of water (136,000 liters) spill over the falls every second during spring runoff and 5,000 gallons (19,000) do so in the fall.

So, what did our friends, Ken and Fran, have to say about the Grand Canyon of the Yellowstone? Fran spoke for both: “I had an ooh and ahhh experience. I’ve never seen anything like it! I loved the look of the canyon, the colors, and knowing that it will be changing forever.”

After soaking up the beauty of the Grand Canyon of the Yellowstone, drive south through **Hayden Valley**, with its abundant wildlife, watching all the while for wolves and both black and grizzly bears near the edges of the trees. However, they’re rarely seen except at daybreak and nightfall. Our only guarantee, when it comes to wildlife, is that you’re sure to see many of the park’s 3,000 buffalo, also known as bison. There’s a reason for that:

You’ll notice that the valley is wide open, with no trees. That’s because trees can’t send roots into the earth here. Over the millennia, the valley floor has become compacted with rock that has been carried down the Snake River. So, instead of trees, there are lush grasslands that are suitable for grazing. Buffalo spend most of their days grazing, and with the Yellowstone River handy they have little reason to go elsewhere.



Also present in abundance are elk, otters, coyotes and many kinds of birds. Stop several times while driving through the valley, to increase your chances of seeing them. Binoculars will be particularly useful here.

The valley is about seven miles (11 km) long and seven miles wide. It was named in honor of surveyor Ferdinand V. Hayden whose exploration of the Yellowstone Region in 1872 contributed significantly to the establishment of the park.

Soon after you leave the Hayden Valley, you’ll come to **Mud Volcano**. We suggest that you park on the right and walk across the road to the bridge overlook of Sulphur Caldron. (*Watch out for cars on the road!*) Sulphur Caldron is famous for its escaping hydrogen sulfide gases, which give off an especially strong rotten egg smell.

Then, return to the parking lot and following the map in the “Mud Volcano Trail Guide,” start your exploration of the area at Dragon’s Mouth Spring and observe its bubbling, steaming and gurgling. After that, we recommend that you follow the 2/3-mile (1 km) trail clockwise, which makes for an easier walk than counter-clockwise. If you don’t have a trail guide, the path is easy to follow and there are information displays that describe the nine hydrothermal features.

Remember to stay on the path and away from the features; serious injury, or worse, is very possible here.

You'll remember that what makes these features different from most in the park is that the hydrogen sulfide gas turns into sulfuric acid, which turns rock into hot, thick mud. The mud is not boiling; the bubbling is caused by escaping carbon dioxide and other gases.

About three miles (5 km) south of Mud Volcano, you'll come to **Le Hardy Rapids**. Here, you'll enjoy a gorgeous view of the Yellowstone River as it winds its way through a heavily-treed part of the park.

Three miles past Le Hardy Rapids you'll reach Yellowstone Lake. Turn left at the junction and enjoy the short hikes down to the lakeshore at Pelican Creek and Storm Point. It's hard to imagine, but underneath the northern part of this lake there are active hydrothermal features like those you've seen elsewhere in the park. (You'll notice from the map on page 8 that the caldera runs east-west through the middle of the lake.)

At this point, don't forget our highly-recommended extension of this trip to Cody, Wyoming, for an authentic taste of the Old West. Click here to read and print the newsletter: www.traveltheamericanwest.com. Cody is about an hour from Storm Point. You'll probably have time to drive there, have dinner and see the night rodeo.

If you plan to spend the night at Lake Hotel, return to the junction and turn left toward West Thumb and Old Faithful. In about 1-1/2 miles turn left onto the road that goes to Lake Hotel; look for the large yellow building with white trim. Either before or after dinner, we suggest that you take a walk along the lakeshore behind the hotel; it's quite a beautiful scene.

And if you're going to return to Jackson, simply follow the maps on pages 8 and 4. With nothing to impede you (such as traffic stopped to view animals) the drive should take 2 to 2-1/2 hours.

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Bill and Celia Ginnodo are residents of Arlington Heights, Illinois. They have lived and traveled extensively in the American West, including Wyoming. They are the authors of *Seven Perfect Days in Colorado: A Guided Driving Tour*, *Seven Perfect Days in Northern California: A Guided Driving Tour*, and *Seven Perfect Days in Arizona: A Guided Driving Tour*, which can be seen at www.pridepublications.com and www.amazon.com (enter keyword Ginnodo).

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Next Issue: "Denver, Colorado"