

# Yellowstone Today

Official Newspaper of Yellowstone National Park

Winter 1998-99



## Winter Magic

Snow and cold transform Yellowstone's 2.2 million acres in ways both obvious and subtle. At first, the effect is one of simplification: the ground appears to be covered by a monotonous white blanket. Spend more time and that illusion is shattered. Cold, wind, and light shape and color snow in infinite textures and tones.

Another force is at work here, too: heat, rising from deep within the earth. Yellowstone's heat source is uninfluenced by the change of the seasons, and thermal activity—geysers, hot springs, mud pots, and fumaroles—continues nonstop.

However, when heat meets cold, the clash creates incomparable beauty. Through time, Yellowstone has been shaped by fire and ice. During winter, these ancient and ongoing forces seem compressed into a snapshot of geologic time.

Snow and cold transform more than the landscape. All living things change somehow to adapt to harsh conditions. For some, this means simply leaving the area for the duration of winter. Others enter states of dormancy or considerably reduced activity. Still others move to different habitat, grow thicker coats, change colors, and alter feeding habits to survive.

Winter takes life and gives life. Animals perish but death gives sus-

tenance to other animals. Plants and animals depend on the reservoir of water locked in the snowbanks and freed through the months of spring, summer, and fall. Over the long term, winter is a major regulator of natural systems, an essential part of the cycle of building and destruction. Winter helps maintain a balance between living and nonliving things.

In the wildness of Yellowstone it is possible to see not only the beauty of the season but to begin to comprehend the sublime necessity of its harshness.

## Caution, Winter Visitors

Yellowstone has many hidden and unmarked hazards. Freezing, thawing, and extreme temperatures can create dangerous conditions. Take proper precautions; use common sense and extra care near canyons, waterfalls, thermal areas, viewpoints, and wildlife. Watch your children. Your hand and your voice may be too far away once your child leaves your side.

Road conditions on the stretch of road open to automobiles from Gardiner to Cooke City, Montana, can be icy, snowpacked, and hazardous. Snowtires or chains are always recommended and, at times, may be required on this road.

Please drive, walk, snowmobile, and ski safely to protect yourself and your park.

Non-Profit Organization  
U.S. POSTAGE PAID  
Permit No. 104  
Livingston, MT 59047

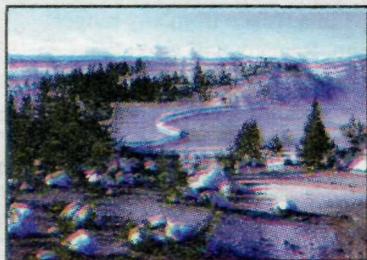


## Yellowstone Association

*Yellowstone Today*, which is distributed to visitors at park entrances, is published by the staff of Yellowstone National Park. As a member of the Yellowstone Association (YA), you have contributed to the production costs of this publication, a major source of information for millions of park visitors each year. YA operates book sales facilities in visitor centers and museums; YA staff provide information and assistance to park visitors. Ultimately, much of YA's revenue is returned to the park's educational, interpretive and research programs. As a YA member, you are a part of the team striving to preserve Yellowstone "For the Benefit and Enjoyment of Future Generations."

## Contents

Safety .....	2
Visitor centers .....	3
Snowmobile regulations .....	10
Entrance fees .....	13
Park map .....	16



## Emergency—Dial 911

## Spring plowing starts March 8

Throughout the park, groomed roads will close to oversnow vehicle (snowmobile and snowcoach) traffic for spring plowing as follows:

March 8	Mammoth to Norris
March 10	Madison to Norris to Canyon
March 15	All other park roads close to oversnow traffic.

Roads close at 8:00 AM on the days listed.

# Some Things all Visitors Must Know...

Yellowstone Today

## Icy roads and trails

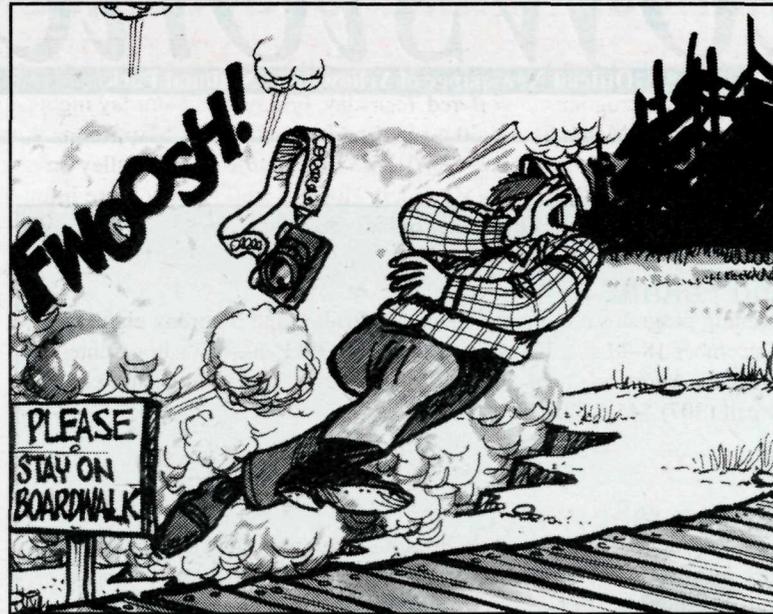
The only roads plowed for the winter season—and not open to over-snow vehicles—are the 56 mile (90 km) stretch between the North Entrance and Cooke City, Montana, via Mammoth and Tower Junction, and a 1 mile (1.6 km) stretch from Mammoth to the parking area at the Upper Terraces. These roads are maintained only during daylight hours and may close during severe storms.

Expect snowpacked roads, icy spots, and frost heaves. High winds may cause blowing and

**drifting snow.** Snow tires or tire chains may be required and are always recommended.

Park roads are designed for slower-than-highway speeds—**45 mph (73 kph) maximum**, lower where posted. Do not stop on the road and block traffic when viewing wildlife or scenery. **please use pullouts.**

**Trails and overlooks may be icy, making footing dangerous. Obey trail closures.** Proceed with caution at all times and watch your children closely.



## Unpredictable wildlife; keep your distance

You will see more of an animal's natural behavior and activity if you are sensitive to its need for space. That need is most critical in winter. Cold and deep snow make it difficult to find food, and every movement costs precious energy.

Do not approach any wildlife. View them from the safety of your vehicle. If an animal reacts to your presence, you are too close.

Each year a number of park visitors are injured by wildlife when they approach animals too closely.

**When on foot, you must stay at least 100 yards (91 m) away from bears and at least 25 yards (23 m) away from bison, elk, bighorn sheep, deer, moose, or coyotes.**

**BISON** may appear tame and slow

but are unpredictable and dangerous. See page 8 for tips on passing bison or other wildlife on a snowmobile.

**COYOTES** can quickly learn bad habits like roadside begging. This may lead to aggressive behavior toward humans.

**BEARS** may be seen in early and late winter. Be alert for tracks and signs. Never approach animal carcasses. Report all bear sightings to a ranger.

**SNOWMOBILERS:** Stop and allow wildlife to move off roads before continuing. If you must pass, then follow the guidelines on page 8.

**SKIERS:** Give all animals plenty of room. Do not ski through herds.



## Scalding water can ruin your trip

Yellowstone's thermal features, rare among the earth's wonders, are extremely fragile. Boardwalks and trails protect you and preserve delicate formations.

**Stay on boardwalks and designated trails.** Scalding water underlies most of the thin, breakable crusts; pools are near or above boiling temperatures.

Pets are prohibited in thermal areas.

Swimming or bathing in thermal pools or streams where waters flow entirely from a thermal spring or pool is prohibited. Thermal waters may contain organisms known to cause infections and/or amoebic meningitis which can be quickly fatal. Swim at your own risk; for more information, ask at any ranger station or visitor center.

## BEWARE OF HYPOTHERMIA AND FROSTBITE

Yellowstone's weather is unpredictable; a calm, clear day may turn fiercely stormy. Without adequate clothing and gear an easy ski tour or snowmobile trip can turn into a battle for survival. Exposure to wind and cold can result in **hypothermia**. This rapid loss of body heat can cause death if not treated. Early warning signs include shivering, slurred speech, memory lapses, drowsiness, and exhaustion.

Exposure to cold and wind can also result in **frostbite**. Frostbite can permanently damage tissue and affect functional use of fingers, toes, nose, ears or other body extremities. Protect yourself with warm, layered clothing and frequent stops to warm up.

## WINTER CAMPING

**Wheeled vehicles:** winter camping is available only at Mammoth Campground (accessible via the North Entrance). Heated restrooms and water are available. Overnight camping or stopping outside of this designated campground are not permitted.

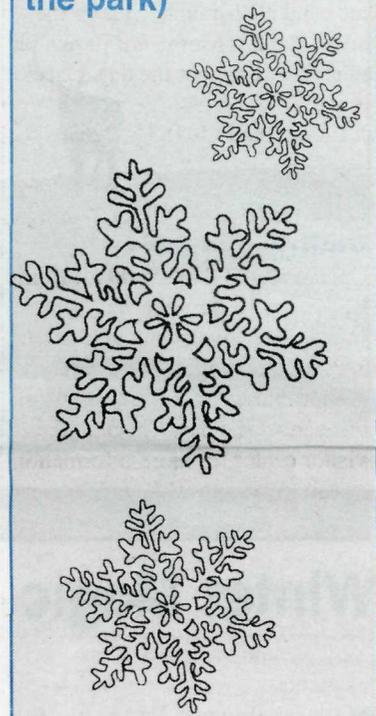
## BACKCOUNTRY PERMITS

Permits are required for **overnight backcountry use** and may be obtained in person up to 48 hours in advance from any ranger station. Rangers will provide information on weather, trails and snow conditions, and alert you to any special winter hazards. **Wood fires are only allowed in Mammoth Campground** so skiers must carry stoves and fuel for cooking and melting snow.

**Emergency**  
—dial 911

**Park information—**  
(307) 344-7381

(long distance from some locations in the park)



## PETS

Pets must be leashed. They are prohibited on ski trails, in the backcountry, and in thermal basins. Leaving a pet unattended and/or tied to an object is prohibited.

## FIREARMS

Firearms are not allowed in Yellowstone. However, unloaded firearms may be transported in a vehicle when the weapon is cased, broken down or rendered inoperable, and kept out of sight. Ammunition must be placed in a separate compartment of the vehicle.

## ATTENTION ANGLERS

Yellowstone National Park's fishing season closed on the first Sunday in November and will not reopen until Saturday of Memorial Day weekend.

# Information and Activities

Opening and closing dates are weather dependent

Yellowstone Today

## Visitor Centers

### Mammoth Hot Springs, Albright Visitor Center

Open year-round. Winter hours 9:00 AM–5:00 PM daily. Information, bookstore, and exhibits of the wildlife, early history, exploration and establishment of Yellowstone National Park are available. A 25-minute film on the national park idea and a 12-minute film on the artist Thomas Moran are shown on request throughout the day. Check at the visitor center for more information or call (307) 344-2263.

### Old Faithful Visitor Center

Open daily 9:00 AM–5:00 PM from December 16 through March 14. Information, bookstore, and geyser eruption predictions are available. A short movie on geysers is shown throughout the day. Check at the visitor center for more information or call (307) 545-2750.

### Warming Huts

#### Old Faithful Warming Hut.

Open Dec. 16–March 14, daytime only. Vending machine snacks are available.

#### Madison Junction Warming Hut.

Open Dec. 16–March 14, 24 hours daily. AmFac Parks & Resorts sells light snacks and hot drinks during the day; vending machine snacks available any time.

#### Indian Creek Warming Hut.

Open Dec. 16–March 7, 24 hours daily.

#### Fishing Bridge Warming Hut.

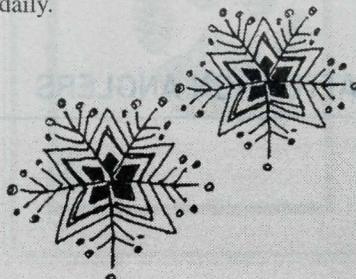
Open Dec. 16–March 14, 24 hours daily. Vending machine snacks and cold drinks available.

#### Canyon Warming Hut.

Open Dec. 16–March 14, 24 hours daily. AmFac Parks & Resorts sells light meals and hot drinks during the day; vending machine snacks available any time.

#### West Thumb Warming Hut.

Open Dec. 16–March 14, 24 hours daily.



## Ranger-naturalist activities

### Mammoth Hot Springs

Evening slide programs are offered Thursday, Friday, and Saturday nights (December 24–March 6) at 8:30 PM in the Mammoth Hotel Map Room. A ranger-naturalist accompanies the Wildlife Bus Tour to Lamar Valley on Wednesdays which leaves the Mammoth Hotel at 1:00 PM. For more information, stop in at the visitor center or call (307) 344-2263.

### Old Faithful

Evening programs are offered Thursday, Friday, and Saturday nights (December 18–March 13) at 7:30 PM in the Old Faithful Visitor Center Auditorium. Allow one hour. For program topics, check at the visitor center or call (307) 545-2750.

### Roving ranger-naturalists

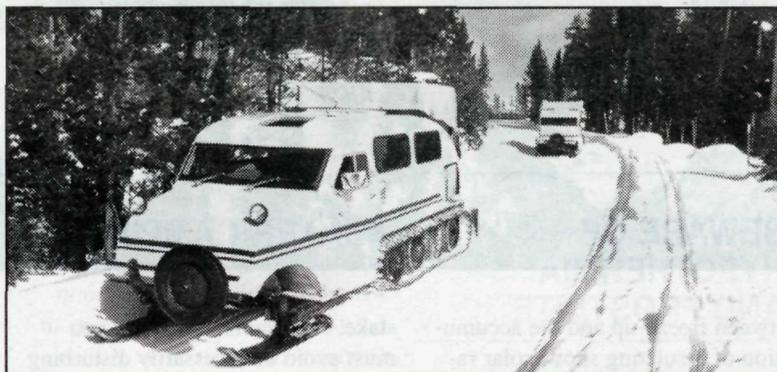
Look for ranger-naturalists at Yellowstone warming huts or near major park features. They are intermittently available to assist you, to answer your questions, and to tell you more about the winter wonderland of Yellowstone.

## Concessioner activities

Park concessioners operate lodging and provide other services, including **evening programs, snow-coach tours, guided ski and snowshoe tours, guided snowmobile tours, and wildlife bus tours.**

Detailed information is available at the visitor centers, warming huts,

or ask for a copy of *Discover Yellowstone*. For more information call local Chambers of Commerce for activities starting outside the park or AmFac Parks & Resorts at (307) 344-7311 for activities starting both inside and outside the park.



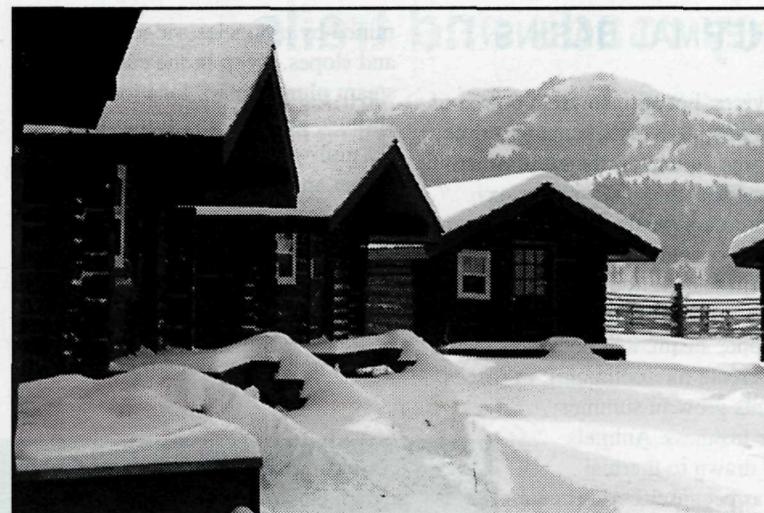
## Planning is crucial for winter visit

Winter in Yellowstone is a time of extremes: boiling versus frozen water, the suspended animation of hibernating animals versus the struggle of others to find food, days of blizzard whiteout versus days of pure sparkling colors. Transformed by cold temperatures, water assumes endlessly variable forms and shapes: waterfalls freeze into giant icicles, geyser spray falls as crystal beads or grows into fantastic ice sculptures, Yellowstone Lake freezes from shore to shore.

Wildlife and people adapt to harsh conditions in ways both obvious and subtle. In the vast wilderness of

Yellowstone, snow and cold combined with natural wonders create an incomparable winter experience.

Yellowstone's season of winter operations runs from late December to early March. First, decide how you will get around the park. Heavy accumulations of snow limit driving; **the only road open for year-round automobile travel is the Gardiner, Mont.–Cooke City, Mont. road** (North Entrance to 7 miles east of the Northeast Entrance). All other park roads are closed to wheeled vehicles but groomed for snowmobile or snow-



## Yellowstone Institute courses

As seasons change and winter arrives, the Yellowstone country is transformed into a beautiful snowscape, offering visitors rewarding experiences available to relatively few people. Yellowstone Institute winter courses provide an opportunity to learn about this special place in a stimulating, fun, and safe environment, full of the camaraderie that comes so easily at this time of year. Field courses offered this winter are:

**Wilderness First Responder—January 2–12, 1999**

**Snowshoeing in Yellowstone—January 15–18, 1999**

**Snow Tracking—January 22–24, 1999**

**Winter Ecology on Skis—January 28–31, 1999**

**Exploring Yellowstone on Skis—February 4–7, 1999**

**Literature of Yellowstone—February 13–15, 1999**

**Winter Ecology and Survival—February 19–21, 1999**

**Yellowstone's Wolves—March 12–14, 1999**

**Wildlife Observation—March 18–21, 1999**

The Yellowstone Association Institute offers close to 100 diverse courses year-round on such topics as geysers, grizzlies, birds, wildflowers, and park history. For more details about these learning experiences, call (307) 344-2294 or write P.O. Box 117, Yellowstone National Park, WY 82190.

coach travel. Snowmobiles, rented or privately owned, and snowcoaches are permitted only on groomed roadways; **sidehilling and off-road travel are illegal.**

Snowcoaches—winter vehicles on skis and caterpillar tread—depart from Old Faithful, Mammoth Hot Springs, West Yellowstone (at the West Entrance) and Flagg Ranch (near the South Entrance). Reservations are strongly recommended; call Amfac Parks & Resorts at (307) 344-7311 for information and reservations.

Snowmobiles may be rented from a variety of outfitters in nearby communities or from park concessioner AmFac Parks & Resorts. Privately owned and operated snowmobiles must be registered according to the laws of the operator's state of residence and have a muffler in good working order (see page 10). **Operators must have a valid motor vehicle driver's license.** Before beginning your trip, get an up-to-date road and weather report. The key to enjoying your winter visit is **preparation.**

# A Winter Wonderland!

Yellowstone Today

## THERMAL BASINS

Geysers, hot springs, mud pots, and fumaroles are fascinating any time of year. In winter, the clash of extreme heat and cold creates extraordinary beauty—ghost trees, ice cones, eruptions seemingly amplified in the frigid air to several times summer height. Warm ground, steam, and hot water runoff create microclimates; in places, plants grow in summer-like lushness. Animals are drawn to thermal areas because food is easier to find.

Most of the park's major thermal basins lie along the 50 mile (80.5 km) road between Mammoth Hot Springs and Old Faithful. These areas include the Mammoth Hot Spring Terraces, Norris Geyser Basin, Fountain Paint Pots, Midway Geyser Basin, Biscuit Basin, Black Sand Basin, and the Upper Geyser Basin (where you will find Old Faithful). West Thumb Geyser Basin, located on the shore of Yellowstone Lake, is 22 miles (35.4 km) north of the South Entrance. Six miles (9.7 km) north of Fishing Bridge junction, in Hayden Valley, is Mud Volcano. Boardwalk trails may be snowpacked and icy, so walk carefully.

You may be surprised to see puffs of steam at random locations. Countless tiny thermal features elude detection by summer visitors, but winter reveals and highlights their presence. Other clues to thermal influence include patches of bare ground; ice-free streams or ponds; and frozen spray where no waterfall exists. Yellowstone's volcanic past (and future?) expressed in thermal activity, is more obvious now than at other times of the year.

## GRAND CANYON OF THE YELLOWSTONE

The Yellowstone River has carved a great canyon through rocks altered by thermal activity. Snow clings to canyon walls in patterns deter-

mined by pinnacles, ridges, gullies, and slopes. Deep in the canyon, steam plumes mark locations of hot springs, geysers, and fumaroles. By mid-winter the roar of the Upper and Lower Falls is muffled behind massive sheets of ice. Water seems frozen in motion, as though instantly transformed from towering falls to icicle. At the base of the Lower Falls, spray freezes and grows into an ice cone that some-

ly as August. Water temperature gradually drops, cold water sinks as warm water rises, and the process continues until the water is uniformly cold enough to freeze.

Although shallow lagoons or bays may freeze earlier, widespread freeze-up takes place after an intensely cold subzero night. On average, the lake is ice-locked by December 25. In the few days

## WILDLIFE

Winter is the season of greatest stress to all living things. For many animals, it is the time of dying. The very old, very young, and those weakened by injury or illness are at a disadvantage when it is extremely difficult to find food. Even animals in good condition cannot endure repeated stress without depleting energy reserves; soon, survival is at

food easier to find. Of the large mammals inhabiting Yellowstone, only the moose can survive in the higher elevations. Its long legs are well suited to striding through deep snow to reach the fir needles that it eats.

Elk and bison are most commonly seen, partly because their winter ranges overlap areas of human occupation and partly due to their numbers. Look for them in the Lamar, Pelican, and Hayden Valleys, as well as along the Firehole River.

Winter in northern Yellowstone, along the 56 miles (90 km) of road between Gardiner and Cooke City, Montana, is significantly different from the rest of the Yellowstone plateau. Three river valleys—the Yellowstone, Lamar, and Gardner—combine with the lowest elevations in the park to create ideal winter habitat for a variety of wildlife. Typically, less snow falls here and temperatures are a few degrees warmer than elsewhere in the park. Few other places in North America feature the diversity of wildlife found here.



times reaches half the height of the falls. Overlooks along the North and South Rims offer views of different portions of the canyon and of the Lower Falls. Facilities at Canyon Junction include a warming hut, snacks, hot drinks, and snowmobile fuel.

## YELLOWSTONE LAKE

At an elevation of 7,733 feet (2,345 m), Yellowstone Lake is North America's largest body of water at a relatively high elevation. During winter, its 136 square miles (354 sq km) of surface freeze solid from shore to shore (except for isolated spots of thermal activity). Freeze-up is a gradual process in such a large body of water, starting as ear-

between freeze-up and the accumulation of insulating snow, solar radiation causes heating and expansion of the vast sheet. Ice noisily shifts—creaking, popping, and groaning in the stillness; locals say this is the time that "the lake sings."

Yellowstone Lake is snowbound roughly half the year. Break-up occurs quickly, usually in late May or June. This vast body of water is a complex system influencing climate, plants, and animals over a far greater area than its shoreline boundaries. Set among the Absaroka Mountains, it defines the essence of winter—an untouched wilderness snowscape, harshly beautiful. Warming huts are located near Fishing Bridge and at West Thumb.

stake. Now more than ever, you must avoid unnecessarily disturbing wildlife. Never approach animals closely—you may cause an animal to move, and exertion through deep snow consumes great quantities of energy.

Animals have adapted to cold and snow in a variety of ways. Ground squirrels, marmots, and bears disappear underground or into dens, entering that mysterious state of suspended animation known as hibernation. Others, including many birds, leave the area for more moderate climates. For those which remain, adaptations include thicker winter coats, a change to protective coloration, or migration to lower elevations or to thermal basins where winter is slightly less severe and

Often, a visit is most remembered and enjoyed for the discoveries made on your own. Patience and alertness may bring you moments of extraordinary beauty or reveal the story of a jumble of tracks in the snow. May your visit be safe, rewarding, and special.



# Yellowstone's Weather— predictably unpredictable

## Yellowstone Today

Visitors to Yellowstone National Park may be surprised to encounter winter weather any time of year. If unprepared, the consequences range from uncomfortable and inconvenient to life-threatening. During the coldest months, wind and snow can kill if protective clothing is not worn. The information presented here describes the "normals" and extremes of Yellowstone's year-round climate and may be used as a guide in planning a visit to the park. Obtain information on current weather conditions and forecasts at visitor centers or ranger stations.

Weather observations were started at Yellowstone National Park headquarters—Mammoth Hot Springs—by U.S. Army personnel in January 1887; a Weather Bureau station was established in 1903. The observation site is located in the extreme northern part of the park on the mountain slopes above the Gardner River. Mountains to the east, south, and west rise 2,000 to 3,000 feet higher than the valley.

The station itself, at 6,241 feet above sea level, is lower than most of the park, which varies from 7,000 to 8,500 feet, with several ridges and peaks rising to 11,000

feet or more. Because of the lower elevation at this headquarters site, temperatures will average about five degrees warmer, and there is less precipitation than at other locations in the park.

In summer, a general rule is that the higher the elevation, the cooler the temperatures and the greater the moisture and shower activity. In winter, precipitation is heavier at the higher elevations and in the southern portion of the park; the coldest temperatures occur in the mountain valleys.

The average maximum temperatures in the summer are in the 70s. Readings occasionally reach the 80s and, rarely, the 90s at the lower elevations. Temperatures at night drop into the 30s and 40s.

Winters are cold with temperatures well below freezing most of the time. In January, which is usually the coldest month, temperatures range from near zero at night to the middle 20s in the early afternoon. Values frequently are well below zero, and all areas of the park have recorded at least -40°F at some time. The lowest recorded temperature is -66°F at the West Yellowstone station on February 9, 1933. There are occasional mild periods

during the winter when daytime temperatures reach into the 40s.

Annual precipitation varies from an average of just under 14 inches at the Lamar Ranger Station in the northeastern portion of the park to around 38 inches at Bechler Ranger Station in the southwestern corner.

Snowfall is quite heavy over the mountains. For most of the park, which lies between 7,000 and 8,500 feet, annual snowfall averages close to 150 inches. At higher elevations, amounts are normally well over 200 inches annually, and, in some locations, over 400 inches. Of course, amounts vary from year to year.

### Estimated Actual Thermometer Reading, °F

Wind Speed in MPH	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-21	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-36	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind speeds greater than 40 MPH have little additional effect.	Little Danger (for a properly clothed person)			Increasing Danger				Great Danger				
	Danger from freezing of exposed flesh											

Yellowstone's weather is well known for its unpredictability and sudden changes. Be prepared for a range of conditions, especially if you will be out for several hours or overnight. See the park map on page 16 for locations of warming

huts and phones. Careful, thorough pretrip planning is the key to an enjoyable winter visit to Yellowstone.

## Self-guiding trails

Take time to stretch your legs and linger in the beauty of the snowscape. Adapt your pace to winter conditions; trails may be icy and snowpacked, so walk with caution. Trail guide leaflets are available for 25¢ at visitor centers or at the parking lot trailheads. **Formations are fragile and unstable. Thin crusts cover areas of boiling mud and water. For their protection—and your own—stay on designated boardwalks and trails.** Thermal features are easily damaged by objects tossed into them; please do not litter. For safety and courtesy to skiers, please do not walk or snowshoe in ski tracks. Always avoid disturbing wintering wildlife, which are often found in geyser basin areas.

### MAMMOTH HOT SPRINGS TERRACES

Paths wind around a hillside of active and inactive hot springs. These springs are noted for their rapid mineral deposition—up to two tons of travertine are added to the hillside daily. From the top of the terraced hillside, you can view the entire Fort Yellowstone complex built by the U.S. Cavalry in the late 1800s and early 1900s when they administered the park.

### NORRIS GEYSER BASIN

Take a walk and explore the hottest, most active thermal basin in the park. Trails from the Museum lead you through both colorful, steamy Porcelain Basin and the more wooded Back Basin, site of the world's tallest active geyser, Steamboat geyser. While Steamboat rarely erupts (the last eruption was in 1991), Echinus Geyser is a perennial crowd pleaser, erupting many times each day.

### FOUNTAIN PAINT POT

This interesting geyser basin is located halfway between Madison Junction and Old Faithful. Along the short, 1/2 mile boardwalk you will see every type of geothermal feature found in Yellowstone—geysers, fumaroles, mud pots, and hot springs.

### UPPER GEYSER BASIN

The world's largest array of geysers, including Old Faithful, are found here. Several miles of trail begin at the Old Faithful Visitor Center. This is a popular area for skiers, and ski trail guide leaflets are available at the visitor center and at the Snow Lodge. Check on trail conditions and weather forecasts before starting out on a ski trip; trails may be closed or restricted due to hazards.

### WEST THUMB GEYSER BASIN

Here you will find thermal features boiling and steaming on the shore of ice-locked Yellowstone Lake. Across the seemingly endless expanse of white the Absaroka Mountains rise. Otters are occasionally spotted fishing in ice holes. **Lake ice is thin and hazardous—do not venture out onto it.**

### MUD VOLCANO

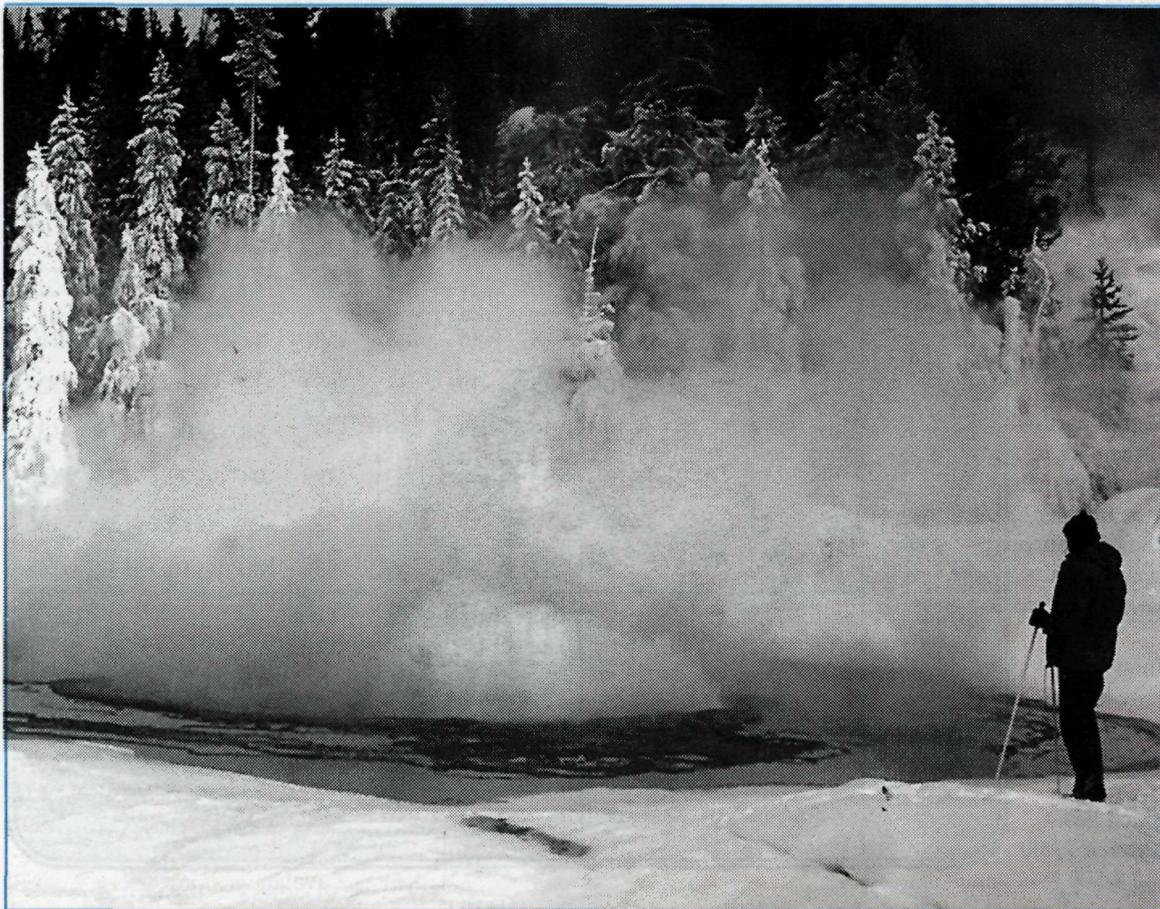
This area, approximately 6 miles (9.7 km) north of Fishing Bridge Junction and 10 miles (16.1 km) south of Canyon Junction, is unique in Yellowstone because of its acidity. The turbulent, seething pools of thick, dark water; the billowing steam; and the all-pervasive smell of rotten eggs (hydrogen sulfide) will long be remembered after your walk here!

### GRAND CANYON OF THE YELLOWSTONE

Views of the colorful canyon and its spectacular waterfalls are awe-inspiring at anytime of year. But, in the winter, the quiet softness of the snow enhances the dramatic colors of the canyon walls and the waterfalls seem frozen in time trapped by the icy spray of the river's water. **The trails and overlooks are snowpacked and icy, please use extra caution.** [NOTE: the road is closed to snowmobiling 4 miles (6.4 km) north of Canyon Junction.]

# Cross Country Skiing Information

Yellowstone Today



Yellowstone National Park, encompassing 2.2 million acres, is one of the world's premier wilderness areas. Most of the park is backcountry and managed as wilderness; many miles of trails are available for skiing.

However, there are dangers inherent in wilderness: unpredictable wildlife, changing weather conditions, remote thermal areas, deep snow, open streams, and rugged mountains with extreme avalanche danger. You have chosen to explore and experience the land on its own terms, but there is no guarantee of your safety. Be prepared for any situation! Carefully read all backcountry guidelines/regulations, and know the limits of your ability.

All unplowed roads and trails are open to cross country skiing and snowshoeing; on unplowed roadways used by snowmachines, keep to the right to avoid accidents.

Most backcountry trails are marked for summer use. Orange metal markers attached to trees may be

difficult to find in winter. Few streams have bridges. Parties venturing into the backcountry should carry a USGS topographic map and a compass—and know how to use them. Even on a well-marked trail, it is easy to get lost in a "whiteout" or blizzard. Only skiers thoroughly familiar with the area should attempt off-trail travel. When planning your trip, get specific information on conditions from rangers at a ranger station or visitor center.

Park elevations with adequate skiable snow range from 7,000 to 10,000 feet. Skiers and snowshoers who live at lower elevations should take a short day or overnight trip to test their capabilities before attempting longer outings.

**A permit is required for all overnight trips in the Yellowstone backcountry. Inquire about backcountry permits at visitor centers or ranger stations.**

Pack it in—Pack it out: All refuse must be carried out of the backcountry.

## Ski Touring Trails

There are a number of popular ski trails throughout the park; maps and trail descriptions are available at visitor centers for trails in the Mammoth, Tower, Northeast, Canyon, and Old Faithful areas. These half- to full-day trails range from easy to difficult.

Many skiing opportunities abound along the plowed road between Mammoth and the Northeast Entrance. Some popular trails in the park include:

### Upper Terrace Loop Trail

The 1.5 mile trail follows the road through the upper terrace area with fantastic views of the steaming lower terraces and historic Fort Yellowstone. This is a thermal area; please stay on the trail.

### Bunsen Peak Trail

This 6 mile trail follows the old Bunsen Peak road; in places it is

quite steep. It is easiest to catch the concessioner-operated ski shuttle from Mammoth to the trail's upper end, just south of Rustic Falls. Along the trail, you will have fine views of the Gallatin Mountains and the Gardner River Canyon. The trail ends in the Mammoth maintenance area (called the YCC camp).

### Blacktail Plateau Trail

The trail, 7.5 miles east of Mammoth, follows an unplowed 8 mile road. Broad vistas of meadows surrounded by mountain peaks are seen, often with elk, deer, coyotes, and occasional bison scattered throughout their winter range.

### Tower Falls Trail

This trail begins at the Tower Junction and follows the unplowed Tower-Canyon road for 2.5 miles past the Calcite Springs Overlook to Tower Falls (snowmobiles are

not allowed). Besides views of the Yellowstone River Canyon, you might see bison, bighorn sheep, or bald eagles. Continue on the 5.5 mile Chittenden Loop Trail or return to Tower Junction.

### Barronette Trail

This 3.5 mile trail near the Northeast Entrance follows Soda Butte Creek along an abandoned roadway and parallels the Northeast Entrance Road. The trail is mostly in a conifer forest at the base of Barronette Peak, but offers some spectacular mountain scenery and consistent snow conditions.

### Lone Star Geyser Trail

This 9-mile trail is fairly easy. It begins at the Old Faithful Snow Lodge and takes you to Kepler Cascades where you then follow an unplowed service road lying next to the Firehole River to Lone Star

Geyser. The geyser erupts about every three hours from a 12-foot high sinter cone. Beginning skiers should return the same way, while more advanced skiers might like to return via the Howard Eaton Trail. This trail is quite steep (downhill) upon leaving the geyser area and should be skied with caution.

### Fairy Falls Trail

Catch a snowcoach shuttle at Old Faithful Snow Lodge to the southern end of the Fountain Flats Drive. From here you can ski to one of the most spectacular ice-encrusted falls in the park. You will be skiing through areas of burned forest so be cautious of falling trees. You can ski back to Old Faithful by following the trail next to the snow vehicle road until you reach the Biscuit Basin Trail, which takes you through the Upper Geyser Basin past Morning Glory Pool and Geyser Hill. The entire trip is about 8 easy miles.

For more details about these and other ski trails, check at the Mammoth or Old Faithful Visitor Centers.



# Cross Country Skiing Information

Yellowstone Today

## Ski Gear Guide

Choose skis and boots made for touring or mountaineering. Narrow racing skis won't give you enough surface area to break trail. Low shoes won't give you enough ankle support, and track is set only on a few Yellowstone trails. Before you rent or borrow equipment, check for fit and suitability for wilderness use. Equipment that fits both you and park conditions can make or break your trip.

Winter temperatures are severe in Yellowstone but you can be comfortable and confident if you are properly dressed. Prepare for changing conditions by wearing clothes in several adjustable layers. It is as important to prevent overheating as it is to prevent chilling.

Be sure your clothing includes a windproof hooded outer layer with wool or other insulated garments underneath. Wool or synthetic trousers and long underwear will help keep your legs warm and dry in deep snow. Wind or rainpants are lightweight and provide extra warmth on windy days. Avoid cotton jeans and sweat-

shirts. Thick wool socks and gaiters or overboots help keep your feet warm and dry. Wear gloves or wool mittens with shells that breathe to allow moisture to escape from sweaty hands.

Since you lose more heat from your head than from any other part of your body, wear a facemask-style stocking cap or parka hood when you need maximum protection. Dark sunglasses

are a must for sunny days. High altitude sunlight reflected from snow is much more intense than

at lower elevations; snowblindness may occur if sunglasses are not worn. Apply sunscreen lotion

to exposed skin to avoid painful sunburn.

Trip planning should include allowances for limited daylight, snow conditions, temperature extremes, and the number of people in the group and

On day trips consider taking some or all of these items to increase your safety:

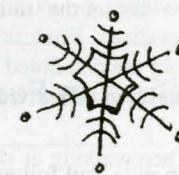
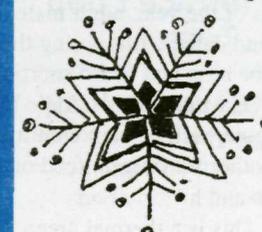
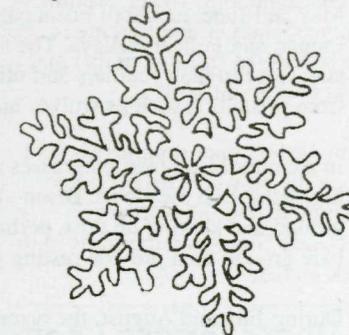
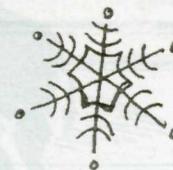
- extra clothing
- matches or lighter
- water
- map
- compass
- snack food
- ski repair kit

Skiers who are planning extensive backcountry trips involving overnight camping should carry all of the above as well as the items below:

- backpack
- sleeping bag
- small tarp
- tent or bivouac bag
- closed-cell sleeping pad
- stove and pots
- easily prepared food
- first aid kit
- repair parts and tools for skis
- avalanche cord
- transceiver
- shovel
- maps
- pack
- compass
- knife



their experience and physical condition. Overnight ski and snowshoe trips during December and January are difficult due to short days (8:30 am–5:00 pm), temperature extremes, and soft snow.



## Skiing Safety

**1. Evaluate your party's capabilities.** Plan your outing so that the weakest group will enjoy and survive it.

**2. Learn about your equipment's capabilities and weaknesses** and be prepared to repair it.

**3. Never closely approach geysers, hot springs, or mud pots.** You may fall through overhanging snow ledges or thin crust. Do not leave designated trails in geothermal areas.

Beware of icy conditions on downhill grades leading into thermal areas. Side-step or walk down the hill rather than risk skiing out of control into a boiling pool.

**4. Avalanches** are possible on hillsides or in canyons with slopes of 25–45%. Slides occur most frequently after heavy snowstorms or during warm periods.

Avalanche hazard can be high on roads between the East Entrance and Fishing Bridge Junction, on Dunraven Pass, on trails in the Cooke City vicinity, and in many areas of the backcountry. Learn about avalanche mechanics, safe travel methods, and rescue procedures.

**5. When crossing frozen lakes, use extreme caution** and check ice thickness by prodding with a ski pole. Ice, snow covered or not, may be thin, especially near inlets, outlets, and waters warmed by thermal activity. Crossing rivers may be

dangerous; some have bridges and some do not. Ask a ranger about local crossings.

**6. Do not approach wildlife.** All wild animals are unpredictable; if they charge, you can't outrun them in deep snow. If they run, you are forcing them to use energy they need to survive.

**7. Fires** during the summer of 1988 burned near or across many ski trails and destroyed the trunks and root systems of many trees, creating hazardous standing snags which could fall with little warning. Skiers—be alert for this possibility, and, while in burned areas, stay on established trails.

**8. Exertion in dry mountain air can dehydrate you.** Carry and drink two quarts of water a day. Carry gear to melt water from snow or dip it out of a stream from a safe distance with a ski pole. Boil water from lakes or streams to reduce the chance of infection.

**9. Learn as much as you can about winter survival.** Talk with park rangers before you leave on any trip. Many good books are also available on this topic.

**10. Basic ski etiquette: yield to those going downhill when skiing uphill on trails.**

**11. Hikers: please do not walk in ski tracks.**

# Bison in the Yellowstone Ecosystem

Yellowstone Today

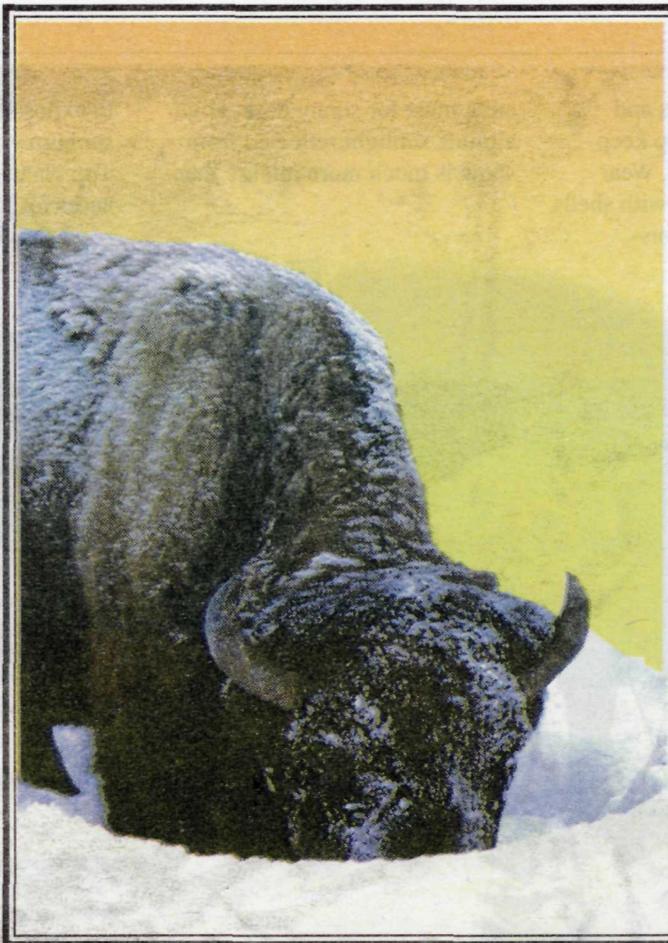
Wild, free-ranging bison have been a part of the Yellowstone landscape since pre-historic times. Primarily because of poaching and market hunting, the bison population declined until just after the turn of the century when less than 50 bison were known to exist in Yellowstone National Park.

In this century, bison populations have made a remarkable recovery, now numbering more than 150,000 animals in private and public herds nationwide. Bison are *not* listed as a federally endangered or threatened species. The Yellowstone bison population numbers about 2,500.

Maintaining a wild, inherently nomadic bison herd can present problems. Bison do not recognize political boundaries and sometimes move to adjacent public and private land, especially during the winter. Increased numbers of bison, weather conditions, and human activities all affect distribution of animals; attempts to manipulate bison movements by hazing or herding

have met with very limited success.

Unfortunately, early in this century, bison were exposed to the disease brucellosis, probably a result of contact with domestic livestock. It was first detected in Yellowstone bison in 1917. Representatives of the livestock industry have concerns about the possibility of brucellosis transmission from bison to cattle. While no documented case exists of wild, free-ranging bison from Yellowstone transmitting brucellosis to domestic cattle, the small risk of transmission is of concern.



To address these issues, the National Park Service, together with the U.S. Forest Service and the state of Montana, released a draft environmental impact statement (EIS) in June 1998 for the Interagency Bison Management Plan for the state of Montana and Yellowstone. The EIS examined seven alternatives for managing bison and minimizing the risk of transmission of brucellosis from bison to domestic cattle. The public comment period on the plan ended on November 2, 1998. However, copies of the document can be obtained from: Sarah Bransom, Interagency Bison Management Plan, DSC-RP, P.O. Box 25287, Denver, CO 80225-0287.

Until a decision is made on the long-term management plan, the agencies will continue to manage bison under an adjusted Interim Bison Management Plan, approved in August 1996 and adjusted in 1997. (Copies of this plan are available from the Yellowstone Center for Resources, P.O. Box 168, Yellowstone National Park, WY 82190.) A variety of methods are used along the north and west boundaries of the park to limit the distribution of bison and to maintain separation of bison and cattle on public and private lands. When possible and practicable, bison are hazed back into the park. Otherwise, bison that leave the park are captured and tested for brucellosis (and, if sero-positive, sent to slaughter; if sero-negative, marked and released), or are shot, depending on location. The Interim Plan is designed to maintain a wild, free-ranging bison population and to assist the state of Montana in maintaining its "brucellosis class-free" status until the long-range management plan can be completed.



## More about bison...

Bison are one of the most commonly seen animals in the park. In May and June, newborn bison calves can be viewed in the Firehole, Lamar, and Pelican valleys. The small, gangly, reddish-colored calves stay close to their mothers and other young females for protection from predators, such as wolves and bears.

In summer bison feed on grasses and sedges in Yellowstone's lush, high-elevation meadows. Bison also create wallows by lying on the ground and kicking up dust, perhaps to deter insects. These patches of bare ground then provide resting places for the bison themselves.

During July and August, the bison mating season—or rut—occurs. At other times of the year, adult male bison often stay separate from the females and calves. But during the rut, males form vast herds of bison can be seen and heard snorting and socializing in the upper Lamar and Hayden valleys. Male bison, competing for females, often fight and gore each other, sometimes causing injury or death. Grizzly bears and other scavengers feed on and defend these carcasses from competitors.

In winter, bison migrate to geothermal areas and winter range at lower elevations. Winterkill (death of the old, young, and sick) may occur from the combined effects of climatic stress, food availability, and the condition of individual animals.

When walking or skiing, give bison a wide berth. Along roadways, watch the bison safely from your snowmobile or car!

## Tips for passing bison and other wildlife on park roads

**If bison or other wildlife are slowly walking toward you on the road:** Pull your machine over to the side of the road opposite the animal(s) as far as possible and stand to the side of it, leaving the machine between you and the animal(s). Wait until they are completely past you before driving on. Do not make any quick or loud movements. Wildlife are generally not aggressive unless they have been provoked or surprised.

If animals are standing in the road: Stop at least 25 yards (23 m) before reaching them. Give them the opportunity to move off the road. If they don't move, and you want to pass them, assess their behavior.

If the animals do not appear to be agitated and if they remain standing calmly, inch toward them and stop. Watch how they respond to your advance. They may decide to get out of your way by walking off the road or by moving to avoid you. If so, pass safely on the opposite side of the road at a moderate and consistent speed. Use groomed pullouts whenever possible to give the animals maximum space when you are passing.

If the animals remain calm, but do not move as you inch toward them, stop, pause, and then try again. Give them the right of way. If they feel pressured or pushed, they may begin to stampede.

If an animal raises its tail, paws the ground, or throws its head and body around, do not attempt to pass. Wait for the animal to leave the road on its own. Any advance may be perceived as a threat, and the animal(s) could charge.

**If animals are running toward you:** It is likely that oncoming snowmobile traffic is pushing them your way. If you have enough time and space, turn your machine around and move down the road until the animals have moved off the road or until you find a safe place to pull over. Remember that it is difficult to turn a snowmobile around quickly. If your machine does not have reverse, remember that you will need the space of both lanes to turn your vehicle around.

If you do not have time to turn around, pull your machine as far as possible to the side of the road opposite the animal(s) and stand to the side of it, leaving the machine between you and the animal(s).

Be aware of the urgency of this situation. Anticipate it as you come around a curve and be prepared to act quickly. Also, make an effort to avoid running wildlife down the road, pushing them toward oncoming snowmobilers. **And remember, there is no guarantee of your safety.**

# Yellowstone's Wildlife in Winter

Yellowstone Today



Yellowstone's wildlife live in an environment characterized by long winters that range in severity of temperature and snowfall depending on location. Each species has adapted to these conditions in their own way. For example, many bird species leave the park and move to lower and/or distant areas for the winter. Grizzly and black bears spend the fall gorging themselves on high-fat foods in preparation for entering their winter dens sometime between mid-October and early December where they will "sleep" or hibernate through the adverse conditions. Other familiar park species such as marmots, ground squirrels, and chipmunks also hibernate through the cold and snowy months.

While approximately 30,000 elk summer in the park, many leave the park in the winter. About 15,000 to 20,000 elk winter here, mainly in the northern portion of the park where the elevation is lower and snowfall and temperatures are more moderate. Often huge herds of elk on their winter range can be viewed from the road between Mammoth and the Northeast Entrance. One park elk herd summers and winters entirely within the interior of the park. The Madison-Firehole herd numbers about 600-800 animals and spends its winter among the thermal basins of the park, taking advantage of exposed vegetation and the warmth of the area.

Moose, typically solitary creatures, often move *up* in elevation (to as high as 8,500 feet) during the winter where they spend the long, cold months in subalpine fir and Douglas-fir forests. There they browse almost exclusively on the twigs and needles of these conifers. In the thick fir stands, much of the snow builds up on the branches of the trees, which results in less snow being on the ground beneath the trees. The snow is also shaded by the trees and is, therefore, less crusty, which enables the long-legged moose to move more easily.

Some, but not all, ravens remain in the park year-round. Ravens, along with the rest of their cousins in the crow family, have evolved the highest degree of intelligence among birds. Experiments have shown these birds can count up to three or four, are good at solving puzzles, and have amazing memories. All this helps to explain the behavior that many Yellowstone snowmobilers complain about: ravens that unzip or unsnap the packs on their "biles" looking for a snack! Visitors are reminded that no wildlife should be fed human foods, and this behavior should be strongly discouraged.



## Habituation spells disaster

Yellowstone offers unique opportunities to view wildlife in their natural environment. While most animals avoid humans and their developments, some birds and mammals live near roads and park communities. Unfortunately, this increases the likelihood that some individuals will become habituated—that is, used to people. Habituated wildlife are misleading; they may appear to be highly tolerant of humans, but they are still wild and unpredictable.

Approaching wildlife at close range can cause the animals stress. Be observant—many animals will show signs of increased alertness or fear. The animal(s) may move away; heads may perk up, or eyes widen and focus on nearby humans; the animal may flatten its ears, flare its nostrils, change body direction, stop eating, or rise from a resting stance.

Habituated wildlife can quickly become conditioned to human foods. Swans, coyotes, bighorn sheep, ground squirrels, bears, ravens, and other species have all demonstrated "begging" behavior in Yellowstone. This seemingly harmless activity is dangerous for both you and the animal(s). When they come to the roadside to obtain food, animals often are hit by vehicles or become exhausted chasing traffic.

Human foods in an animal's diet may result in tooth decay, ulcers, digestive problems, or failure to accumulate adequate fat reserves for the winter when food is scarce. Beggar birds and wildlife may become aggressive, and have occasionally injured park visitors. Please enjoy the opportunity to view and photograph park wildlife in their wild, natural state. The park is not a zoo; animals live and die based on their species' adaptations and their individual ability to survive in this environment. Respect park wildlife—never approach too closely and be alert for changes in their behavior. **All park animals are wild and potentially dangerous. Never feed or approach any park animals.**



# Snowmobiling and Other Information

Yellowstone Today

## Snowmobile Regulations

Snowmobiling is one way to discover Yellowstone's winter wonders. Snowmobile regulations are designed to protect park resources and you, and they are strictly enforced.

• **Snowmobile operators must have a valid state motor vehicle driver's license in possession** (see article below).

• Drive on the right side of the road and in single file. When stopping, pull to the far right and park in single file. Stay to the right even if the roads are rough.

• Maximum speed limit is 45 mph (73 kph) or less where posted or as conditions warrant. Obey all speed limits and stop signs.

• Snowmobiles may be driven on designated roads only. **Sidehilling is prohibited** and carries a fine of up to \$5,000. Stay on roads to

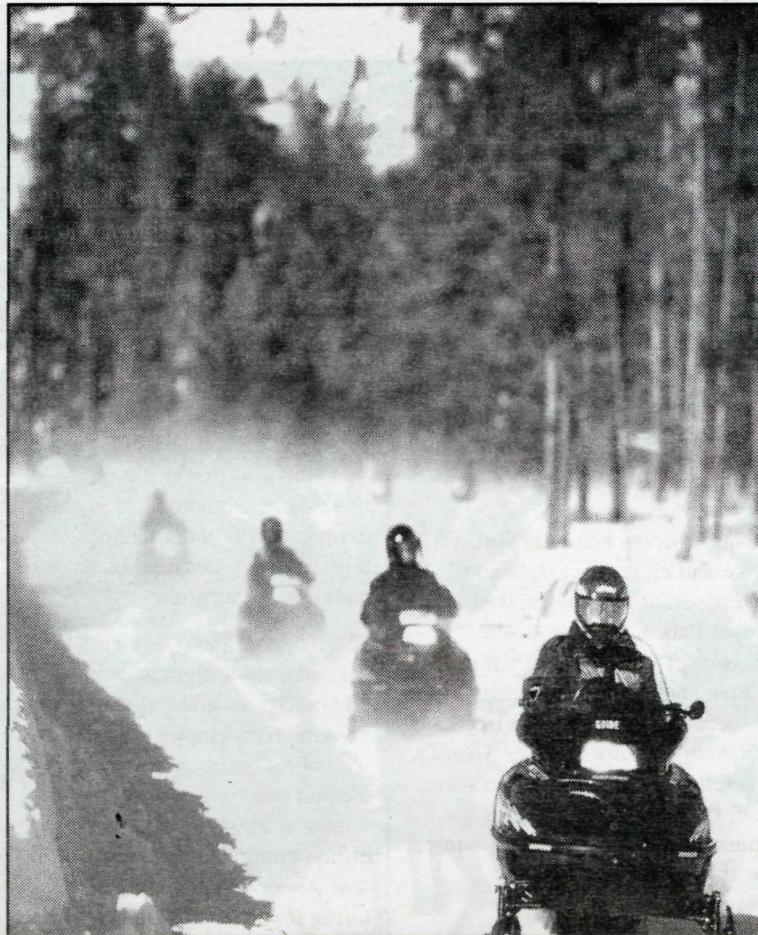
avoid injuring yourself, damaging your machine, or harming the environment.

• Operating a snowmobile while intoxicated is illegal. Possession of open containers of alcoholic beverages, including bota bags, is illegal while operating a snowmobile or riding as a passenger.

• **Wildlife have the right of way!** Chasing, molesting, approaching or feeding any animal is prohibited.

• Snowmobiles must be registered according to applicable state law.

• Snowmobile exhaust and muffler systems must be in good working order. The maximum noise allowed is 78 decibels. **Snowmobiles exceeding the decibel standard will be denied entry into the park.**



## Keep your trip safe

• **Travel in groups;** emergencies are more easily handled than if you are alone.

• **Dress for extreme cold.** Items essential for snowmobilers include: helmet, face mask, heavily insulated gloves or mittens, felt lined boots, and a heavily insulated snowmobile suit. Avoid tight-fitting garments; they restrict circulation and increase the possibility of frostbite.

• Carry extra food for 12 hours beyond your planned trip, extra fuel, drive belt, spark plugs and appropriate tools, plus extra parts that frequently break down or wear out on your machine. Always include matches and a first aid kit. **Repair services are not available in the park** except for minor repairs and parts at Old Faithful.

• **Know the locations of warming huts, visitor centers, and public phones** (see the back page of this newspaper).

• Before starting your trip, **check on road and weather conditions.** Blowing and drifting snow can be especially hazardous in Hayden Valley (between Canyon and Fishing Bridge junctions) and on Swan Lake Flats (approximately 4 mi [6.4 km] south of Mammoth Hot Springs).

• **Avalanches** may occur on steep hills or in canyons. When traveling through such areas, do not bunch up—spread out. Avalanches are more likely to occur during or after heavy fresh snowfall, high winds, or extreme temperature changes.

• Hazardous conditions may temporarily close Sylvan Pass (between the East Entrance and Fishing Bridge Junction). The road from Tower Junction to the Washburn Hot Springs Overlook, 4 miles (6.4 km) north of Canyon Junction is closed to snowmobiling due to avalanche danger.

• See article on previous page to assist you in passing bison and other wildlife.

## License is needed to snowmobile

All snowmobile operators in Yellowstone National Park are required to possess a valid motor vehicle operator's license. In addition, persons possessing a learner's permit may operate a snowmobile in the park when supervised one-to-one within line of sight (but not further than 100 yards) by a licensed person 21 years of age or older. The policy change was implemented because of the park's concern about the number of snowmobile accidents involving young operators.

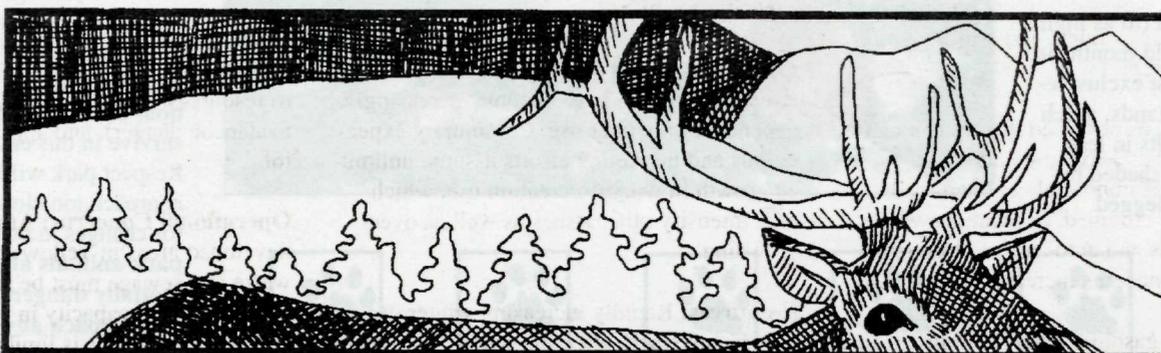
Snowmobile use has increased dramatically in the park during the past decade, and it is now common to have more than 1,600 snow-machines a day, including track-conversion vehicles and snow coaches, operating each day on the park road system. Modern snowmobiles weigh 400-500 pounds and are capable of quick acceleration to over 70 mph. Between 1987 and 1992, youthful operators accounted for an average of 16 percent of the snowmobile accidents in the park, while composing an estimated 5 percent or less of the total number of

snowmobile operators.

Park officials believe that winter traffic conditions are more similar to a highway driving situation than to the snowmobile and off-road vehicle trails found elsewhere. Under the high-speed highway conditions found in the park, most young snowmobilers are at a distinct disadvantage in terms of their judgment, experience, and physical capabilities compared to a licensed driver.

The driver's license requirement being implemented for snowmo-

biling in Yellowstone is not unprecedented. A number of states require the possession of a valid driver's license to operate a snowmobile on public lands or on public roads. Options for young people visiting the park during the winter include doubling up on a snowmobile operated by a licensed driver or using any of the authorized commercial snowcoach services that provide transportation in the park.



# Winter Use

Yellowstone Today

## The winter use dilemma

Many of Yellowstone's employees consider winter to be their favorite season. Wildlife is more visible; the scenery is spectacular covered with snow; and thousands of thermal features are at their most dramatic, wreathed in delicate ice formations and billowing steam.

We hope your visit is safe and memorable, and that Yellowstone lives up to your expectations. But while you are here, we would like you to think about a vexing dilemma we all face. The focus of our concerns revolves around the extraordinary wonders we all enjoy and their need for special consideration in the winter.

For all its beauty, winter is a time of extreme hardship for much of Yellowstone's wildlife. Winter controls the size of many animal populations, and those populations have evolved to survive in an extreme environment.

But human use of the park has skyrocketed in the past 20 years, and though we humans try very hard to use the land lightly, we have many effects that we only now are beginning to understand. As well, we have effects on each other; the more people there are, the less each person can be assured of the quality experience for which Yellowstone is so famous.

In 1990, after extensive public involvement, we issued a Winter Use Plan, aimed at ensuring the protection of park resources and the quality of the visitors' experience. This plan's estimates of winter use lev-

els in the year 2000 were reached in the 1992-93 winter season.

Today, scientific studies are beginning to reveal the extent of our impacts upon resources such as air quality. Budgetary realities are that our staff and resources have not increased in proportion to winter use. Individuals and organizations are expressing concerns that the experience is slipping in quality. We in Yellowstone are actively seeking ways to address these problems.

Working with the National Forest Service and eight other state and local cooperating agencies, the National Park Service is in the process of producing a draft Winter Use Plan and Environmental Impact Statement for Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway. One of the goals of this plan is to continue to provide a range of winter recreation opportunities in Yellowstone.

We all want the chance to enjoy Yellowstone at its best, and we all want Yellowstone to last in good shape, not only for your next visit but also for future visitors.

If you would like to comment about your winter experience in the national parks, please do so at any of the warming huts or visitor centers in the parks or when you return home by writing to: Winter Use, P.O. Box 168, Yellowstone National Park, WY 82190 or visit our web site at [www.nps.gov/yell/winteruseplan.htm](http://www.nps.gov/yell/winteruseplan.htm).

## Snowmobile studies underway

Snowmobiles are powered by two-stroke engines, which have extremely high power-to-weight ratios and operate well in sub-zero weather but are inherently polluting. Two-stroke engine technology mixes oil and gasoline in the combustion process. This results in significant amounts of burned and unburned fuel and oil emissions. Snowmobiles produce much more carbon monoxide and particulates than modern automobiles and may contain significant quantities of air toxics.

The National Park Service (NPS) is concerned with how snowmobile emissions affect the health of visitors, NPS employees, and natural resources. The NPS initiated air quality monitoring in the winter of 1994-95. Monitoring efforts continued the following two winter seasons. This monitoring indicates that on peak-use days that coincide with cold, calm weather, there are high levels of carbon monoxide in some areas. To further understand these results and corresponding impacts, the NPS is continuing to conduct research on snowmobile emissions.

Some oil companies have recognized these concerns. For example, Conoco Oil developed a biodegradable 2-cycle motor oil that reduces the oil component of the emissions and breaks down more easily in the environment. Yellowstone has used this oil in its administrative snowmobile

fleet for the past two winters. The Conoco oil, other low-particulate oils, and oxygenated fuels were tested by the Southwest Research Institute in 1997. Tests will continue this winter.

In addition to the alternative fuels and lubricant studies, other studies have been or are currently being conducted in Yellowstone to address winter air quality issues. The following studies completed in the 1997-98 winter are in the process of being analyzed and finalized.

- A social science study conducted by the University of Montana and the University of Vermont expanded on earlier work to develop appropriate indicators of carrying capacity such as air quality. In 1997-98 a more detailed survey included visitor reactions to emissions and willingness to change use patterns to protect the park.

- A pilot study by the NPS and the U.S. Geological Survey revealed elevated levels of ammonia, sulfates, and total organic carbon in areas near groomed roads. Work continues to better understand if pollutants in the snow are entering streams and lakes in measurable quantities.

New and continuing research studies include:

- The University of California-Davis will conduct a study to determine the effects of human exposure to ambient snowmobile emissions.

- Denver University is working to develop a technique to measure snowmobile emissions in the field.

- Montana State University is doing further analysis on the deposition of snowmobile emissions in the snowpack.

These studies will help define how transportation emissions react in the fragile environment and impact natural resources. This information will allow the NPS to determine appropriate, measurable indicators for monitoring air quality, establish appropriate standards to ensure that air quality does not become unacceptable, develop management actions to ensure that the standards are not exceeded, and implement those management actions.

Another concern to the NPS is how groomed roads affect wildlife movements. The Biological Research Division of the U.S. Geological Survey, Montana State University, and the NPS will continue studies this winter on bison habitat use and movements within Yellowstone. Additionally, Montana State University will begin a study on the effects of winter recreation on wildlife in Yellowstone.

The NPS will be collecting additional data on the economics of winter recreation in the Greater Yellowstone region.

## Winter use concerns

As we described above, the rapid increase in winter visitor use is bringing a whole host of concerns to the managers and staff here at Yellowstone. Some of these issues come from our own observations; most have been suggested by visitors like you. Some of the concerns that we face are:

**Overcrowding:** During peak use periods, parking areas, roads, warming huts, and restrooms are full, making it difficult for visitors to enjoy the areas they have come to see. Eating and shelter facilities are especially crowded in inclement weather.

**Visitor Conflicts:** Many winter visitors expect a quiet, serene experience, while others prefer a more social setting. There are often conflicts where different and diverse uses exist (snowmobilers and cross-country skiers, for example).

**Safety:** Young or unskilled drivers can cause safety problems. Heavy use and warm weather make it impossible to keep roads and trails well groomed. In locations where snow machines and autos are in close proximity, safety concerns increase.

**Gasoline:** All gasoline that is sold in

Yellowstone National Park during the winter must be brought into the park in the fall and stored for the winter season. Storage tank capacity is limited.

**Community Expectations:** Communities around the region have become increasingly dependent on winter use. Community expectations and marketing efforts assume unlimited growth in winter recreation use, which may intensify other issues as well as overcrowding.

**Resources:** Rapidly increasing winter use may be adversely affecting wildlife and other

resources. Snowmobile exhaust and noise levels raise health concerns for employees and visitors.

**Visitor Behavior:** Some visitors are unaware of wilderness mandates, impacts to resources, safety issues (such as avalanche danger), and appropriate behavior.

**Operational Concerns:** At the major developed areas in Yellowstone, all solid waste and sewage must be stored for the winter. Storage capacity in garbage trucks and sewage lagoons is limited.

# Life in the Snow

—some fascinating stories

—Yellowstone Today



Look closely, and you will see that the snowscape tells some fascinating stories. The following description relates to the illustration above, roughly left to right.

1. Many different types of snow pile up like a layer cake to make the snowpack. Here the bottom layer is composed of large, angular, bell-shaped crystals of temperature-gradient snow, weakly bonded to each other and therefore easy to dig through. An ice crust (melted and refrozen earlier in the winter when this was the surface of the snowpack) marks the upper limit of depth hoar, or snow with little cohesion which has metamorphosed under graded temperatures at depth. The middle layers of the snowpack are all rounded, strongly bonded grains of equitemperature snow, while the top few inches are light, new snow, unchanged by metamorphism and still showing its original crystal structure.

2. Shrews occasionally forage on the snow surface for wind-blown insects. Whether this shrew becomes a meal for a great grey owl may depend on the texture of the uppermost snow layer. Owls rely on both sight and sound in locating their prey. If the snow is "noisy" (with an icy crust, for example), this owl will be more likely to catch the shrew than if the surface is soft, sound-muffling powder.

3. Deep, soft snow and icy crust both favor smaller animals, which stay on the surface,

and make movement difficult for large heavy animals, which sink in or break through. Under such conditions wolves are more likely to bring down an exhausted cow moose, but a snowshoe hare is more likely to escape a pursuing lynx. If the snowpack is firm, the situation is reversed, and the larger animals have the advantage.

4. Unlike many other small rodents, voles do not hibernate, but remain active all winter in extensive tunnel systems beneath the snow. Voles usually stay near the ground surface since that is where the warmest temperatures and most plentiful food supplies are found (here a vole is raiding a squirrel midden under a fallen tree).

However, if the snowpack loses its oxygen permeability due to a heavy wet snow or ice crusts, voles are forced to dig ventilator shafts up to the snow surface. An alert red fox, listening and smelling at the shaft openings, will hunt more successfully during periods of impermeable snow. A pine marten, using its nose as it burrows beneath the snow, will catch more voles if the snow is loose and permeable to smell.

5. Ptarmigan (and grouse) seek shelter within the snowpack at night, flying straight in at full speed if the snow is soft. In harder snow, they "walk" in, digging with their specially adapted claws.

This article and artwork have been reprinted

with the permission of *Biologue: A Journal of the Interpretation and Discovery in the Life Sciences*, vol. 2, no. 2, Winter 1988, "Looking at Winter." Back issues of *Biologue* are available from the Teton Science School, P.O. Box 68, Kelly, WY 83011, (307) 733-4765.

—Illustration by Denise Casey.  
—Adapted from text and concept by Kim Fadiman, a "freelance explainer," who has taught natural science courses at the Teton Science School and elsewhere.

## Attention Teachers!

Expedition Yellowstone! is a curriculum for fourth–sixth grades. The *Teacher's Activity Guide* presents a variety of topics including geology, animal and plant life, and human history, each with extensive background information and student activities. A companion student storybook, *Expedition Yellowstone! A Mountain Adventure* presents Yellowstone history. Materials may be used in the classroom or in conjunction with a student trip to the park through participation in a residential program (4–5) days taught by park rangers.

### Please send me more information about Expedition: Yellowstone!

Name: \_\_\_\_\_  
School: \_\_\_\_\_  
School Address: \_\_\_\_\_  
City, State, Zip: \_\_\_\_\_  
Phone: ( ) \_\_\_\_\_

Mail to:  
Expedition Yellowstone  
National Park Service  
P.O. Box 168  
Yellowstone National Park, WY 82190

# Friends of Yellowstone

Yellowstone Today

## Yellowstone Entrance Fees

In 1996, Congress authorized a pilot fee program to demonstrate the feasibility of spreading some of the costs of managing public lands among those who use them. Yellowstone and Grand Teton are two of 100 National Park Service units that were selected to participate in the new fee program. The additional funds generated by the fee increase are being used to accomplish projects that the parks have been unable to fund through yearly

Congressional allocations. Funded projects increase the quality of the visitor experience and enhance the protection of park resources. Projects that have been completed include the new bison exhibit at Canyon Visitor Center and rehabilitated facilities at the Mammoth Campground. Projects that are planned include new geology exhibits at the Canyon Visitor Center and amphitheater and campground upgrades parkwide.

Private, noncommercial automobile	\$20 (7 days, both Yellowstone and Grand Teton)
Individual snowmobile, motorcycle	\$15 (7 days, both parks)
Single entry (foot, bike, ski, etc.)	\$10 (7 days, both parks)
Annual Permit, both parks	\$40 (one year from date of purchase)
Golden Eagle Passport	\$50 (one year from date of purchase—valid at most federal fee collection areas)
Golden Age Passport	\$10 (one-time fee for lifetime pass—available to those citizens or permanent residents of the U.S. 62 years of age and older)
Golden Access Passport	Free (available to those citizens or permanent residents of the U.S. who have been determined to be blind or permanently disabled)

NOTE: Remember to keep your admission receipt in order to re-enter the park.

## Yellowstone Park Foundation

Yellowstone National Park is one of America's greatest treasures. Every year, millions of people like you come to visit and experience the beauty and mystery of the world's first national park. More than 50 million people have visited Yellowstone during the last 20 years. Unfortunately, shrinking federal budgets make it more and more difficult to protect and care for Yellowstone in perpetuity.

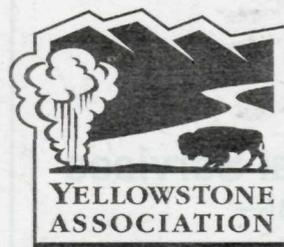
The Yellowstone Park Foundation is the only non-profit organization dedicated exclusively to raising money for projects that protect, preserve, and enhance Yellowstone National Park. The goal of the Foundation is to alleviate the environmental and financial pressures that Yellowstone faces by raising money for projects that would otherwise go unfunded. The Foundation supports many important projects, including:

- The Wolf Restoration Project which tracks and monitors the habits, habitat needs, and ecological impacts of Yellowstone's new wolf packs;
- A beaver population survey to determine the range and impact of beavers on the bio-

logical diversity of Yellowstone's aquatic and terrestrial ecosystems;

- A self-guiding trail through Fort Yellowstone that interprets the role of the U.S. Army in protecting Yellowstone during its early years;
- A landmark effort to restore the park's native Westslope Cutthroat Trout population.

The Yellowstone Park Foundation receives no government support. It relies solely on the generous contributions of private individuals, foundations, and corporations to help protect and preserve Yellowstone for our enjoyment and that of future generations. Yellowstone needs your support now more than ever. Please help to preserve the beauty and wonder of the park by becoming a Friend of Yellowstone. With a donation of \$100 or more you will receive Yellowstone's limited edition 125<sup>th</sup> anniversary pin while supplies last. If you make a donation of \$1,000 or more, you will receive special recognition as a Yellowstone National Park Steward on the park's Honor Wall at Old Faithful for one year.



## Yellowstone Association

Public appreciation and dedication have ensured Yellowstone's protection and preservation for the first 125 years of its history. The non-profit Yellowstone Association has dedicated itself to fostering this critical public support through education since its founding in 1933 and, with the help of visitors like you, has provided funding of over \$6,100,000 to Yellowstone National Park in support of educational, historical, and scientific projects.

### How can you help?

**First, visit a Yellowstone Association educational bookstore**, located in all park visitor centers. **One hundred percent** of the profit from your purchase is returned directly to Yellowstone to fund critical educational programs, scientific research, ranger-naturalist training, and program supplies.

**Second, become a member of the Yellowstone Association** and provide substantial support to Yellowstone while receiving a year's subscription to the Association's informative Yellowstone **newsletter** and to *Yellowstone Today*, the official park **newspaper**, both published quarterly. You will also receive a **15% discount** on purchases in Association park bookstores and a discount on Yellowstone Institute **classes**. In appreciation for their contribution, members who join in the park will also receive their choice of a large, beautiful and reusable fabric **book bag** depicting a grizzly bear or gray wolf.

For more information on Association membership or activities, ask one of our helpful staff members at any park visitor center, or write P.O. Box 117, Yellowstone National Park, WY 82190; or call (307) 344-2296. You can also visit our website at [www.YellowstoneAssociation.org](http://www.YellowstoneAssociation.org).

### Yes, make me a Friend of Yellowstone National Park!

Contributor  \$25    Supporter  \$50    Guardian  \$100    Steward  \$1,000    Other

Enclosed is a tax deductible gift of \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip code \_\_\_\_\_ Phone (\_\_\_\_) \_\_\_\_\_



Make checks payable to The Yellowstone Park Foundation.

### The Yellowstone Park Foundation

37 East Main, Suite 4  
Bozeman, MT 59715 (406) 586-6303  
[www.ypf.org](http://www.ypf.org)

### YES! I want to help save Yellowstone through education.

To receive all the benefits of membership, visit any park visitor center or complete and mail this form with your dues to: The Yellowstone Association, P.O. Box 117, Yellowstone National Park, WY 82190.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Annual dues:  Associate.....\$25     Patron.....\$250  
 Contributing .....\$50     Sponsor .....\$500  
 Sustaining .....\$100     Benefactor.....\$1,000

Make checks payable to The Yellowstone Association.

Charge to: \_\_\_\_\_ VISA    \_\_\_\_\_ Mastercard    \_\_\_\_\_ Discover  
Card # \_\_\_\_\_ Expiration Date \_\_\_\_\_  
Signature \_\_\_\_\_ PNP

# Services in the Park

Yellowstone Today

## Comprehensive Medical Care in a Wilderness Setting...

### Mammoth Clinic

- Open weekdays 8:30 AM and 2:00-5:00 PM; closed Wednesday afternoons. Phone (307)344-7965

### Old Faithful Clinic

- Staffed every two weeks beginning December 30, 1998, through the SnowLodge Winter Season. Call Mammoth Clinic for specific information and appointments.

- Board Certified physicians
- Prompt personal, family, and emergency medical care
- For appointments, call (307) 344-7965
- For emergencies, dial 911



**Yellowstone Park Medical Services**  
A division of West Park Hospital—  
Cody, Wyoming  
We're there when you need us!

## Yellowstone Park Medical Services

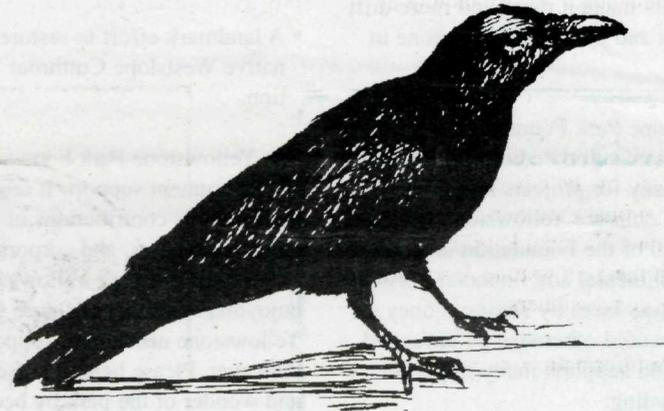
West Park Hospital, Cody, Wyoming, through its Yellowstone Park Medical Services Division, has been offering medical care to Yellowstone's visitors, employees, and residents since 1980.

A board-certified family practitioner provides year-round health care to the Yellowstone park community, including biweekly visits to Old Faithful during the snowmobile season. Experienced registered nurses and office staff complete the team, offering courteous, professional family and emergency medical care.

In the summer, the operation grows to meet the needs of the park's increased number of visitors and the employees who serve them. Outpatient services are provided at Lake Hospital and Old Faithful Clinic as well as at Mammoth Clinic.

Lake Hospital is also an acute-care facility with ten inpatient beds, clinical laboratory, pharmacy, radiology, and 24-hour ambulance and emergency services. The staff is assembled from highly qualified, experienced professionals from across the country.

For information on employment for the 1999 season (both professional and nonprofessional positions are available), send a resume to: Yellowstone Park Medical Services, 707 Sheridan Avenue, Cody, WY 82414 or call 1 (800) 654-9447, ext. 462.



## CELLULARONE®

CellularOne of Cody is now serving Yellowstone with cellular service. Share your Yellowstone experience with a friend!

## HAMILTON STORES INC.

EST. 1915

### YELLOWSTONE NATIONAL PARK



HAMILTON STORES INC.  
EST. 1915  
YELLOWSTONE NATIONAL PARK

Serving the traveling public since 1915, Hamilton Stores, Inc., offers a wide variety of merchandise, including Yellowstone souvenirs, gifts, film and photo supplies, souvenir T-shirts and sweatshirts, winter accessories, groceries, and food, including hot and cold beverages, beer, and liquor.

Mammoth General Store is open year-round to serve the traveling public and, for your convenience, is an authorized UPS shipping agent.

We are also happy to invite you to visit our on-line catalogue at:  
<http://www.hamiltonstores.com>

## Hamilton Stores—oldest park concessioner

The 1872 Act that set the park aside "for the benefit and enjoyment of the people, and the protection of the natural and scenic treasures therein" also granted leases for the various concessioners who served the public. For the first decade of the park's official existence, no lease to sell general store merchandise was issued. Then, in 1882, Henry E. Klammer applied for and received permits to provide fresh meat to camps and hotels, to pasture and slaughter beef cattle, operate a dairy herd, and to open a general store in the Old Faithful area of the park.

In 1915, a year after the Klammer General Store was purchased by Charles Ashworth Hamilton, horse transportation in Yellowstone reached its zenith. Three thousand "hayburners" pulled Yellowstone wagons, coaches, surreys, freight wagons, and—grandest of all—double-decker 26 passenger Tallyhos or stagecoaches. However, autos were allowed into the park for the first time that year, and Charles Hamilton quickly spot-

ted the tire marks in the dirt. In the next five years he acquired store concessions at Lake and Fishing Bridge, and he built filling stations at each location. This was the start of what was to become the oldest, privately owned family concession in the National Park system, serving the traveling public for more than 75 years.

Hamilton Stores invites you to visit its locations during the summer season for a bit of that history—most especially, the original store at Old Faithful (the Lower Basin Store) and the General Store in the Lake area. The upper store at Old Faithful and the Fishing Bridge General Store also convey rustic charm. The newest store, Grant Village General Store, was built and decorated with the craft of many Montana artisans. The general store at Mammoth Hot Springs, open year-round, can also be seen in historic photos from around the turn of the century with horse-drawn stagecoaches and people in period dress in front of the store.

# Services in the Park

Yellowstone Today

## Amfac Parks and Resorts—committed to hospitality excellence

Amfac Parks and Resorts has been Yellowstone's principal concessioner since 1979. Amfac Parks and Resorts operates the park's lodging, RV park, four campgrounds, restaurants, cafeterias, snack shops, cocktail lounges, gift shops, dinner cookouts, horse corrals, motorcoach sightseeing tours, self-guided auto tour rentals, and a full-service marina. For details on the **Winter in Yellowstone!** operation, see the advertisement at right.

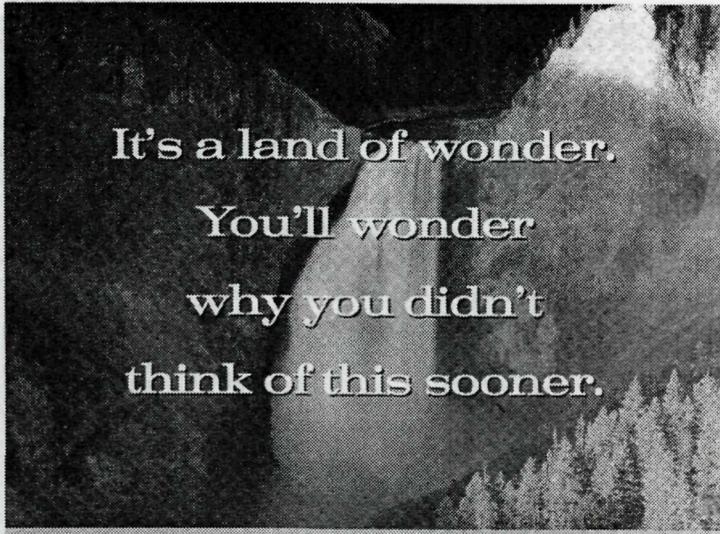
Amfac Parks and Resorts is committed to hospitality excellence and will do the utmost to assure that your visit to this park is a memorable experience; your comments are welcome.

Reservations for lodging, activities, and dinner at two hotel dining rooms are strongly recommended. Please inquire at

any lodging front desk or activities desk as soon as your plans are made. Park visitors are advised to *carry along a jacket, sweat-shirt, and/or rain gear* when participating in any outdoor activity.

Amfac Parks and Resorts also operates visitor facilities at Zion, Bryce Canyon, North Rim-Grand Canyon, and Everglades national parks; Mount Rushmore National Memorial; and Scotty's Castle at Death Valley National Monument. Amfac Parks and Resorts reinvests millions of dollars into improvements and new concession facilities at these locations as well as in Yellowstone.

Employees are one of Amfac's greatest assets. Amfac hires more than 3,700 seasonal employees in Yellowstone alone. If you would like to receive an application to join this team, please call (307) 344-5324.



**It's a land of wonder.  
You'll wonder  
why you didn't  
think of this sooner.**

Yellowstone National Park promises that and more with steaming hot springs, breathtaking sunsets, Old Faithful Geyser, wild moose, bald eagles and tranquilizing waterfalls. No matter what season you visit, you'll find yourself wondering just why you waited. For accommodations, campgrounds and activities call 1-307-344-7311 or visit [www.amfac.com](http://www.amfac.com)



**YELLOWSTONE NATIONAL PARK LODGES**  
Operated By **Amfac Parks & Resorts**  
Let the memories begin.

**Yellowstone Today**  
is produced by the Division of Interpretation, National Park Service, Yellowstone National Park, in cooperation with the Yellowstone Association and park concessioners.

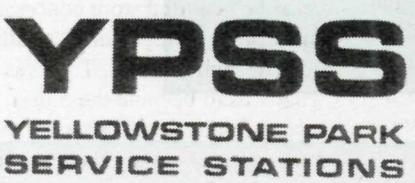
For more information, call (307) 344-2265.



**Providing electricity to  
Yellowstone National Park since 1959.  
May your visit to Yellowstone be memorable.**

**The Montana Power Company**

[www.mtpower.com](http://www.mtpower.com)



**YPSS  
YELLOWSTONE PARK  
SERVICE STATIONS**

Yellowstone Park Service Stations has been serving Yellowstone visitors since 1947. Since 1972, we have also served winter travelers, offering quality petroleum products at four winter locations.

Snowmobile fuel is available at Canyon and Old Faithful December 18–March 14, at Fishing Bridge December 18–approx. March 14, and at Mammoth Terraces December 22–March 7.

Drive belts, spark plugs, and accessories are available at Old Faithful, Canyon and Fishing Bridge (Snowmobile repair services are **not** available).

Conoco, Master Card, Visa, Discover, and American Express credit cards are accepted.

**Snowmobilers: YPSS offers services, advice**

Prior to the invention and proliferation of the snowmobile, the roads of Yellowstone National Park were seldom travelled in the winter months. The resident winterkeepers, a few hardy souls on skis and snowshoes or in snowplanes, and an occasional ranger were about the only people out there among all of the winter wildlife and scenery. The tempo has changed during the past 20 years, but the unique Yellowstone winter wilderness experience is still here.

Yellowstone Park Service Stations (YPSS) has offered basic services to snowmobilers in Yellowstone since 1972. You are encouraged to play it safe out there—Yellowstone can be very unforgiving in winter. Familiarize yourself with the location of warming huts, public telephones, and other services in the park, and know where you are as you travel. Dress intelligently and carry a tow rope, flashlight, matches, an extra drive belt, and spare spark plugs. Fill your fuel tank when you have the opportunity to do so. Travel at least in pairs if you can and watch each other for signs of hypothermia. Let someone know what your travel plans are, especially if travelling at night, and check back in with them when you arrive at your destination. Be on the lookout for animals on the road. Do not approach wildlife closely. The energy an animal expends running from you may seriously affect the animal's prospects for survival.

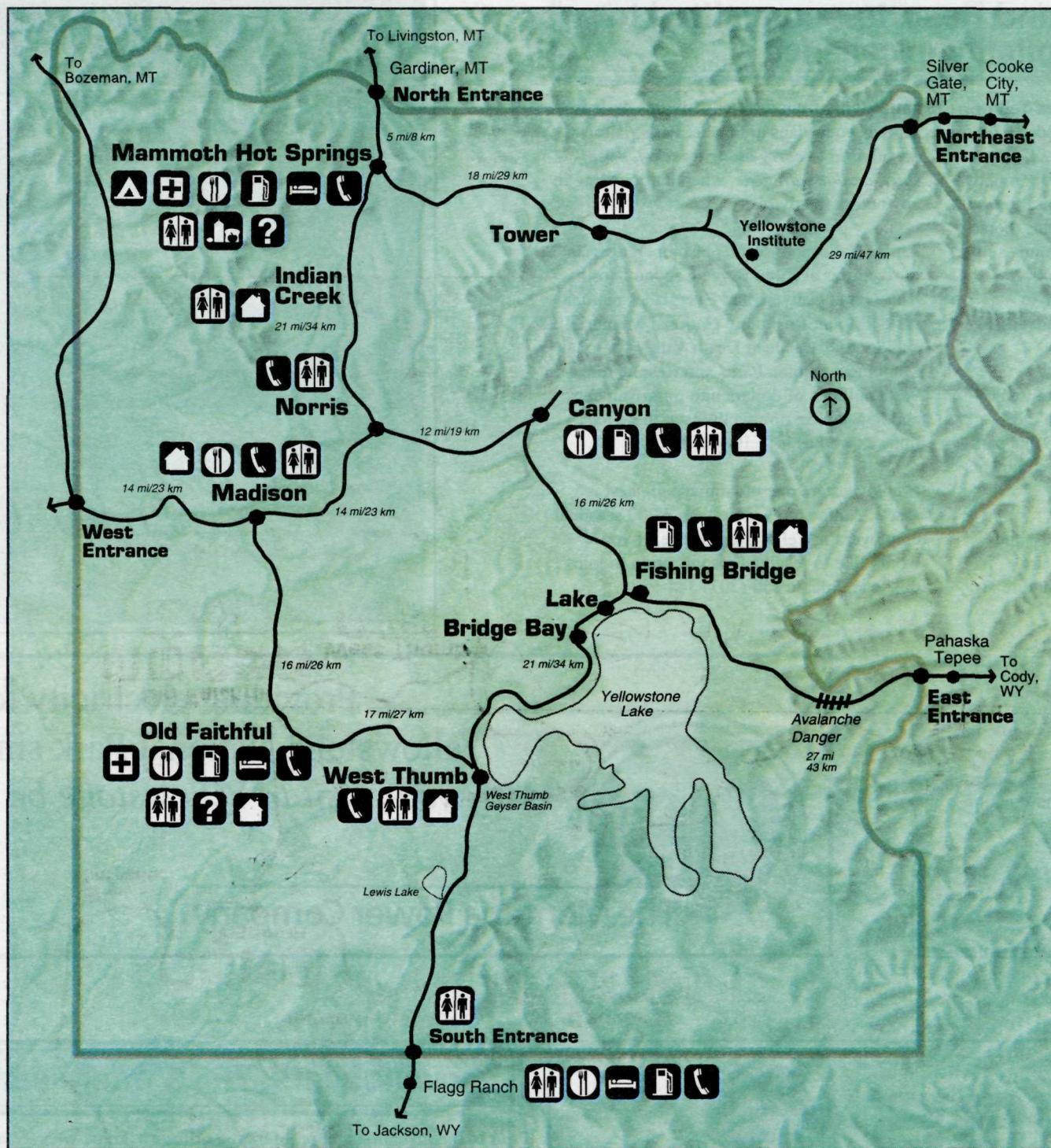
It is a privilege to be able to live and work here in the winter. All of us who do hope you enjoy your winter visit.

# Yellowstone National Park Winter Facilities

Park Information (307) 344-7381

TDD: (307) 344-2386

Emergency—dial 911



**DATES SUBJECT TO CHANGE DUE TO WEATHER CONDITIONS AND/OR RESOURCE MANAGEMENT CONCERNS.**

- |   |   |   |
|---|---|---|
| <p><b>?</b> <b>Visitor centers</b><br/>Mammoth Hot Springs: Open year-round<br/>Old Faithful: Dec. 16–Mar. 14</p> <p><b>🏠</b> <b>Warming Huts</b><br/>Dec. 16–early Mar.<br/>Indian Creek, Madison Junction, Old Faithful, West Thumb, Fishing Bridge, Canyon</p> <p><b>🛏️</b> <b>Lodging</b><br/>Mammoth Hot Springs Hotel: Dec. 22–Mar. 7<br/>Old Faithful Snow Lodge: Dec. 18–Mar. 14</p> <p><b>☎️</b> <b>Telephones</b></p> | <p><b>🍴</b> <b>Food service</b><br/>Dining Rooms: Mammoth Hotel, Dec. 22–Mar. 2<br/>Old Faithful Snow Lodge, Dec. 18–Mar. 7<br/>Snack Shop: Old Faithful Four Seasons Snack Shop, Dec. 16–Mar. 14<br/>Light Lunches: Mammoth Genera Store, Open year-round<br/>Snack Bars: Madison and Canyon warming huts, Dec. 16–Mar. 7</p> <p><b>🏪</b> <b>General store:</b><br/>Mammoth Hot Springs: Open year-round</p> | <p><b>🚗</b> <b>Snowmobile fuel</b><br/>Old Faithful, Canyon Junction: Dec. 18–Mar. 14<br/>Fishing Bridge: Dec. 18–approx. Mar. 14<br/>Mammoth Hot Springs: Dec. 22–Mar. 7</p> <p><b>🏕️</b> <b>Campground</b><br/>Mammoth Hot Springs: Open year-round</p> <p><b>+</b> <b>Mammoth Clinic:</b> Open weekdays 8:30 AM–1:00 pm and 2:00–5:00 PM; closed Wednesday afternoons; phone (307) 344-7965.<br/>Old Faithful Clinic: Staffed every 2 weeks beginning December 30. Call Mammoth Clinic for more info.</p> <p><b>🚽</b> <b>Restrooms</b></p> |
|---|---|---|

**CONOCO** This map is courtesy of Conoco—providing petroleum products since 1917... All service stations in Yellowstone offer environmentally sensitive fuels, specially formulated by Conoco to reduce hydrocarbon emissions and decrease other pollution-related problems.