Section 3
Resources and their Management

Landforms and Characteristics

This Section includes background on the Greater Yellowstone's general geology, the special and unique geologic features that attract tourists, unstable rock and soil, groundwater aquifer recharge and riparian areas, and seismic activity.

General Geology

Map 3 shows the following different rock types and surface materials:

Surficial Deposits. Soil and rock materials that have been left by receding glaciers or deposited in their present location by running water or wind. These deposits sometimes contain aggregate sources that are useful in road construction.

Basaltic Flows. Dark-colored lava rock produced by volcanic flows from the earth's interior to the surface. These rocks generally produce soils that are more fertile than soils from lighter-colored rocks.

Rhyolitic Tuffs and Flows. Rocks formed from welded volcanic fragments (generally light-colored and somewhat coarse in texture) and lava rock of similar composition containing dark bands of obsidian.

Paleozoic and Mesozoic Sedimentary and Metamorphic Rocks. Rocks that are formed from the accumulation of sediments that have been altered by high temperature and pressure. In the Greater Yellowstone Area they consist mainly of sandstones, siltstones, limestones, and quartzites.

Precambrian Metamorphic Rocks. Rocks altered during deep burial by high temperature and pressure. They are generally hard and tend to be stable.

Andesite and Andesitic Tuffs and Flows. A volcanic rock composed of andesine and one or more dark-colored minerals.

Tertiary Volcanic Extrusives. Fragments from volcanic activity that have been welded by heat or cemented together by another mineral substance.

Cretaceous Sandstones and Shales. Soft sedimentary rocks that consist mainly of sandstones and sedimentary rocks that have been altered by pressure or heat. Mass slope failures have occurred naturally in some of these rocks.

Tertiary Metamorphic and Sedimentary Rocks. Rocks that formed in more recent geologic times from the accumulation of sediments, occasionally altered by elevated temperature and pressure.

Granite/Granodiorite Igneous Rocks. Rocks that were formed at great depths from molten magma. Economic ore deposits are sometimes associated with these rocks.

Special and Unique Geologic Features

A major attraction of the Greater Yellowstone Area is the abundance of special and unique geologic features. As shown on Map 4, features with special geologic significance include the following:

Water Falls. These range from ten to several hundred feet high.

Hydrothermal Explosion Craters. Craters caused by the explosion of superheated water going directly to steam. Usually a one-time event, these can range from as small as a foot wide to as large as several miles across.

Springs. Springs that are unique because of their large volume or other special characteristics.

Major slide areas. Massive landslides such as the Gros-Ventre slide.

Two Ocean Pass. An area where water in a small lake drains out in two directions, one west into the Pacific and the other east into the Gulf of Mexico.

Hot Springs. Geothermal areas and geysers.

Granite/granodiorite igneous rocks are frequently overlaid by a sedimentary cap from more recent geologic times, Targhee National Forest.

Rock glaciers. Glacier-like tongues of angular rock waste usually in a cirque or other steep-walled amphitheaters. These have the appearance of small valley glaciers.

Fault/Dike/Rock Outcrop Complex. Areas where faulting, geologic dikes, dip and scarp patterns, and rock outcrops form to create unique geologic patterns on the landscape.

Obsidian Cliffs. Areas where large concentrations of obsidian (volcanic glass) are exposed.

Hoodoo Rock Formations. Pillars of rock that remain following erosion of the surrounding material.

Mining Towns. Heavily developed areas of mining activity with numerous buildings remaining.

Glaciers, such as Grasshopper Glacier on the Custer National Forest, are present in several locations within the Greater Yellowstone Area.

Lava Dome. Area uplifted by subsurface injection of magma.

Caldera. A large basin-shaped volcanic depression.

Snow/Ice Glacier: A large permanent body of snow and/or ice.

The Greater Yellowstone Area also includes caves, natural bridges, petrified forests, earthquake areas, and the Grand Teton mountain range as unique geologic features.

Old Faithful Geyser in Yellowstone National Park is the most famous geologic feature in the Greater Yellowstone Area.

Unstable Rock and Soil

Unstable rock and soil are divided into two categories:

- Areas of high mass movement potential
- Highly erodible soil

Areas of high mass movement potential are areas where unstable soil and rock, large downslope movement, or landslides may occur, have historically occurred, or are now occurring (see Map 5). Some slides occur naturally, but avoiding site-disturbing activities such as road construction will prevent induced slides, renewed movement of dormant slides, or accelerated movement of active slide areas. Other mitigation measures or preventive measures such as installation of drainage structures can reduce or prevent further movement. Such measures are often expensive and not always effective.

Highly erodible soils are areas that are prone to excessive erosion from wind and water. Highly erodible is defined as areas where the soil loss exceeds five tons per acre per year. Highly erodible soils occur naturally throughout the area. Some land uses such as stock driveways, grazing, road construction, and timber harvest can occur on these soils but require proper mitigation and monitoring.

Groundwater Aquifer Recharge Areas

Groundwater aquifer recharge areas are divided into three classes:

- Highly productive
- Moderately productive
- Low or unknown productivity

Productivity refers to the ability of an area to naturally recharge or replenish itself by allowing moisture to infiltrate the ground. Thus, in both Forests and Parks a management goal is to protect and, where possible, to increase the productivity of recharge areas by monitoring any activity that would decrease infiltration.

The aquifer recharge areas displayed on Map 6 should not be confused with geothermal recharge areas that feed the

The Gros Ventre slide is an extreme example of mass movement, Bridger-Teton National Forest.

An example of highly erodible soils, Shoshone National Forest.

many thermal features in the Greater Yellowstone Area. Although some thermal features may be directly linked to adjacent groundwater recharge areas, others may be fed by water that enters the ground from a considerable distance.

Riparian Areas

Riparian areas are lands influenced by water. By definition, the riparian zone occurs between the land and aquatic environments. Visible vegetative or physical characteristics show the water's influence. Streamsides, lakesides, and marshes are typical riparian areas.

Virtually all fish and wildlife species in the Greater Yellowstone Area are dependent upon riparian areas at some time during their life cycles. High quality riparian habitat is essential for an abundance of many fish and wildlife species. Therefore, maintaining the quality and quantity of riparian habitat is very important to maintaining existing wildlife and fish populations. Riparian areas can be maintained in good condition by closely monitoring activities such as road construction, cattle grazing, placer mining, and some recreational or other developments located near water.

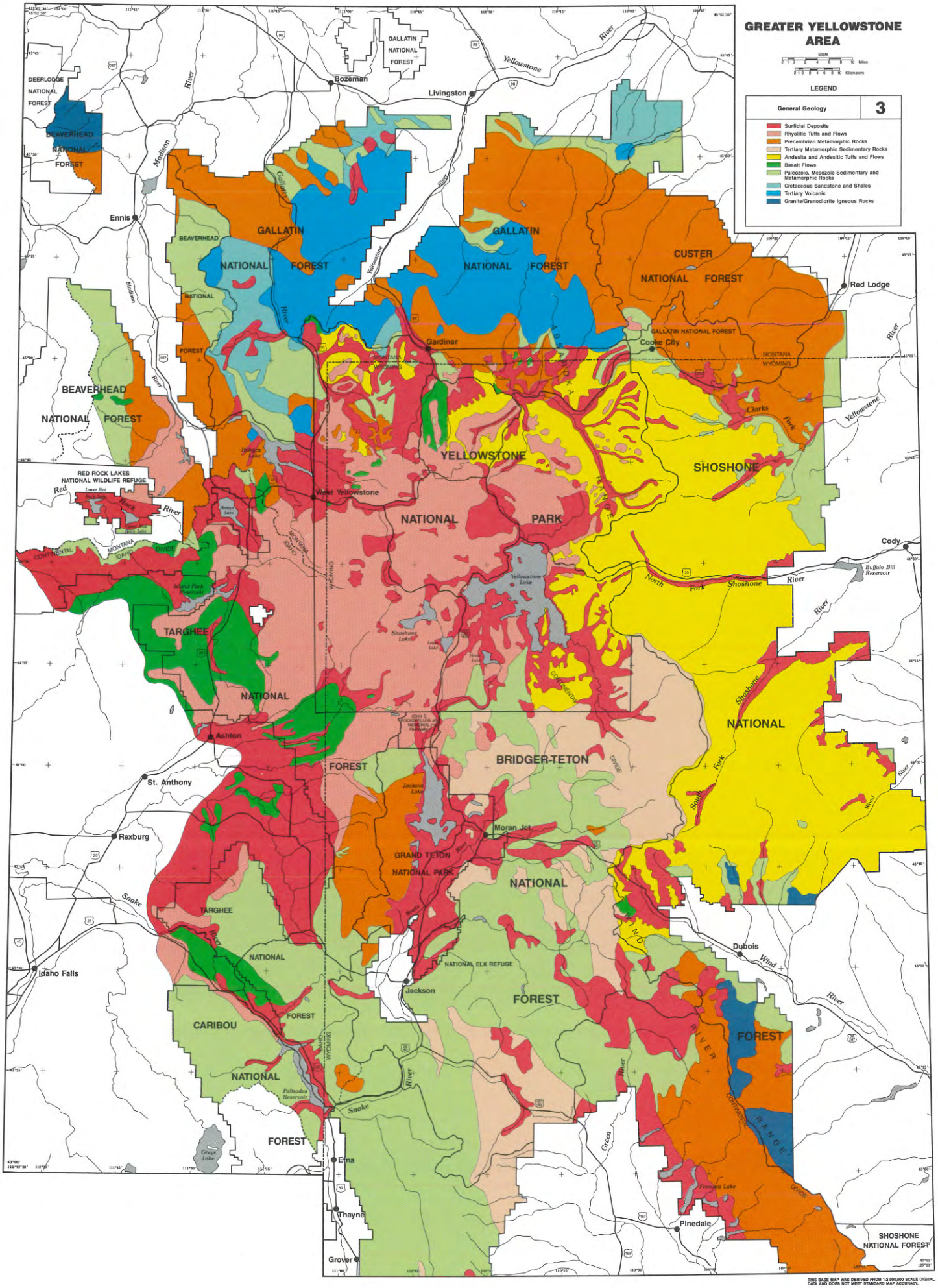
The location of riparian areas is displayed on Map 7.

These riparian areas on the Targhee National Forest support a variety and abundance of riparian vegetation.

Seismic Activity

Seismic events are a regular occurrence in the Greater Yellowstone Area. Although there has been seismic activity throughout the area, most events are centered in Yellowstone National Park near the town of West Yellowstone (Map 8). Most events with magnitude 3.0 or greater on the Richter scale were also centered near the town of West Yellowstone.

Earthquake Lake on the Gallatin National Forest was formed in 1959 when a powerful earthquake shook the Greater Yellowstone Area. The force of the earthquake—7.1 on the Richter scale—caused a massive landslide that dammed the Madison River.


GREATER YELLOWSTONE AREA
Scale
Miles
Kilometers
LEGEND
General Geology
3
Surficial Deposits
Rhyolitic Tuffs and Flows
Precambrian Metamorphic Rocks
Tertiary Metamorphic Sedimentary Rocks
Andesite and Andesitic Tuffs and Flows
Basalt Flows
Paleozoic, Mesozoic Sedimentary and Metamorphic Rocks
Cretaceous Sandstone and Shales
Tertiary Volcanic
Granite/Granodiorite Igneous Rocks
YELLOWSTONE NATIONAL PARK
GRAND TETON NATIONAL PARK
BRIDGER-TETON NATIONAL FOREST
TARGHEE NATIONAL FOREST
CARIBOU NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
GALLATIN NATIONAL FOREST
CUSTER NATIONAL FOREST
SHOSHONE NATIONAL FOREST
RED ROCK LAKES NATIONAL WILDLIFE REFUGE
NATIONAL ELK REFUGE
Bozeman
Livingston
Ennis
Gardiner
Cooke City
Red Lodge
West Yellowstone
Cody
Ashton
St. Anthony
Rexburg
Idaho Falls
Jackson
Moran Jct
Dubois
Etna
Thayne
Grover
Pinedale
Buffalo Bill Reservoir
Yellowstone River
Madison River
Gallatin River
Snake River
Green River
Wind River
Clarks Fork
North Fork Shoshone River
South Fork Shoshone River
Continental Divide
Montana-Idaho Divide
Montana-Wyoming Border
Wyoming-Idaho Border
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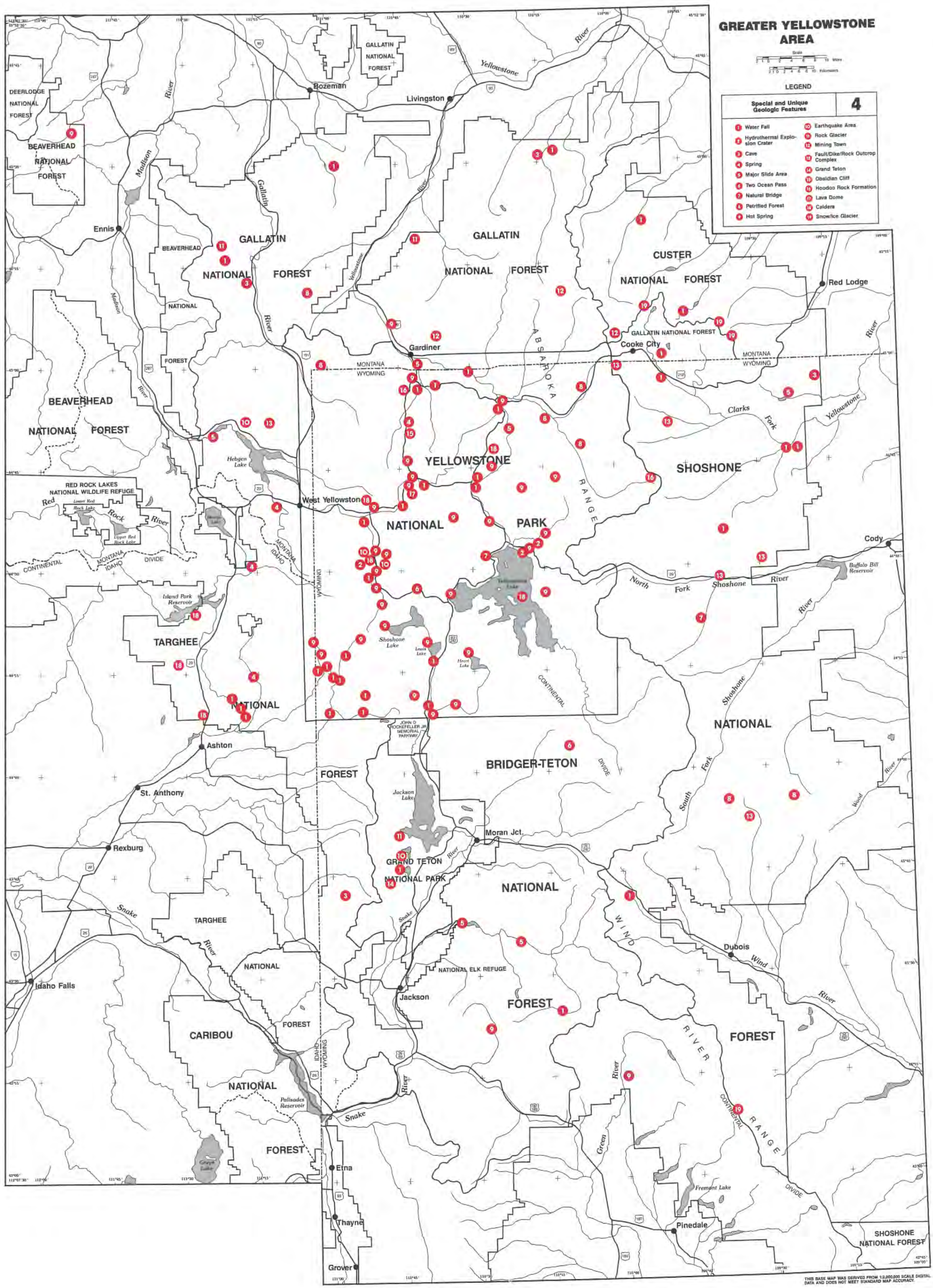
GREATER YELLOWSTONE AREA
Scale
Miles
Kilometers
LEGEND
Special and Unique Geologic Features
4
1 Water Fall
2 Hydrothermal Explosion Crater
3 Cave
4 Spring
5 Major Slide Area
6 Two Ocean Pass
7 Natural Bridge
8 Petrified Forest
9 Hot Spring
10 Earthquake Area
11 Rock Glacier
12 Mining Town
13 Fault/Dike/Rock Outcrop Complex
14 Grand Teton
15 Obsidian Cliff
16 Hoodoo Rock Formation
17 Lava Dome
18 Caldera
19 Snow/Ice Glacier
GALLATIN NATIONAL FOREST
Bozeman
Livingston
Yellowstone River
DEERLODGE NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
Madison
Ennis
GALLATIN NATIONAL FOREST
CUSTER NATIONAL FOREST
Red Lodge
Gardiner
Cooke City
GALLATIN NATIONAL FOREST
ABSAROKA RANGE
MONTANA
WYOMING
YELLOWSTONE NATIONAL PARK
West Yellowstone
Hebgen Lake
RED ROCK LAKES NATIONAL WILDLIFE REFUGE
Red Rock River
CONTINENTAL DIVIDE
MONTANA IDAHO
SHOSHONE NATIONAL FOREST
Clarks Fork
Cody
North Fork
Shoshone River
Buffalo Bill Reservoir
Island Park Reservoir
TARGHEE NATIONAL FOREST
Shoshone Lake
Lewis Lake
Heart Lake
Yellowstone Lake
JOHN D. ROCKEFELLER JR. MEMORIAL PARKWAY
Ashton
St. Anthony
BRIDGER-TETON NATIONAL FOREST
Jackson Lake
Moran Jct.
GRAND TETON NATIONAL PARK
Rexburg
Snake River
TARGHEE
NATIONAL ELK REFUGE
Jackson
Idaho Falls
CARIBOU NATIONAL FOREST
IDAHO WYOMING
Palisades Reservoir
Grays Lake
WIND RIVER RANGE
Dubois
Wind River
Green River
Fremont Lake
Pinedale
Etna
Thayne
Grover
SHOSHONE NATIONAL FOREST
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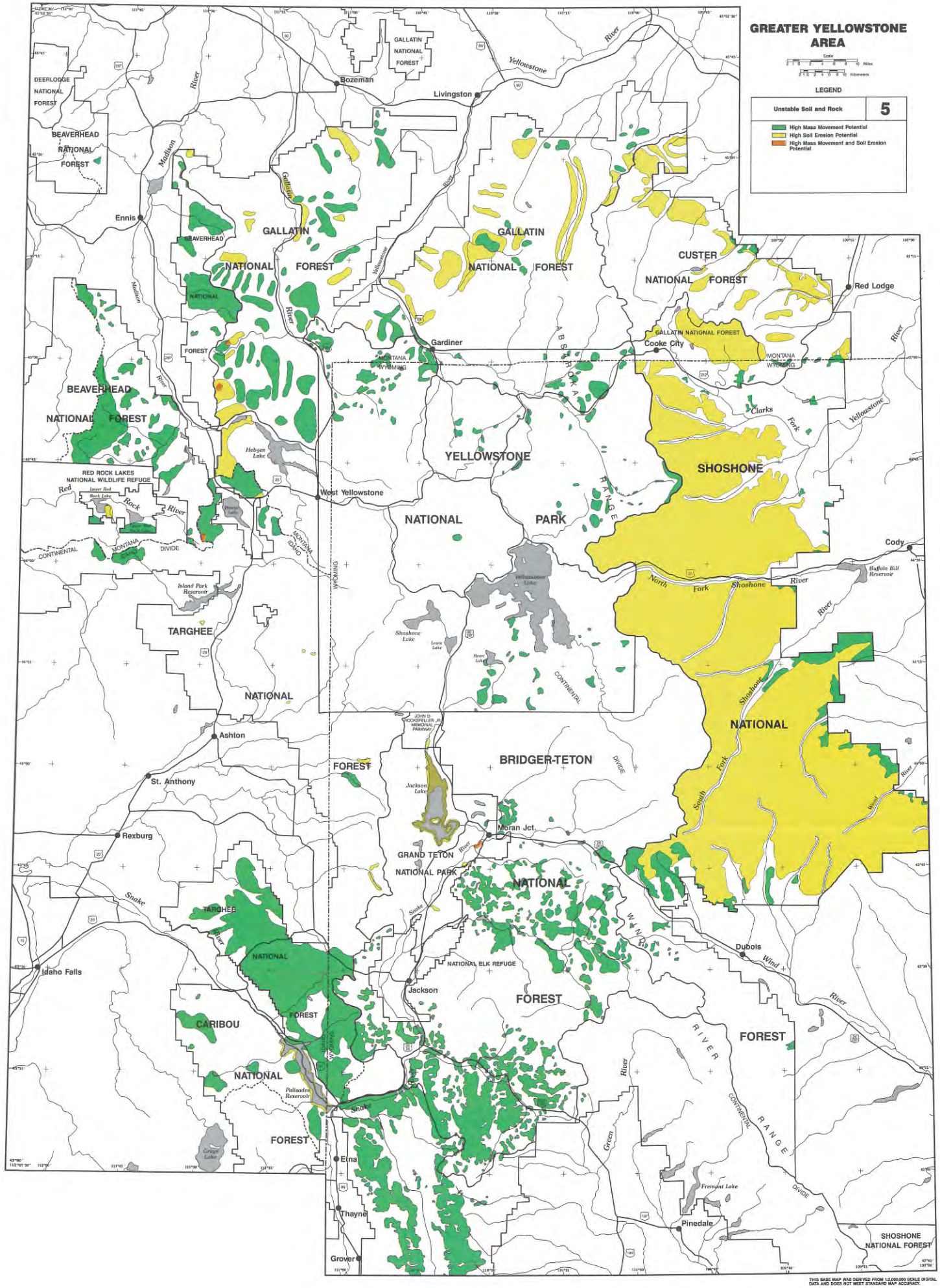
GREATER YELLOWSTONE AREA
Scale
Miles
Kilometers
LEGEND
Unstable Soil and Rock
5
High Mass Movement Potential
High Soil Erosion Potential
High Mass Movement and Soil Erosion Potential
DEERLODGE NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
GALLATIN NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
GALLATIN NATIONAL FOREST
GALLATIN NATIONAL FOREST
CUSTER NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
RED ROCK LAKES NATIONAL WILDLIFE REFUGE
YELLOWSTONE NATIONAL PARK
SHOSHONE NATIONAL FOREST
TARGHEE NATIONAL FOREST
BRIDGER-TETON NATIONAL FOREST
GRAND TETON NATIONAL PARK
NATIONAL ELK REFUGE
WIND RIVER RANGE
CARIBOU NATIONAL FOREST
SHOSHONE NATIONAL FOREST
Bozeman
Livingston
Ennis
Gardiner
Cooke City
Red Lodge
West Yellowstone
Cody
Ashton
St. Anthony
Rexburg
Idaho Falls
Moran Jct.
Jackson
Dubois
Etna
Thayne
Grover
Pinedale
Madison River
Gallatin River
Yellowstone River
Snake River
Green River
Wind River
Clarks Fork Yellowstone River
North Fork Shoshone River
South Fork Shoshone River
Wind River
Hebgen Lake
Island Park Reservoir
Buffalo Bill Reservoir
Jackson Lake
Palisades Reservoir
Fremont Lake
Lower Red Rock Lake
Upper Red Rock Lake
Red Rock River
Shoshone Lake
Lewis Lake
Heart Lake
Yellowstone Lake
MONTANA WYOMING
MONTANA IDAHO
WYOMING
CONTINENTAL DIVIDE
ABSAROKA RANGE
JOHN D. ROCKEFELLER JR. MEMORIAL PARKWAY
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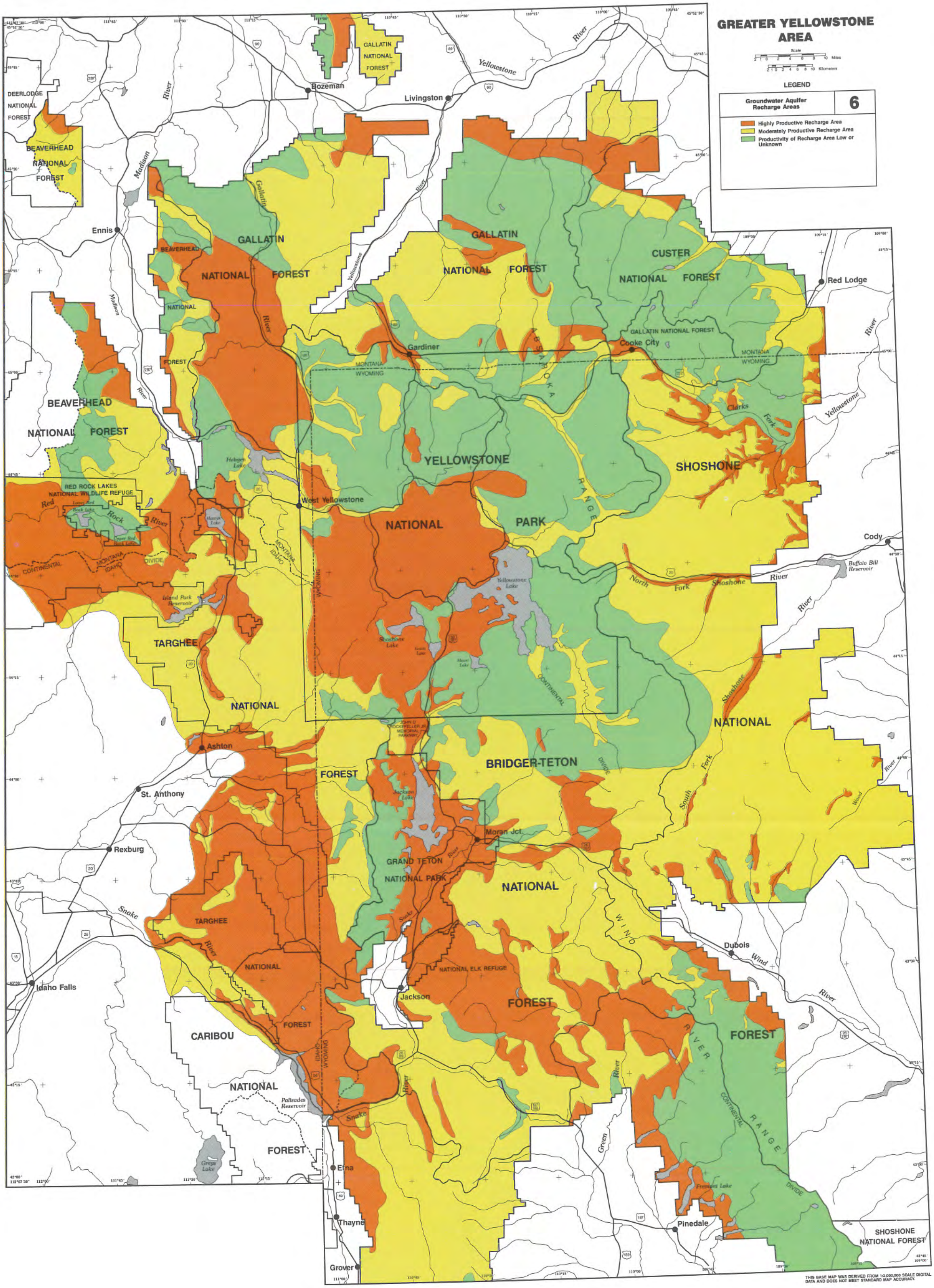
GREATER YELLOWSTONE AREA
Scale
Miles
Kilometers
LEGEND
Groundwater Aquifer Recharge Areas
6
Highly Productive Recharge Area
Moderately Productive Recharge Area
Productivity of Recharge Area Low or Unknown
GALLATIN NATIONAL FOREST
DEERLODGE NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
CUSTER NATIONAL FOREST
YELLOWSTONE NATIONAL PARK
SHOSHONE NATIONAL FOREST
TARGHEE NATIONAL FOREST
BRIDGER-TETON NATIONAL FOREST
GRAND TETON NATIONAL PARK
CARIBOU NATIONAL FOREST
RED ROCK LAKES NATIONAL WILDLIFE REFUGE
NATIONAL ELK REFUGE
ABSAROKA RANGE
WIND RIVER RANGE
CONTINENTAL DIVIDE
Bozeman
Livingston
Ennis
Gardiner
Cooke City
Red Lodge
West Yellowstone
Cody
Ashton
St. Anthony
Rexburg
Idaho Falls
Moran Jct.
Jackson
Dubois
Etna
Thayne
Grover
Pinedale
MONTANA
WYOMING
IDAHO
Yellowstone Lake
Buffalo Bill Reservoir
Island Park Reservoir
Palisades Reservoir
Hebgen Lake
Shoshone Lake
Jackson Lake
Fremont Lake
Grays Lake
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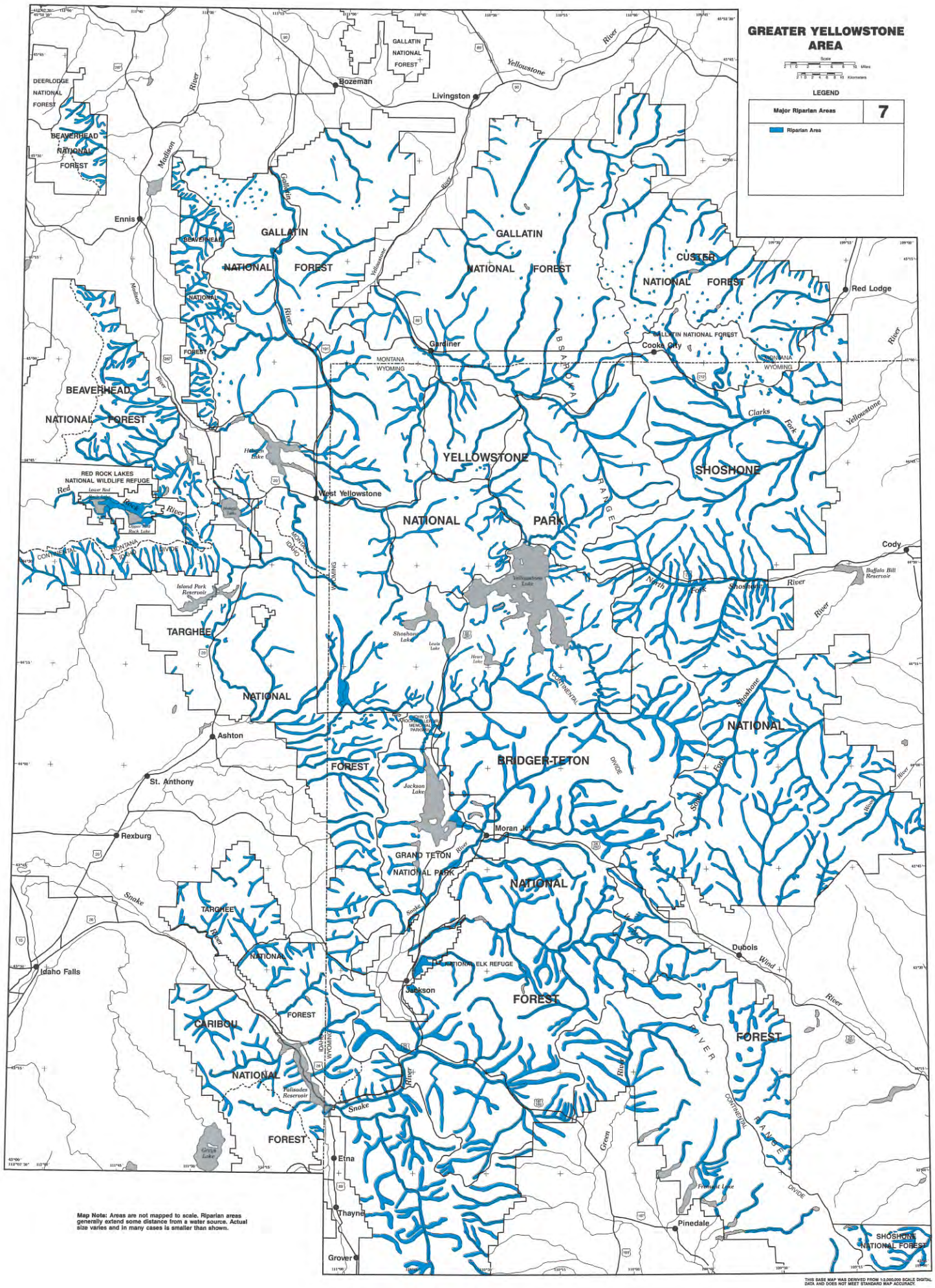

Map Note: Areas are not mapped to scale. Riparian areas generally extend some distance from a water source. Actual size varies and in many cases is smaller than shown.

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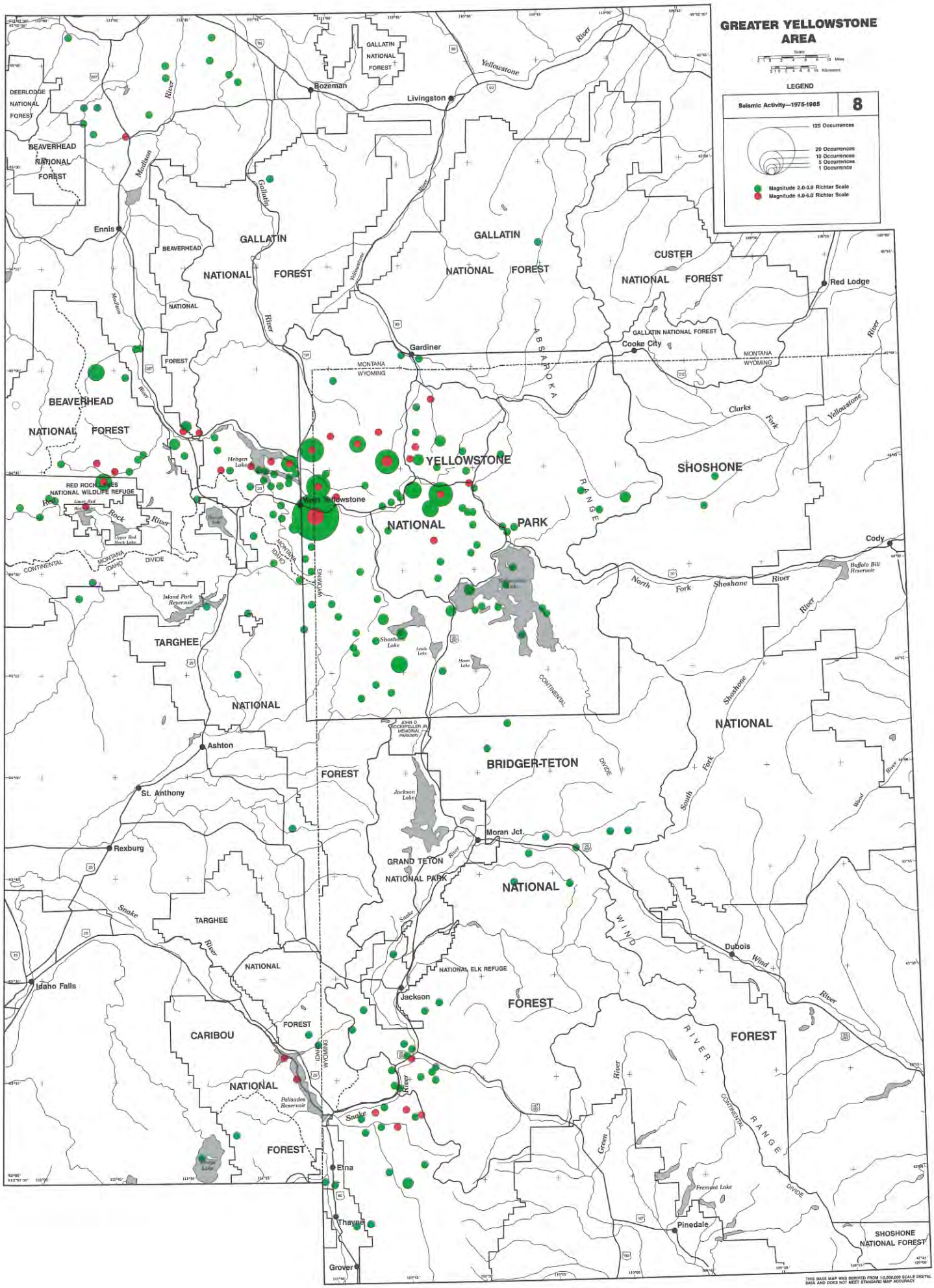
GREATER YELLOWSTONE AREA
LEGEND
Seismic Activity—1975-1985
8
125 Occurrences
20 Occurrences
10 Occurrences
5 Occurrences
1 Occurrence
Magnitude 2.0-3.9 Richter Scale
Magnitude 4.0-5.0 Richter Scale
YELLOWSTONE NATIONAL PARK
GRAND TETON NATIONAL PARK
BRIDGER-TETON NATIONAL FOREST
TARGHEE NATIONAL FOREST
CARIBOU NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
GALLATIN NATIONAL FOREST
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Pinedale
West Yellowstone
MONTANA
WYOMING
IDAHO
CONTINENTAL DIVIDE
ABSAROKA RANGE
WIND RIVER RANGE
Yellowstone River
Madison River
Gallatin River
Snake River
Green River
Clarks Fork
North Fork Shoshone River
South Fork Shoshone River
Wood River
Buffalo Bill Reservoir
Island Park Reservoir
Palisades Reservoir
Henrys Lake
Jackson Lake
Fremont Lake
Shoshone Lake
Lewis Lake
Heart Lake
Upper Red Rock Lake
Lower Red Rock Lake
Hebgen Lake
JOHN D. ROCKEFELLER JR. MEMORIAL PARKWAY
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Management Area and Zones

Parks and Forests in the Greater Yellowstone Area divide their lands into subunits to help manage the lands as efficiently as possible. Forests call these subunits management areas and Parks call them management zones.

Areas and zones range in size from less than 100 acres to several hundred thousand acres. Parks and Forests have varying numbers of these subunits, depending on the resources within an area or zone.

Map 9 displays management areas and zones. Chart 3 shows acres in each category.

Cattle grazing in a clearcut in a management area where timber and range are emphasized, Targhee National Forest.

National Forest Management Areas

To facilitate mapping for the *Aggregation*, these areas are grouped into the following broad designations. Groupings show a general management emphasis; however, a range of other activities may also occur. For example, areas where timber, range, and minerals are emphasized also provide wildlife habitat and recreation; wilderness provides for some forms of recreation, wildlife habitat, and range for domestic livestock. Management plans for individual units should be consulted for information about specific activities and management practices for each area.

Wilderness. Lands designated by Congress as wilderness are managed to maintain its primeval or primitive characteristics. Thus, activities such as road construction, timber harvest, and motorized use are generally prohibited. But activities such as camping, hiking, hunting, horseback riding, fishing, and livestock grazing are generally allowed.

Recommended Wilderness. Areas recommended to Congress for wilderness designation are managed similarly to wilderness. However, some historical activities such as motorbike or snowmobile use may be allowed to continue, pending future congressional decisions. New mineral leases are generally not allowed although existing leases continue in effect.

Wilderness Study, Research Natural Areas, and Wild and Scenic Rivers. (1) Land being studied for possible recommendation to Congress for wilderness designation, (2) land designated as research natural areas, and (3) rivers designated by Congress as part of the nation's wild and scenic river system. Management is designed to retain existing characteristics.

Developed Recreation. Areas or sites where developed recreation facilities such as campgrounds, picnic areas, visitor information services, and boating facilities exist or are planned.

Dispersed Recreation. Areas where the emphasis is on trails and trailhead facilities for public access and use. Hiking, hunting, fishing, trail bike riding, climbing, cross-country skiing, and snowmobile use are typical activities that are managed.

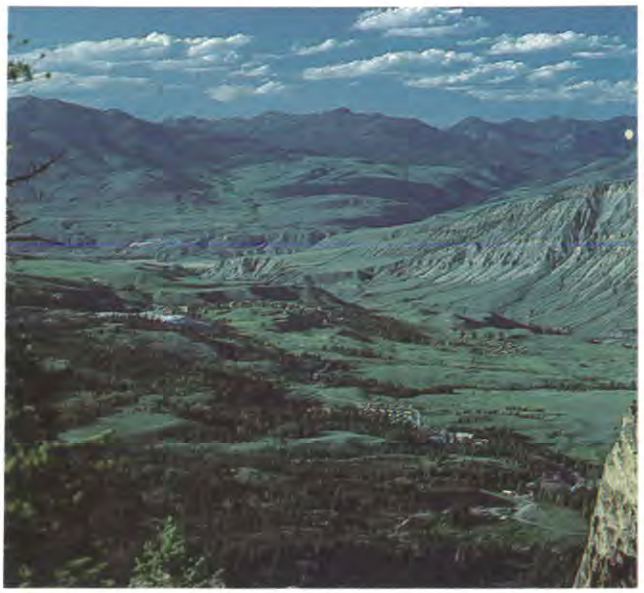
Range, Minerals, Wildlife, and Dispersed Recreation. Areas managed to maintain or improve forage for domestic livestock and wildlife. A variety of dispersed recreation activities occur in these areas. Mineral leasing is permitted, subject to stipulations to protect other resources. Forested land under this designation is not suited for timber production although timber can be harvested to protect multiple-use values.

Timber, Range, and Minerals. Land where management emphasis is on timber subject to contractual arrangements that protect other resources. Livestock grazing also occurs here, so land is managed to maintain or improve forage conditions for domestic livestock. Mineral leasing is permitted, subject to stipulations to protect other resources. Dispersed recreation also occurs, but is not emphasized. Wildlife habitat is also provided.

Timber, Range, Minerals, Wildlife, and Dispersed Recreation. Land with a combination of management emphasis, including timber production, wildlife habitat maintenance, and forage improvement for domestic livestock. Mineral leasing is permitted, subject to stipulations to protect other resources.

Timber, Wildlife, and Dispersed Recreation. Timber management is practiced. Diversity and improvement of wildlife habitat is emphasized. A variety of dispersed recreation activities are encouraged. Livestock grazing may occur, but it is secondary to wildlife needs. Some of the area may be open to mineral leasing, but stipulations are usually restrictive.

Wildlife and Dispersed Recreation. Diversity of wildlife habitat is emphasized. Much of the area is important for big game species and grizzly bear. Dispersed recreation activities are emphasized within guidelines set for wildlife needs. Some timber harvest may occur, but much of the area is not suited for timber production. Livestock grazing occurs but is secondary to wildlife needs. Some of the area may be open to mineral leasing, but stipulations are usually restrictive.



The Mammoth Complex in Yellowstone National Park is an example of a Park Development Zone.

Other Areas. Areas that do not fall into the designations listed above. Usually a single use with limited opportunities for other activities is emphasized.

National Parks Management Zones

Management zones in National Parks include the following categories:

Natural Zone. Land where conservation of natural resources and processes is emphasized.

Wilderness Subzone. Designated wilderness, areas recommended to Congress for wilderness designation and potential wilderness.

Natural Environment Subzone. Land maintained in its natural condition.

Special Use Zone. Land designated for special uses, not entirely under management of Parks.

Resource Utilization Subzone. Private lands within Grand Teton National Park.

Private Utilization Subzone. Areas where livestock grazing is permitted.

Reservoir Subzone. Jackson Lake.

The Tetons in Grand Teton National Park are managed as a wilderness subzone; the area in the foreground is a natural environment subzone.

Historic Zone. Areas where preservation, protection, and interpretation of cultural resources and their settings are emphasized.

Park Development Zone. Areas where emphasis is on providing and maintaining Park development to serve Park management and visitor needs.

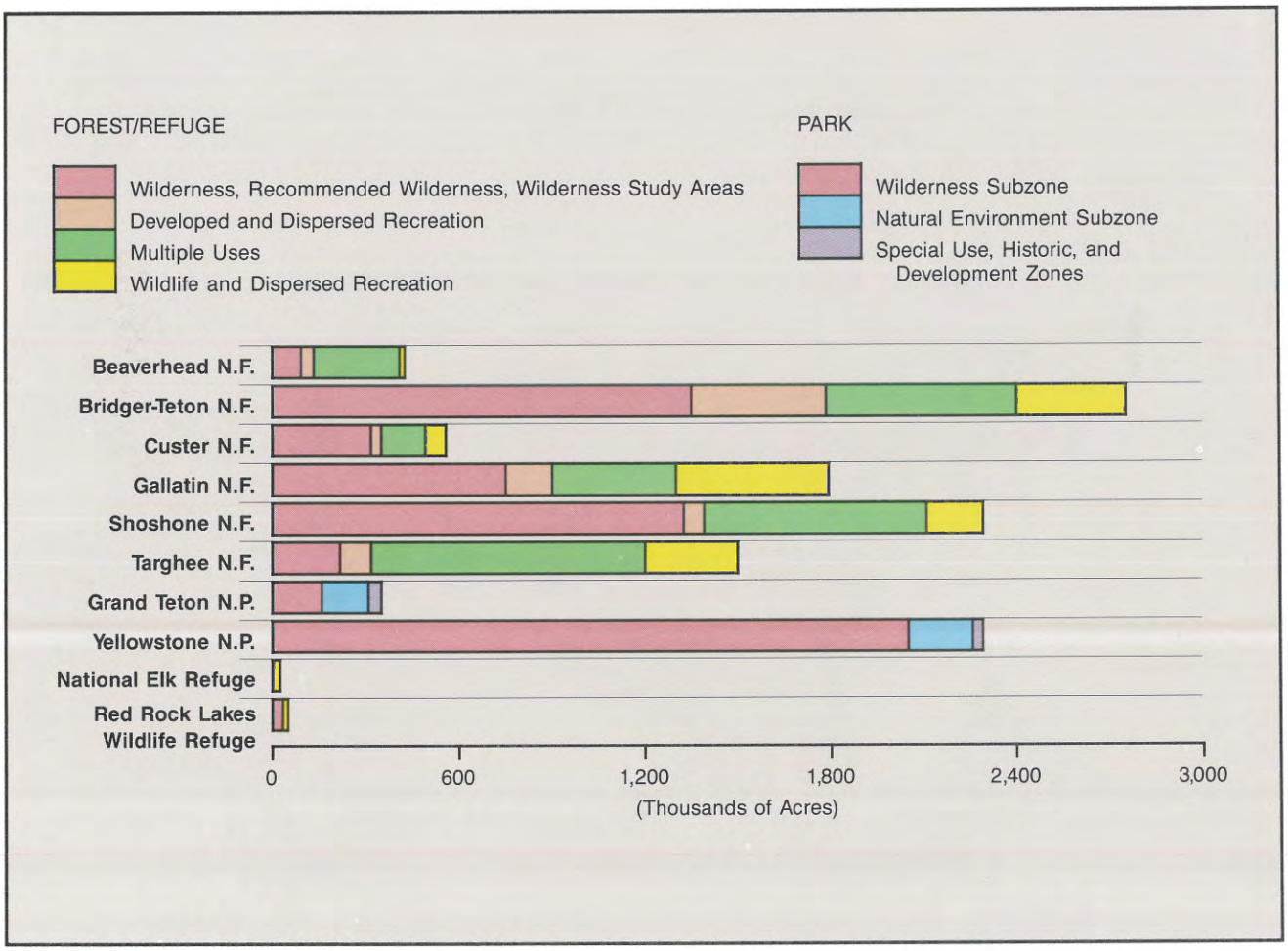
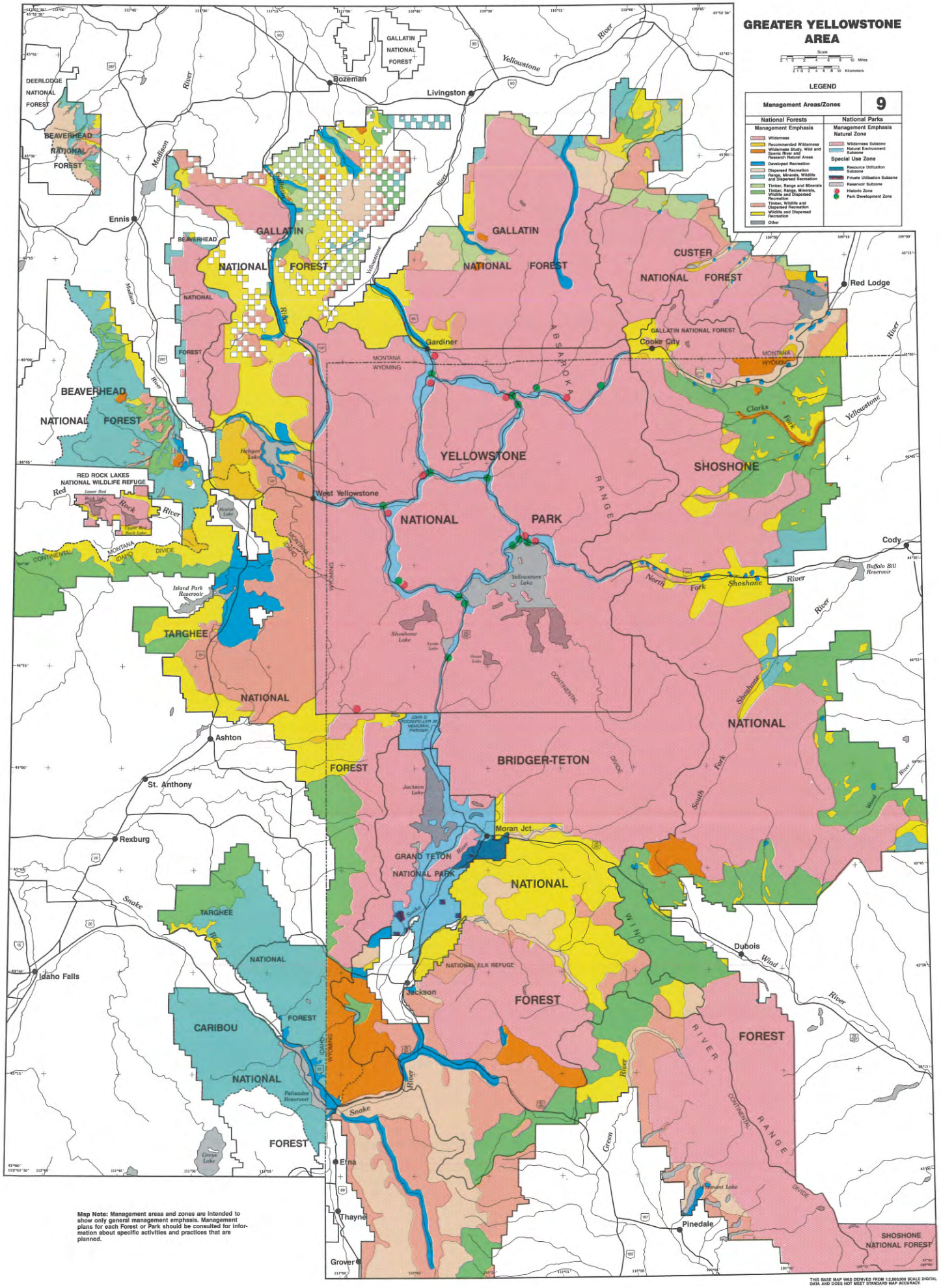


Chart 3. *Management areas and zones.*



Map Note: Management areas and zones are intended to show only general management emphasis. Management plans for each Forest or Park should be consulted for information about specific activities and practices that are planned.

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Transportation and Administrative Facilities

The network of roads and trails in the Greater Yellowstone affects nearly all resource-related activities.

Access or lack of access affects activities such as hunting, photography, and timber harvesting. So opening, closing, building, and upgrading roads and trails are extremely important to the pattern of human use.

Existing Situation

The arterial and collector road systems in Parks and Forests are mostly complete. Arterial roads are the main routes for through traffic. Collector and local roads are smaller and provide access to areas off the main route.

Map 10 shows the existing and planned transportation system in the Greater Yellowstone Area.

Roads

Roads may seem intrusive in the natural setting of the Greater Yellowstone, but they provide important access to the following:

- Areas for backpacking, snowmobiling, firewood gathering, cross-country skiing, hiking, fishing, and other recreational uses
- Areas where timber is to be harvested and other activites occur
- Areas where large numbers of visitors could not otherwise be accommodated

Forest Roads. Most Forest roads, most of which are not paved, were built to provide access to the following:

- Recreational facilities
- Timber harvests
- Grazing areas
- Hunting and fishing areas
- Areas needing fire protection
- Mining and oil and gas activities

Snow closes most roads in National Forests, except for those plowed by private or public groups who require business access.

Park Roads. Park roads provide access to the following:

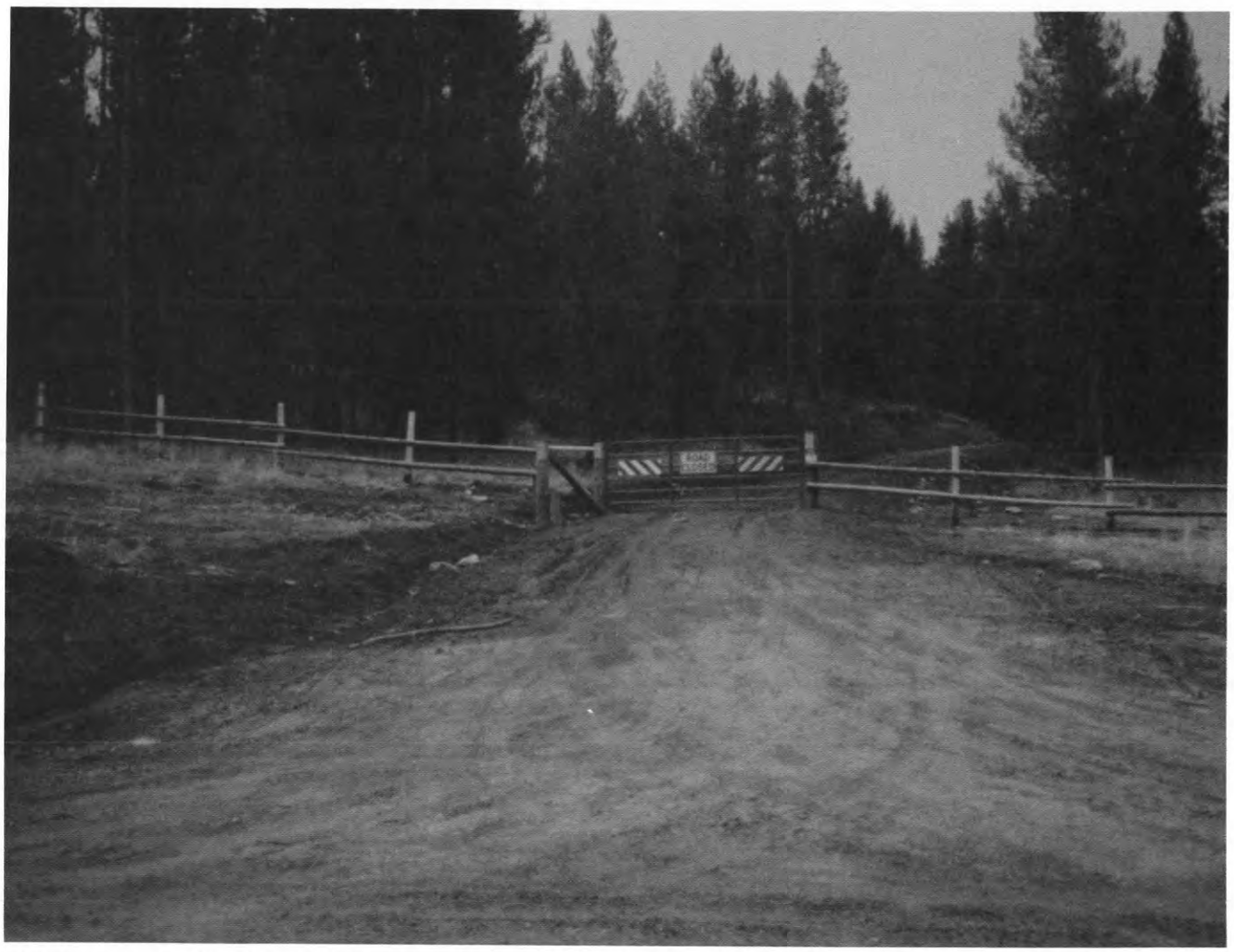
- Recreational facilities
- Lookouts
- Trailheads

Low standard "work roads" such as this one on the Targhee National Forest will be obliterated and reseeded following the timber sale.

In winter all Park roads are closed, except for the road from Gardiner to Mammoth Hot Springs and Cooke City and the main highway through Grand Teton National Park.

Most roads in Yellowstone National Park are in poor condition due to water damage from sub-base and drainage failures. These roads were built many years ago over old horse and wagon trails. The number and weight of modern vehicles—especially in early spring when roads are re-opened—were to the original road builders unimaginable.

Miles of existing and planned roads, with their respective restrictions, are shown in Chart 4.



Gating new roads following timber harvest provides security for wildlife while retaining the road for future management needs, Targhee National Forest.

Trails

Park trails are for foot and horse traffic. In Forests, some trails are open to motorbikes as well. Both Parks and Forests have snowmobile trails; in Parks, however, snowmobiles are confined to roads closed for the winter to other motorized use.

Map 11 shows the location of different types of trails. Chart 5 shows miles for various categories.

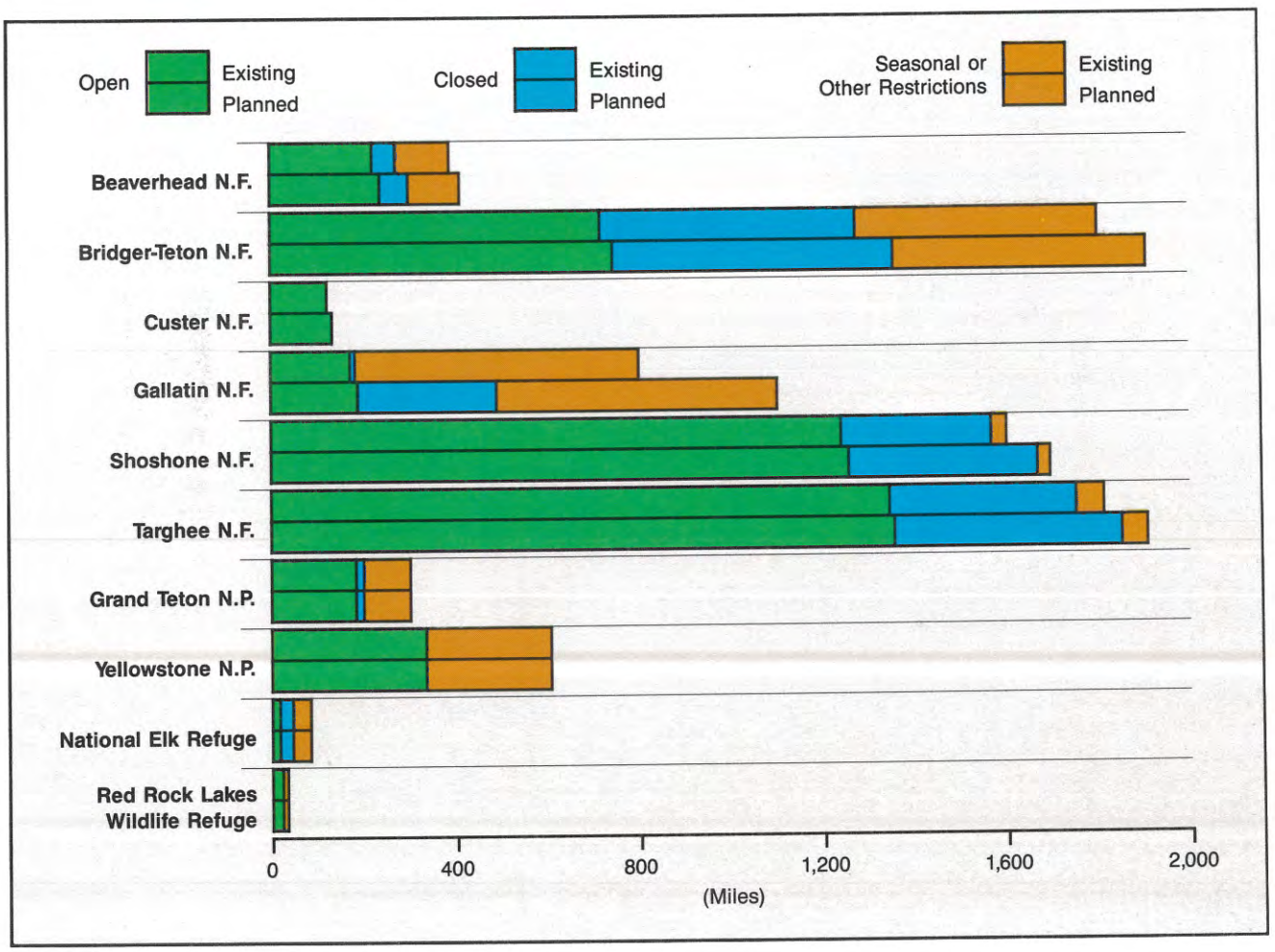


Chart 4. Roads—existing, planned, and restrictions to use.

Administrative and Transportation Facilities

Transportation facilities other than roads and trails are limited. Most towns have landing strips or airports. Railroads, which have cut services in recent years, reach some areas. Map 12 shows the locations of other transportation facilities.

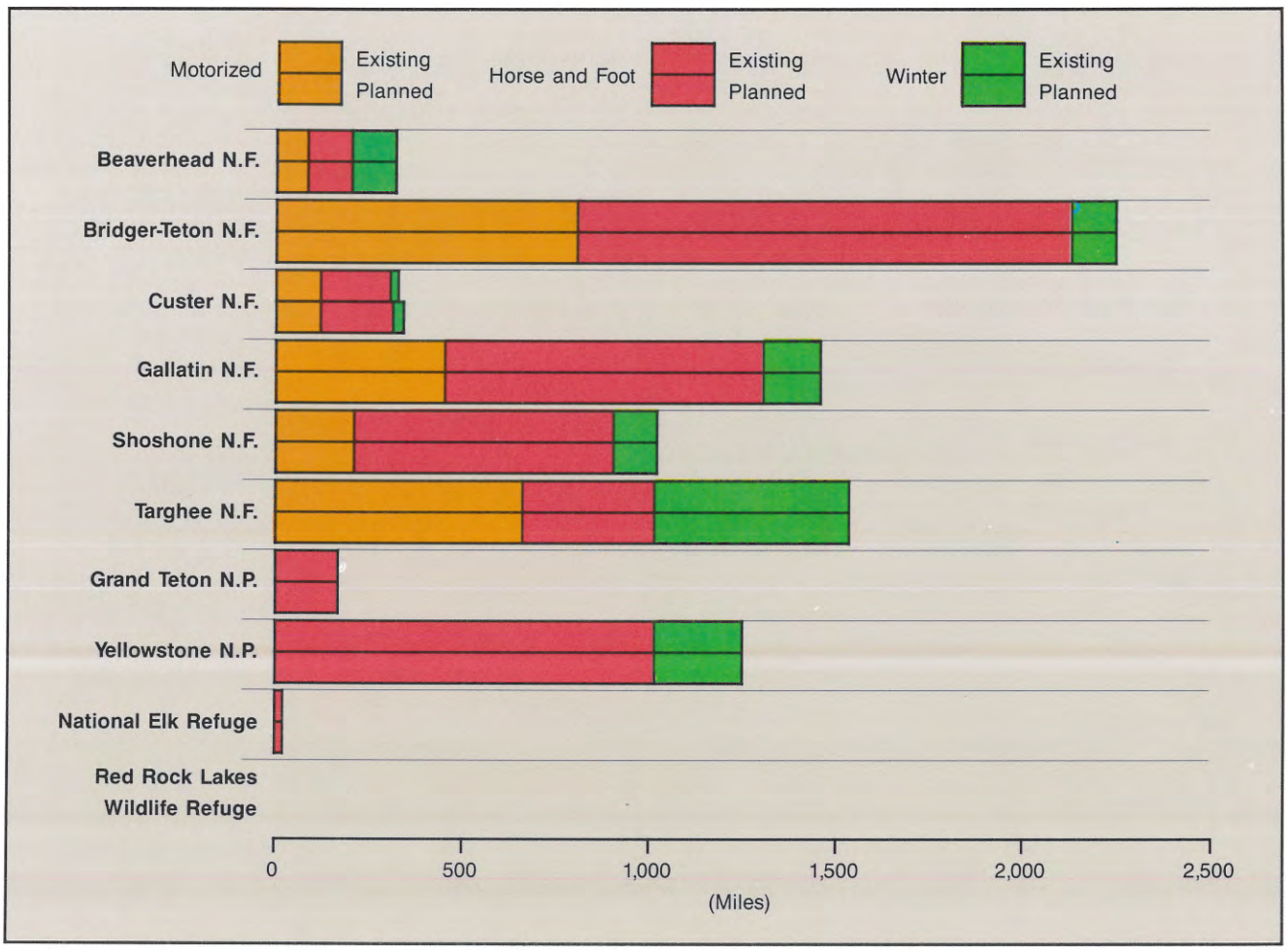


Chart 5. Trails—existing, planned, and type of use.

Planned Management

Except for new recreational access roads in the Custer and Gallatin National Forests, new roads built in Forests during the next decade will mainly support timber harvests. Most new local roads and some collector roads will be open only to access areas for management activities, including habitat improvement projects, fire fighting, and resource monitoring.

A concern for both Parks and Forests is that no road unnecessarily intrude upon essential natural habitat. At the same time, certain roads necessarily enter the Greater Yellowstone Area for resource maintenance and for local business.

No new roads are planned for either Grand Teton or Yellowstone Parks.

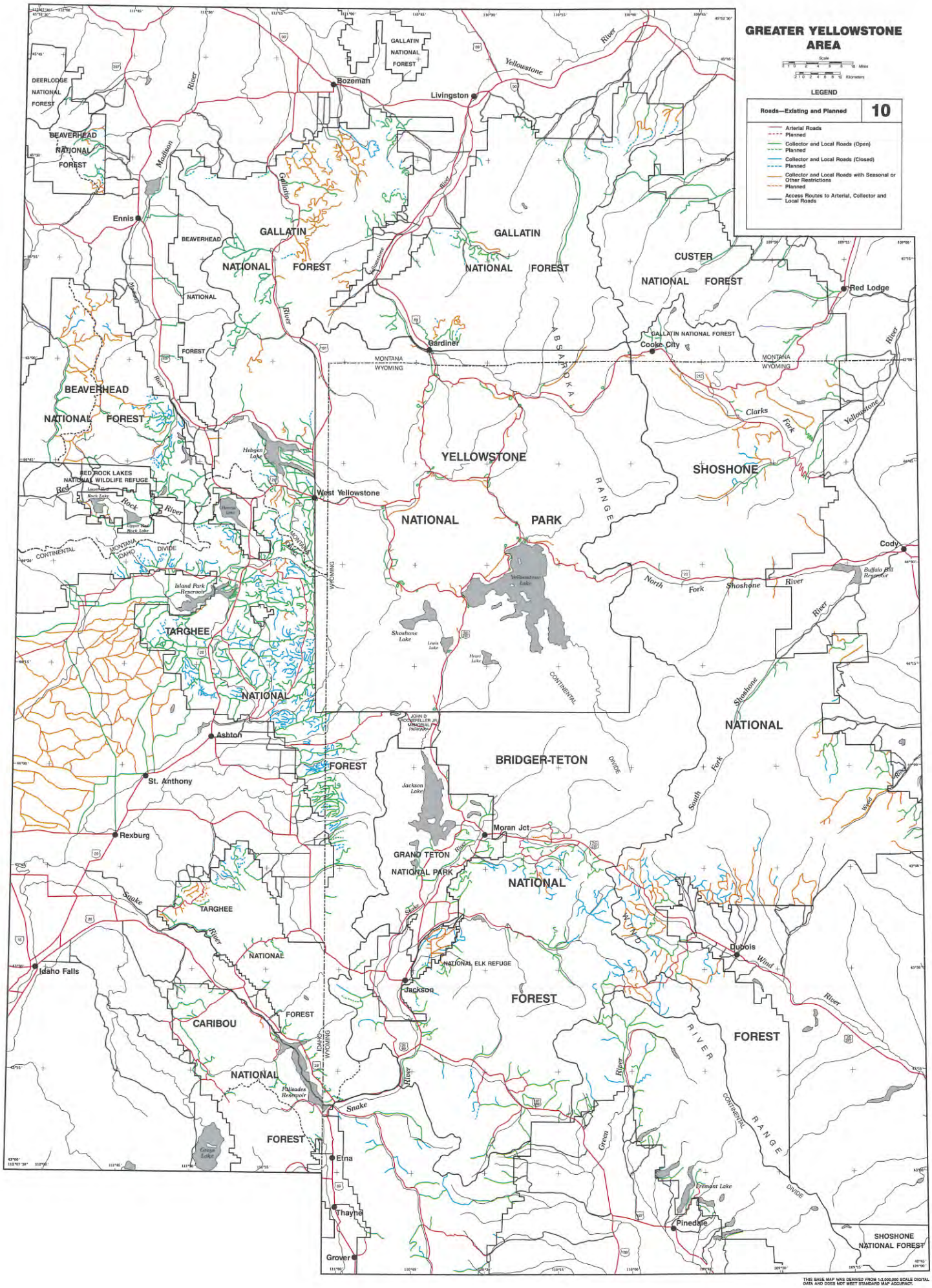
Road management has these goals:

- Closing roads seasonally to protect them from vehicle damage during wet weather
- Closing unneeded roads throughout the year
- Closing roads to protect wildlife from disturbances
- Opening roads for timber harvests, mining, recreation, and other uses only when impacts on wildlife and vegetation are acceptable

Coordination Opportunities

Management of the transportation system in the Greater Yellowstone Area includes these opportunities:

- Providing an interlocking transportation system that supports visitor needs and management of resources such as timber, minerals, range, and recreation
- Ensuring that transportation systems and motorized use do not adversely affect other important resources within the Greater Yellowstone Area



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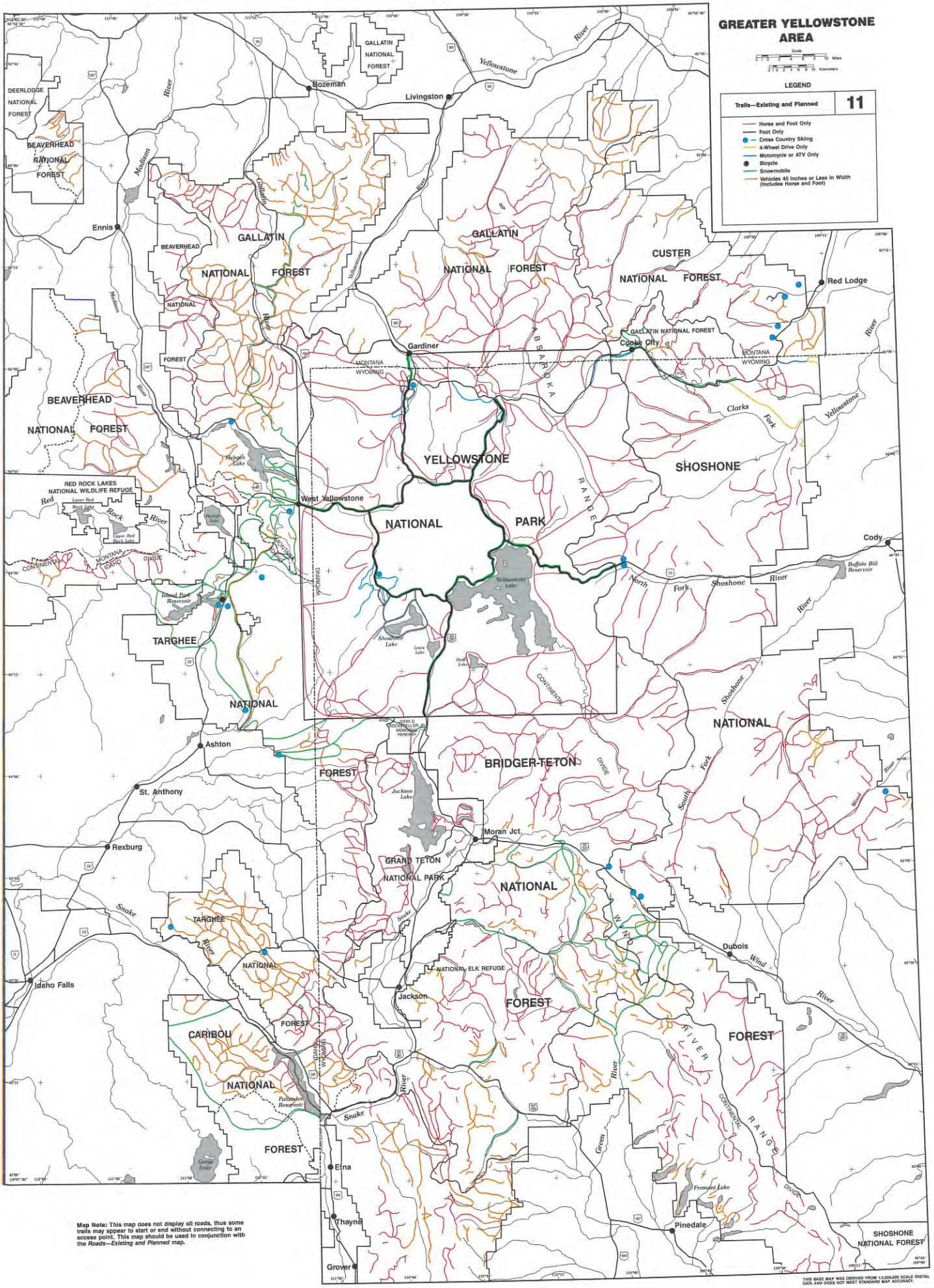

Map Note: This map does not display all roads, thus some trails may appear to start or end without connecting to an access point. This map should be used in conjunction with the *Roads—Existing and Planned* map.

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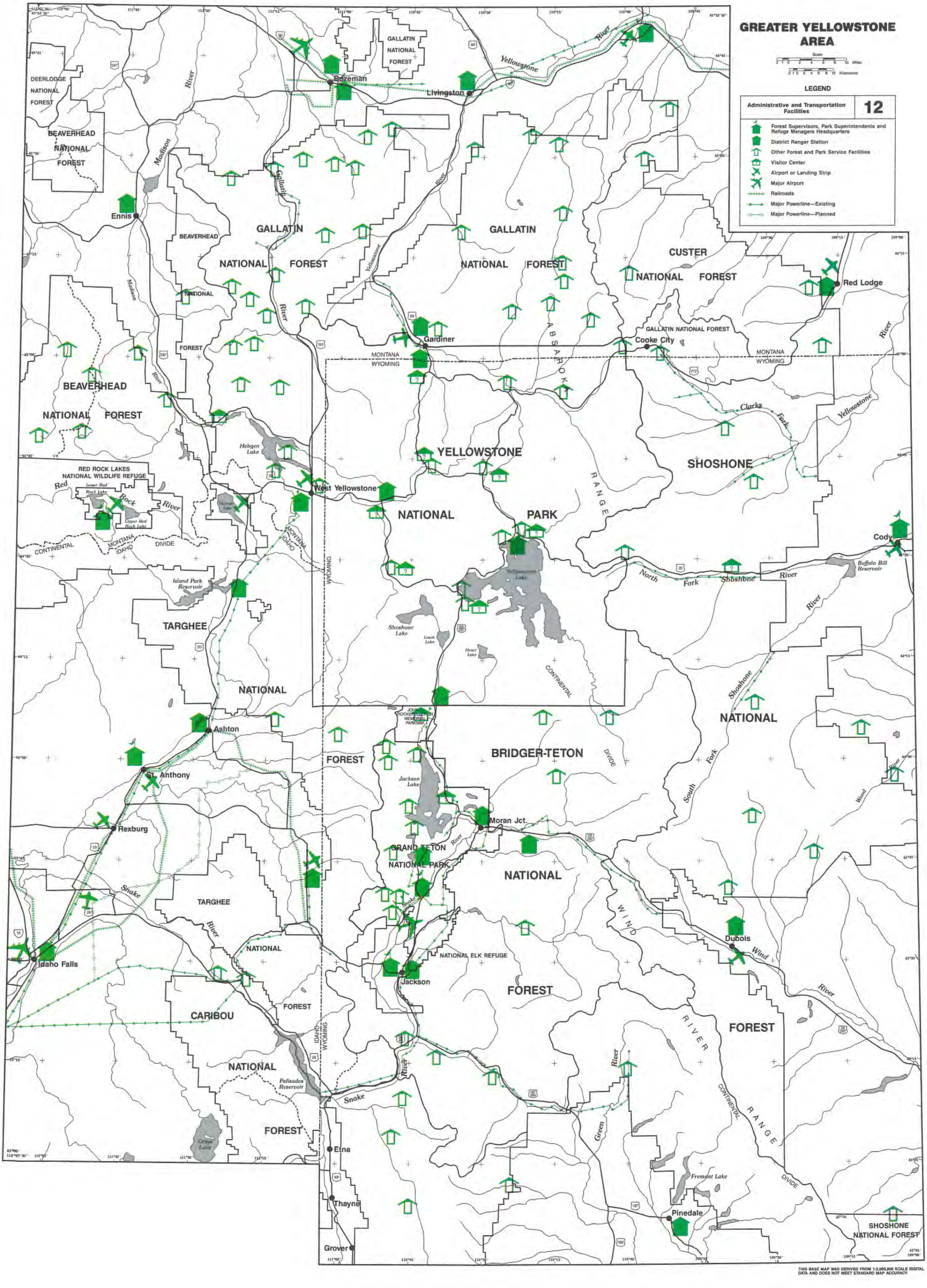
GREATER YELLOWSTONE AREA
Scale
Miles
Kilometers
LEGEND
Administrative and Transportation Facilities
12
Forest Supervisors, Park Superintendents and Refuge Managers Headquarters
District Ranger Station
Other Forest and Park Service Facilities
Visitor Center
Airport or Landing Strip
Major Airport
Railroads
Major Powerline—Existing
Major Powerline—Planned
GALLATIN NATIONAL FOREST
DEERLODGE NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
GALLATIN NATIONAL FOREST
CUSTER NATIONAL FOREST
BEAVERHEAD NATIONAL FOREST
RED ROCK LAKES NATIONAL WILDLIFE REFUGE
YELLOWSTONE NATIONAL PARK
SHOSHONE NATIONAL FOREST
TARGHEE NATIONAL FOREST
BRIDGER-TETON NATIONAL FOREST
GRAND TETON NATIONAL PARK
JOHN D. ROCKEFELLER JR. MEMORIAL PARKWAY
NATIONAL ELK REFUGE
TARGHEE NATIONAL FOREST
CARIBOU NATIONAL FOREST
SHOSHONE NATIONAL FOREST
Bozeman
Livingston
Ennis
Red Lodge
Gardiner
Cooke City
West Yellowstone
Cody
Ashton
St. Anthony
Rexburg
Moran Jct.
Idaho Falls
Jackson
Dubois
Etna
Thayne
Pinedale
Grover
MONTANA
WYOMING
IDAHO
CONTINENTAL DIVIDE
ABSAROKA RANGE
WIND RIVER RANGE
CONTINENTAL DIVIDE
Yellowstone River
Madison River
Gallatin River
Clarks Fork
Shoshone River
North Fork Shoshone River
South Fork
Hebgen Lake
Island Park Reservoir
Yellowstone Lake
Shoshone Lake
Lewis Lake
Heart Lake
Jackson Lake
Buffalo Bill Reservoir
Palisades Reservoir
Fremont Lake
Snake River
Wind River
Green River
Red Rock River
Lower Red Rock Lake
Upper Red Rock Lake
Grays Lake
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Recreation

Nine million visitor days of recreation occur in developed sites of the Greater Yellowstone Area each year. With this many visitors, Forests and Parks are constantly being challenged to maintain high-quality recreation experiences while at the same time protecting other resources such as wildlife, water, and soils.

Existing Situation

Visitors come to the Greater Yellowstone Area to camp, picnic, hike, climb, hunt, and fish. Some arrive in cars and buses; others come on horseback or on foot. Recreation is one of the area's main economic supports.

National Parks impose some restrictions on recreational activities:

- Motorized vehicles are confined to roads.
- Camping is confined to specified sites.
- Hunting is prohibited, except for a limited time and area in Grand Teton National Parks.
- Fishing is subject to park regulations.

National Forests place fewer restrictions on recreation:

- Forests have fewer motorized vehicle restrictions.
- Camping is allowed in most areas.
- Hunting is allowed in National Forests.
- State fish and game agencies, rather than forests, regulate fishing and hunting.

Developed Recreation Facilities

Recreation generates a need for a wide variety of developed facilities in Parks and Forests. These facilities are operated by both private and public sector owners.

Private owners have special use permits and concession contracts, which allow them to build and operate a variety of facilities:

- Resorts
- Lodges
- Summer homes (National Forests only)
- Downhill ski areas (National Forests only)

The public sector—which may include Federal, state, or county ownership—maintains some 460 sites:

- Campgrounds
- Picnic areas
- Trailheads
- Interpretive (historical) sites
- Boat launching facilities

More than 95 percent of all recreation in Parks occurs at these developed sites. In Forests, where recreation is more dispersed, the developed sites account for only about 25 percent of all recreational use. The rest is spread throughout the area.

Map 13 shows the locations of developed public recreation sites. It also indicates a few new sites planned for recreational development, as well as the location of sites that could be developed in the future. Plans for existing developed sites include maintaining easy access and natural beauty.

Planned Management

Parks and Forests annual use of developed sites is tallied here in units called recreation visitor days (RVDs). One RVD equals 12 hours of use—either continuous or intermittent—by one or more persons. The Parks' and Forests' 460 sites currently total about 9 million RVDs annually, projected to increase an average of three percent per year.

Capacity of developed sites is measured by the number of people that can be accommodated at one time—people at one time (PAOT).

As Chart 6 shows, Yellowstone and Grand Teton National Parks have the most use at developed sites and also have the greatest capacity to accommodate this use.

Motorized Vehicle Use

Many visit the Greater Yellowstone Area by car or bus, while many use other motorized recreational vehicles.

Off-road motorized travel in Parks is not permitted. In Forests, some areas are open to motorbikes, ATVs, and

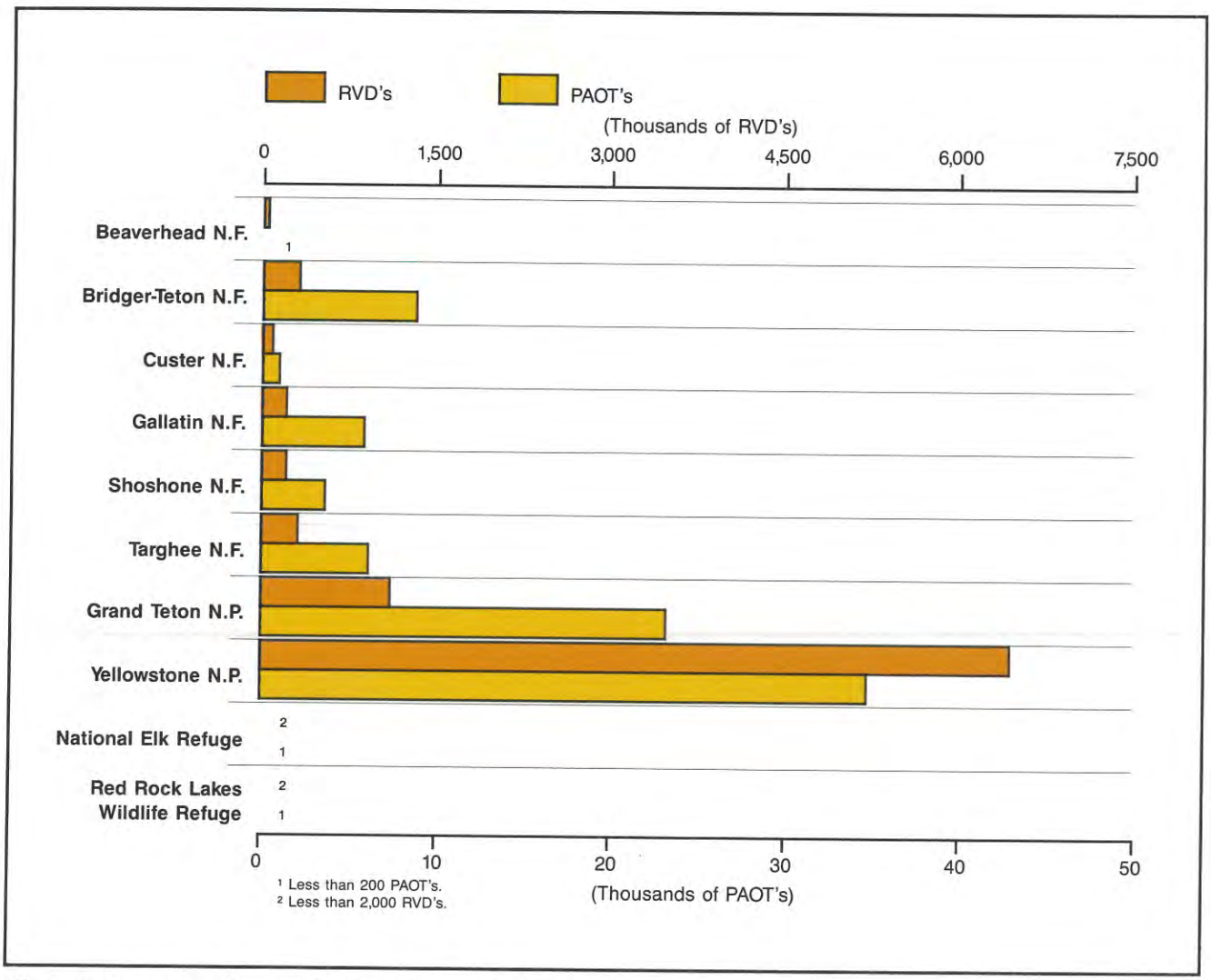


Chart 6. Capacity and use of developed recreation facilities.

snowmobiles. However, restrictions may apply at various times for protecting wildlife and during high fire danger periods.

Motorized vehicles are permitted only where they won't unnecessarily disturb resources. To prevent harm to wildlife, vegetation, soil, and water, some roads are closed to motorized travel and others are even closed to all travel. Restrictions may be year-round or seasonal, depending on the needs of the affected resources. In some cases, travel is restricted simply to create a peaceful setting for recreational use.

Travel restrictions on Park and Forests lands fall into three categories, affecting acreage as follows:

1. Open to both motorized and non-motorized travel—approximately 2,525,200 acres
2. Closed to all motorized use—approximately 6,542,000 acres (the majority being in National Forest wilderness areas and National Parks)
3. Restricted either by type of vehicle, by season, or by both—remaining 2,686,200 acres

Wilderness proposals will cause Parks and Forests to decrease slightly the number of acres open and to increase slightly the number of acres closed to all motorized use. Also, some areas presently open to vehicles may sustain adverse resource effects and subsequently be closed to motorized use or certain kinds of motorized activity.

Map 14 shows the location of areas currently open or closed to motorized use or otherwise restricted. Map 15 shows planned conditions. Chart 7 shows the number of acres that fall into each category of restriction.

Developed recreation sites include developed campgrounds such as this one in Grand Teton National Park.

This trailhead in the Shoshone National Forest and the boat launching site, Gallatin National Forest, are developed sites maintained by the Forest Service.

Snowmobiles are allowed in most parts of National Forests, except for wilderness areas and critical wildlife ranges, Gallatin National Forest.

Cross-country winter travel in most parts of National Parks is confined to snowshoes or cross-country skis, Grand Teton National Park.

Coordination Opportunities

Given the different purposes and legal mandates of National Forests and Parks, the coordination opportunities facing managers are these:

- To provide a wide variety of quality recreational opportunities, including both motorized and non-motorized
- To ensure that the recreational use within each Forest or Park complements activities in other Forests or Parks
- To ensure that recreational uses do not adversely affect other important resources in the Greater Yellowstone Area
- To provide a variety of motorized vehicle use opportunities, while ensuring that such motorized use does not harm other resources

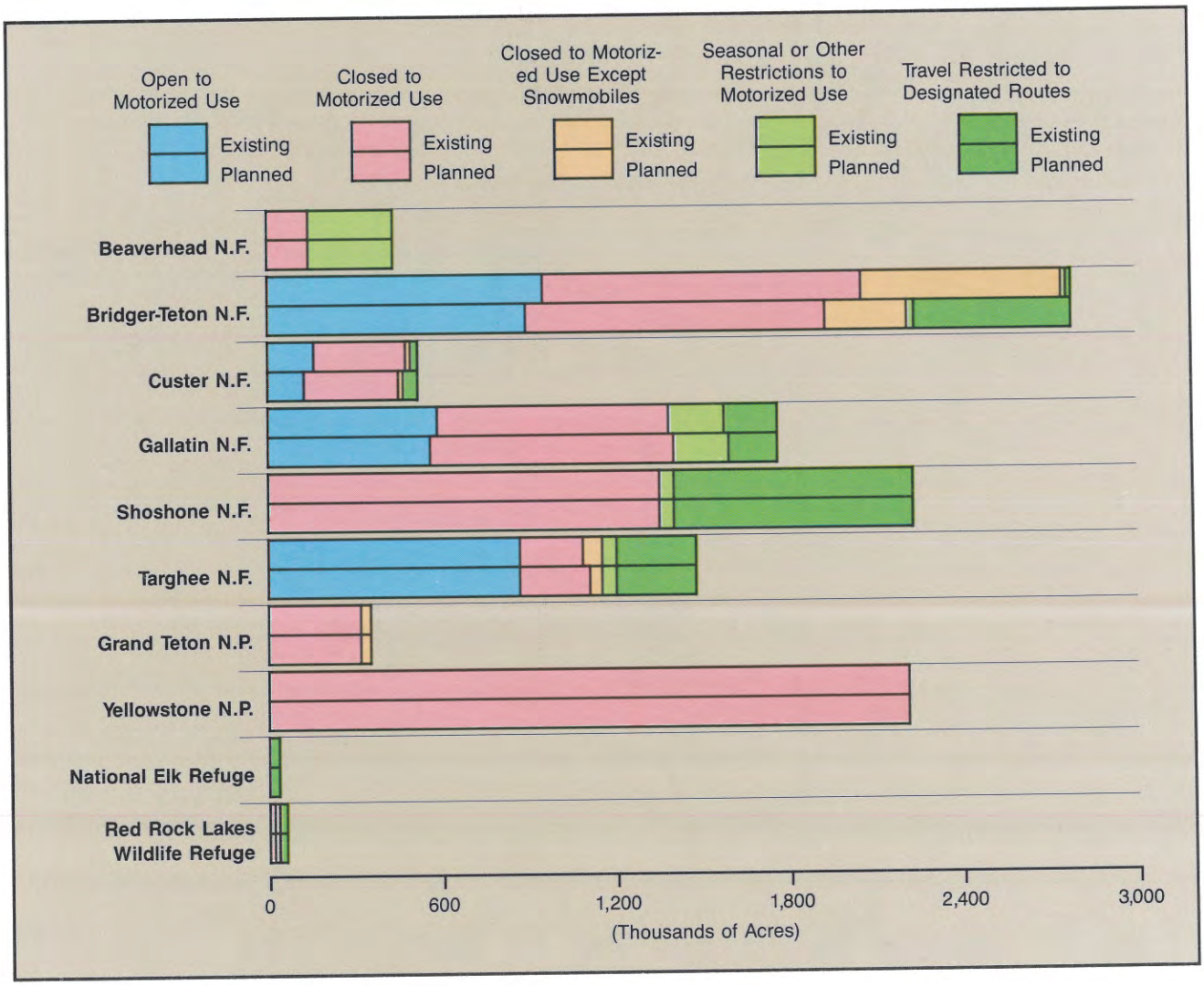
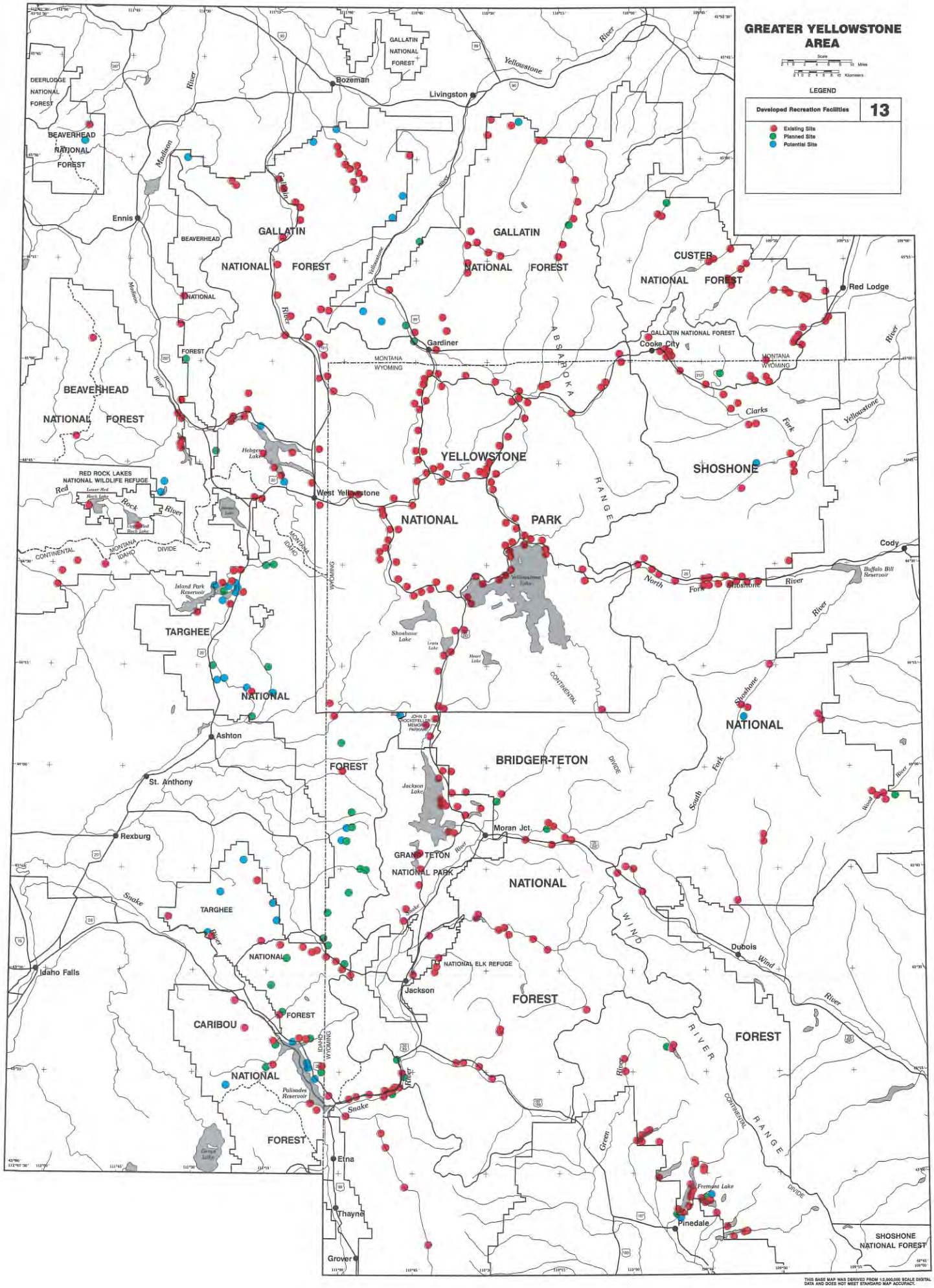


Chart 7. Motorized vehicle use—existing and planned.



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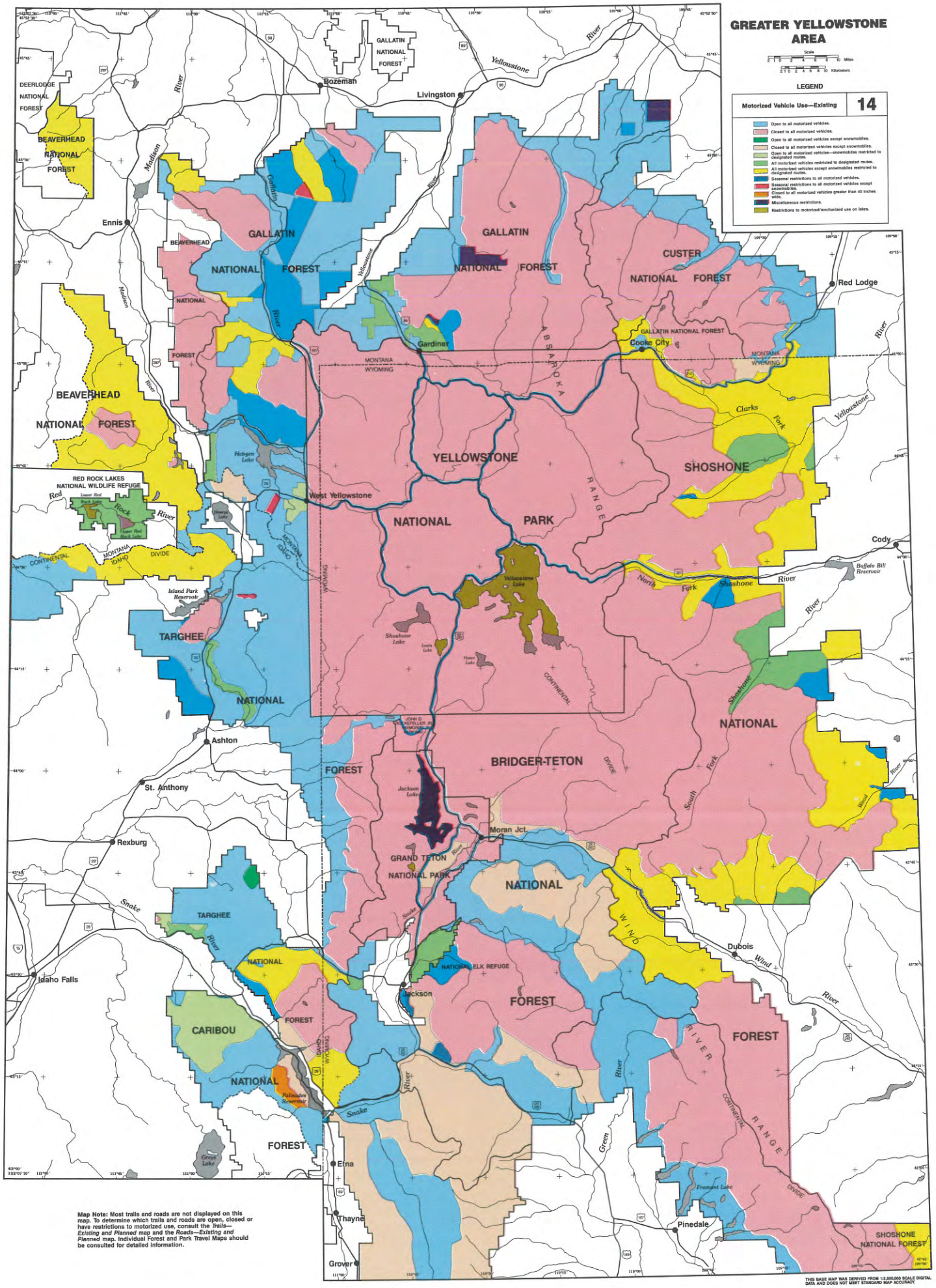

Map Note: Most trails and roads are not displayed on this map. To determine which trails and roads are open, closed or have restrictions to motorized use, consult the *Trails—Existing and Planned* map and the *Roads—Existing and Planned* map. Individual Forest and Park Travel Maps should be consulted for detailed information.

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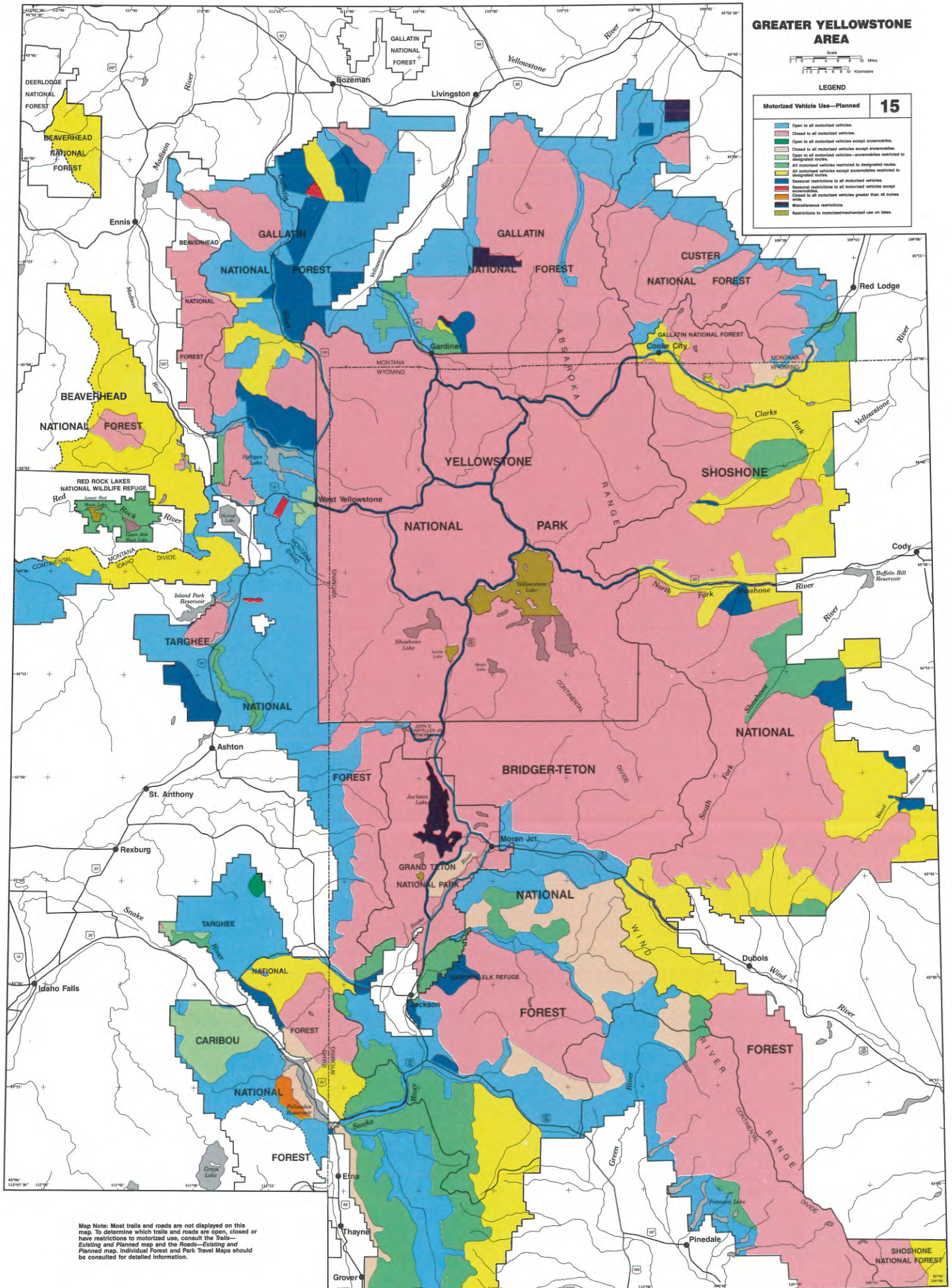

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Cultural Resources

Eleven thousand years of human use have left the Greater Yellowstone Area rich in cultural resources. Future investigations will undoubtedly reveal many more.

Cultural resources include areas, objects, sites, architecture, and records—all of which have important scientific, historic, and social values and, therefore, must be carefully considered in planning and management activities.

Decisions to open cultural resources for public viewing depend on the potential harm or disturbance of these resources.

In addition to their inherent aesthetic value, cultural resources reveal important facts about ancient and historic times. Learning more about the Greater Yellowstone's previous inhabitants can only increase our understanding of the present-day area.

Existing Situation

These three categories of cultural resources exist in the Greater Yellowstone Area:

- **Prehistoric**—resources created before written records (9000 B.C. to 1805 A.D.)
- **Historic**—resources for which written records exist, including the records themselves
- **Ethnic**—objects, sites, and buildings of importance to contemporary American cultural groups

See Chart 8 for the distribution of prehistoric and historic resources throughout the area. (Because the only ethnic resources in the area are American Indian religious areas and because few of them are known, Chart 8 does not show ethnic resources.)

Prehistoric Resources

Artifacts and other evidence of ancient inhabitants provide a wealth of information about prehistoric cultures in the area.

Three main types of prehistoric resources occur in the Greater Yellowstone Area: lithic scatters, quarries, and rock art.

Lithic Scatters. As prehistoric inhabitants moved around with the changing seasons, they chiseled tools out of stone and left the debris behind. Campsites with their tools and debris, along with other specialized sites, are known as lithic scatters. Some of the so-called specialized sites are particularly revealing to archaeologists, who know how to read them. From the surface, a site may not appear too spectacular; however, beneath decayed leaves or a layer of soil, thousands of years of ancient living patterns are preserved. Such sites contain the bulk of prehistoric evidence in the Greater Yellowstone Area.

The obsidian that occurs abundantly in the Greater Yellowstone Area provided ancient American Indians with one of the essentials of life: stone for tools. Tools made from obsidian were so desirable that they were frequently traded over long distances. As obsidian scrapers, knives, and arrowheads moved farther away from their source, they grew more exotic, often becoming part of complex ceremonies.

Tools made of obsidian from Obsidian Cliff and from the Camas-Dry Creek area have been found with Hopewell burials in Ohio dating from 300 B.C. to 400 A.D.

Quarries. The gleaming black Obsidian Cliff in Yellowstone National Park is an ancient quarry—the source of raw material for toolmaking. The Camas-Dry Creek area of the Targhee National Forest is another important prehistoric quarry. Steatite, a ceramic-like material from which the ancients carved bowls, is found in quarries in Pipestone Lakes on the Bridger-Teton National Forest.

Rock Art. Prehistoric inhabitants of the Greater Yellowstone painted symbols on rock outcrops. In a few studies, specialists have been able to identify a distinctive rock-art style for each prehistoric culture.

Other Prehistoric Resources. Excavations at various sites in the Greater Yellowstone Area continue to uncover fascinating features such as teepee rings, burial sites, and crude huts called *wickiups*. Mummy Cave on the Shoshone National Forest is an example of such a site, yielding substantial traces of an 11,000-year-old lifestyle.

Historic Resources

Although historic resources date from the beginning of recorded history, more research is necessary to fully understand them. Historic resources in the Greater Yellowstone Area include timber harvest sites, mining sites, ranches, farms, trails, roads, railroads, Federal buildings, and recreational sites.

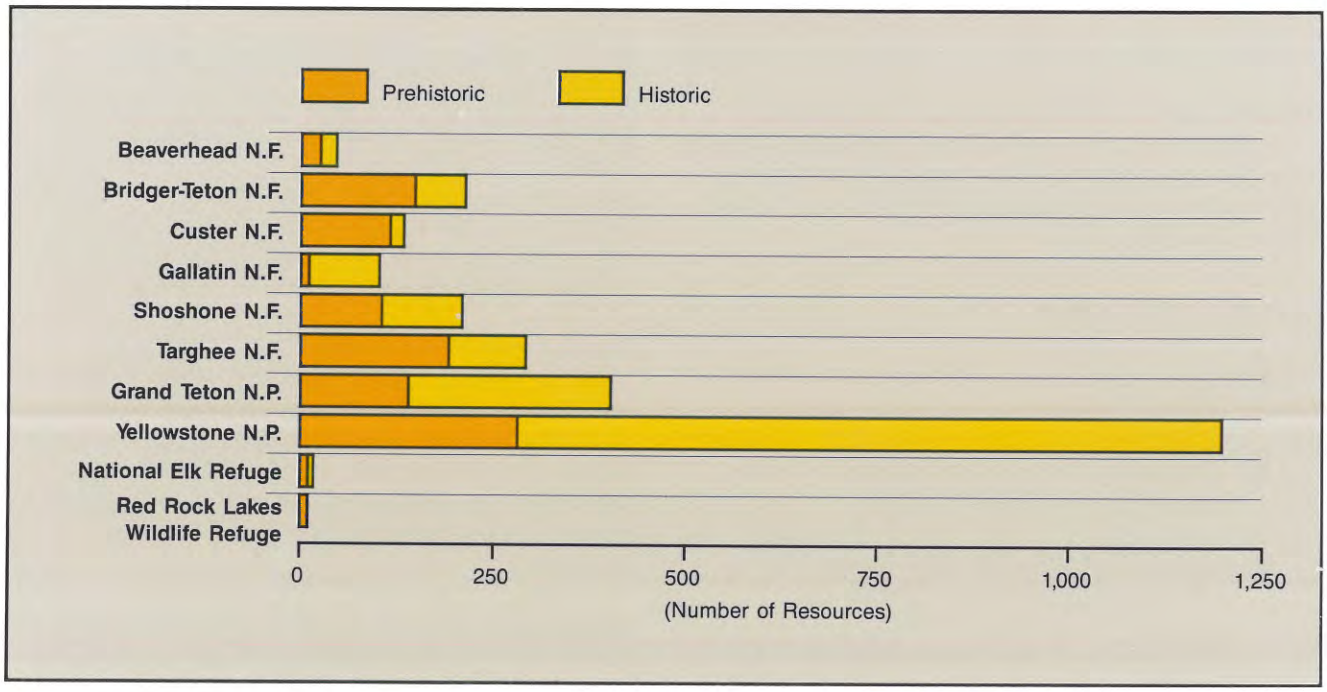

Chart 8. Amount and types of cultural resources.

Timber Harvests. Sites of past timber harvesting, logging, and lumber milling and manufacturing often reveal important details about a forest; for example, these sites illustrate the regeneration of the forest. Only a few early timber harvest sites have been located and analyzed, so more historical research is needed.

Mining Sites. Old mining sites (few of which have been recorded) checker the Greater Yellowstone Area. Activities at these sites included the extraction of precious metals, coal, lime, and phosphate for fertilizer.

Early mine sites will often disclose long-forgotten mining techniques as well as the existence of mineable ore (if modern techniques are used).

Farms and Ranches. Old homesteads, often now under public ownership, include the Cunningham Cabin and the Hunter Ranch in Grand Teton National Park.

Trails, Roads, and Railroads. The Greater Yellowstone Area is etched with historic trails, roads, and railroads that once stimulated development. Old-time visitors' accommodations, for instance, are of particular interest to historians.

Trappers and explorers learned early to rely on Union Pass. The Lander Cutoff helped westward pioneers bypass a treacherous section of the Oregon Trail. The Bannock Trail was the escape route of Chief Joseph and the Nez Perce Indians.

Federal Sites and Buildings. Fort Yellowstone, now Park Headquarters, was once a base from which the Army administered the Park. Park and Forest ranger stations, such as the Wapiti Ranger Station on the Shoshone National Forest, as well as Park interpretive facilities (historical sites) such as the Madison and Norris Geyser Basin Museums are also included among historical resources.

Rock art is evidence of prehistoric inhabitants on the Shoshone National Forest.

Mammoth Hot Springs Chapel in Yellowstone National Park is one of the Greater Yellowstone Area's historical resources.

Recreational Sites and Buildings. These include the facilities that were built when a growing number of tourists began to visit the Greater Yellowstone Area. The Old Faithful Inn, the Lake Hotel, and the Johnny Sack Cabin (a National Forest summer home) all retain their early American rustic charm.

In the formative years of the National Park System, a romanticism about nature and frontier heritage led to a unique architectural style known as *rustic*. Rustic buildings favor a look that blends with natural surroundings rather than a symmetrical, industrial look.

Rustic architecture was widely adopted in the Parks, where it complemented management objectives. Some of Yellowstone National Park's buildings, such as the Fishing Bridge Visitor Center and the Explorers' Museum at Madison, are nationally recognized examples of rustic architecture.

Other Historic Resources. Some historic resources—for instance, old cabins with no artifacts or documentation—require more research to establish their historical significance.

Ethnic Resources

American Indian religious sites are the only known ethnic resources in the Greater Yellowstone Area.

The American Indian Religious Freedom Act established a Federal policy of protecting and preserving the Indians' right to exercise their religion. This Act allows them access to ceremonial sites associated with important spirits or gods.

Only one such site is currently known and in use.

Other Cultural Resources

In addition to sites that reflect the Greater Yellowstone Area's past cultures, the Parks and Forests possess a sizeable inventory of cultural resources.

This inventory includes the following items:

- Artifact collections from archeological excavations
- Archives
- Libraries
- Photographic collections

Thanks to a special agreement with the National Archives, Yellowstone National Park is respository for most of these items. The Park collection includes 11,000 catalogued artifacts; 120,000 photographs; and a 10,000-volume library with 1,000 rare books.

The Forests store some historical records while others are maintained at various Federal record centers. Universities or museums usually take care of Forest collections. The U.S. Forest Service photo collection, dating from the establishment of the first Forest Reserves, is housed in Washington D.C. and is one of the most extensive in the Federal government.

Planned Management

The first step in managing cultural resources is to identify them. The Parks and Forests use the following methods for tracing, cataloguing, and protecting cultural resources: Evaluation and Nomination, Enhancement, Interpretation, Protection, Maintenance and Stabilization, and Loss or Removal (With or Without Mitigation).

Evaluation and Nomination

After a cultural resource has been identified, it can be evaluated for inclusion in the National Register of Historic Places. This Register lists local, state, and national resources, which must meet specified criteria. The evaluation process helps define a resource and its historical significance. Because it requires detailed studies, evaluation has not kept pace with identification.

Enhancement

Once a resource is identified, further research can enhance our knowledge of it. For example, the construction of Old Faithful Inn may be studied for architectural details that represent a certain period. A limited amount of enhancement has been done.

Interpretation

Many cultural resources embody more meaning than meets the eye. Trained staff "interpret" resources for the public by explaining the historical and cultural importance of a resource. In addition, publications and brochures can give in-depth explanations of a resource's background. Parks do more interpreting than Forests do.

Protection

Protection includes actions such as erosion control, fencing, or patrolling, which help prevent natural or human damage to resources.

Maintenance and Stabilization

Maintenance and Stabilization refers to protecting resources, buildings in particular, from the deteriorating effects of time and exposure.

Maintenance must not alter or destroy the distinguishing characteristics of resources. Parks have been more successful in maintaining and stabilizing their cultural resources than have Forests due to a number of factors, including budget, area size, number of cultural resources, and visitor controls.

Loss or Removal With Mitigation

Generally, if a project threatens a cultural resource, the project is redesigned. In some cases redesigning is not feasible. Under these conditions, the National Historic Preservation Act requires finding ways to reduce or mitigate damage to the resource. An example is an excavation project where archeologists wish to recover information without revamping the original site. Mitigation is a rare occurrence because usually the project can be redesigned.

Management of cultural resources can take several forms. The new roof on the garage at Bishop Mountain Lookout, Targhee National Forest, retains the building's unique characteristics.

Loss Or Removal Without Mitigation

On rare occasions, no practical way exists to avoid or reduce destruction of a cultural resource. In this case, the loss occurs without mitigation. This step is a last resort.

Chart 9 highlights proposed management direction for the area's cultural resources. It represents cases where management actions have occurred and where Forest or Park plans make a definite statement about which resources or how many are to be managed during the life of the plan.

Coordination Opportunities

The roster of cultural resources discussed in this section adds up to a unique heritage well worth preserving. Such resources are an important link to the history of the Greater Yellowstone Area. Fortunately, most of the resources are either in remote areas out of the path of development, or projects can be designed to avoid affecting the resources. In either case, aggressive action to protect resources from damage or loss and to make them available to the public is desirable. Three actions in particular support this approach:

- Precede proposed development with inventory and evaluation to identify and record cultural resources likely to be affected.
- Design projects to avoid damage or loss of cultural resources.
- Establish an inventory of cultural resources independent of development projects.

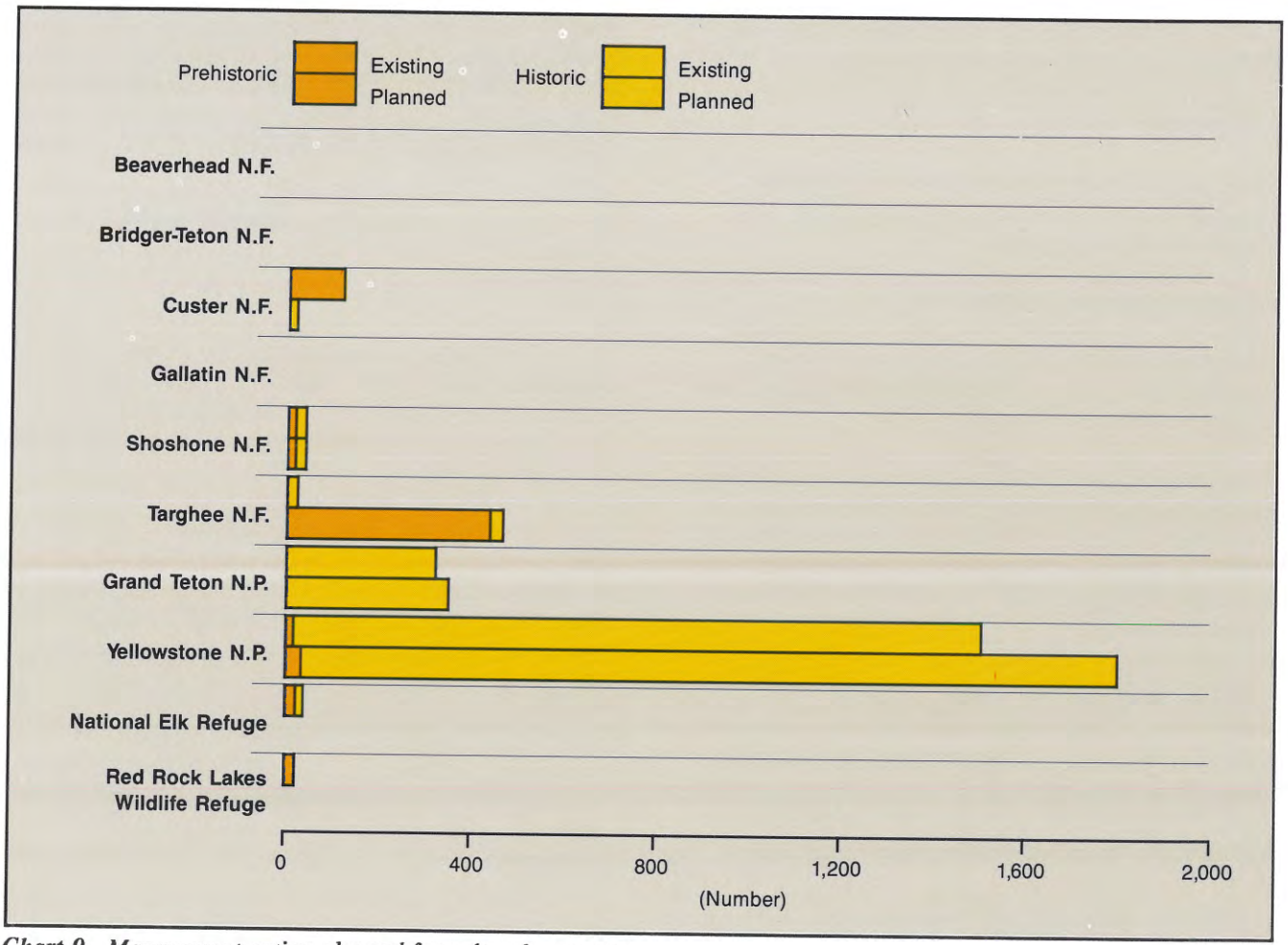

Chart 9. Management action planned for cultural resources.