WINTER USE PLANS
FINAL ENVIRONMENTAL IMPACT STATEMENT
VOLUME I

for the
Yellowstone and
Grand Teton National Parks
and
John D. Rockefeller, Jr.,
Memorial Parkway

U.S. Department of Interior
National Park Service

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Prepared by the U.S. Department of Interior, National Park Service in cooperation with the U.S. Forest Service; the States of Idaho, Montana, and Wyoming; and the Counties of Gallatin and Park, Montana, Park and Teton, Wyoming, and Fremont, Idaho.

This document presents and analyzes seven alternatives for winter use management in Yellowstone National Park (YNP), Grand Teton National Park (GTNP), and the John D. Rockefeller, Jr., Memorial Parkway (the Parkway). YNP, encompassing 2.22 million acres, and GTNP, comprising 310,000 acres, form the core of the Greater Yellowstone Ecosystem, described as the last large, nearly intact ecosystem in the northern temperate zone. The approved plan will serve as a management plan for the three national parks.

Alternative G, the preferred alternative, emphasizes clean, quiet access to the parks using the technologies available today. It would allow over-snow access on all routes currently available via NPS-managed snowcoach only. Other key changes in recreation opportunities are: eliminating winter plowing on the Colter Bay to Flagg Ranch route, making Flagg Ranch a destination via over-snow transport, and eliminating all winter motorized use on Jackson Lake. This alternative addresses the full range of issues regarding safety, natural resource impacts, visitor experience and access. It addresses the issues in a way that would make it necessary for local economies to adapt, and for snowmobile users to access the parks using a different mode of transport. Under alternative A-No Action, current use and management practices in the parks and Parkway continue. The concept under alternative B provides a moderate range of affordable and appropriate winter visitor experiences. Air quality and oversnow motor vehicle sound would be addressed, and by the winter of 2008-2009, strict emission and sound requirements would be required by all oversnow vehicles entering the parks. This alternative also emphasizes an adaptive approach to park resource management, which would allow the results of new and ongoing research and monitoring to be incorporated. Alternative C maximizes winter visitor opportunities for a range of park experiences. Alternative D stresses visitor access to unique winter features in the parks. This alternative emphasizes clean, quiet modes of travel, visitor activities focused near destination areas, and a minimization of conflicts between nonmotorized and motorized users. Under alternative E the protection of wildlife and natural resources is emphasized while allowing park visitors access to a range of winter recreation experiences. Alternative E uses an adaptive planning approach that allows new information to be incorporated over time. Alternative F stresses the protection of wildlife resources by focusing winter visitor activities in YNP outside important winter range for large ungulate species, and closing north and west roads to winter use. For GTNP and the Parkway, this alternative emphasizes the protection of all resources by focusing developments, oversnow motorized trails and zones, and nonmotorized trails and zones in certain areas, while still allowing park visitors opportunities for a range of winter recreational experiences.

The details and impacts of the alternatives are described in this document. They include major long-term beneficial improvements to the protection of geothermal winter range and other park resources, some adverse effects from visitor use activities, and major beneficial improvements to the desired visitor experience for solitude, clean air, and natural quiet. These impacts vary by alternative.

For more information about this document, contact Clifford Hawkes, 12795 West Alameda Parkway, Lakewood, Colorado 80228. The NPS is requesting comments on the plans/FEIS, although it is not legally required to do so. All comments must be received by October 20, 2000 and should be sent to the above address or the email address: yell_winter_use@nps.gov. Comments received after this date will not be considered. Comments transmitted by facsimile machine will not be considered. To meet a deadline in a court-approved settlement agreement for this plans/EIS, the NPS cannot extend the comment period. A full copy of this document is available on the Internet at the National Park Service web site www.nps.gov/planning. Copies are also available at local libraries. Written requests for full copies of the document should be directed to Clifford Hawkes at the address above. Please specify whether you wish a paper copy or a copy on CD ROM.

SUMMARY

INTRODUCTION

In 1990, a Winter Use Plan was completed for Yellowstone National Park (YNP), Grand Teton National Park (GTNP), and the John D. Rockefeller, Jr., Memorial Parkway (the Parkway). In 1994 the National Park Service (NPS) and U.S. Forest Service began work on a coordinated interagency report on Winter Visitor Use Management. This effort was in reaction to an earlier than expected increase in winter use. The 1990 Winter Use Plan projected 143,000 visitors for the year 2000. In 1992-93 winter use in YNP and GTNP exceeded this estimate.

In 1994, the Greater Yellowstone Coordinating Committee (GYCC), composed of National Park Superintendents and National Forest Supervisors within the GYA, recognized the trend toward increasing winter use and identified concerns related to that use. The GYCC chartered an interagency study team to collect information relative to these concerns and perform an analysis of winter use in the GYA. The analysis, *Winter Visitor Use Management: a Multi-agency Assessment* was drafted in 1997 and approved by GYCC for final publication in 1999. The assessment identified desired conditions for the GYA, present areas of conflict, issues and concerns, and possible ways of addressing them. The final document considered and incorporated many comments from the general public, interest groups, and local and state governments surrounding public lands in the GYA.

In May of 1997, The Fund for Animals, Biodiversity Legal Foundation, Predator Project, Ecology Center, and five individuals filed suit in the U.S. District Court for the District of Columbia alleging failures by the NPS to comply with the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), and other federal laws and regulations in connection with winter use in the three national parks. The NPS subsequently settled the suit, in part, by an agreement to prepare a comprehensive environmental impact statement (EIS) addressing a full range of alternatives for all types of winter use in the parks. This is the final environmental impact statement (FEIS) that fulfills that portion of the agreement.

The NPS has prepared this FEIS on its preferred alternative, no action alternative, and five additional alternatives. This Summary outlines the FEIS.

BACKGROUND

Regional Setting

The GYA encompasses over 11 million acres and is considered one of the few remaining intact temperate ecosystems on earth. Within the area, YNP comprises 2.22 million acres, primarily in northwestern Wyoming and extending into south central Montana and eastern Idaho. GTNP encompass an additional 310,000 acres and the Parkway includes 24,000 acres both located in Wyoming. YNP and GTNP comprise the strategic core of an upland plateau called the GYA. Portions of six national forests — Gallatin, Custer, Shoshone, Bridger-Teton, Caribou-Targhee, and the Beaverhead-Deerlodge ¾ are within the GYA, as are the National Elk Refuge and Red Rocks National Wildlife Refuge. Public lands make up most of the area (69%). Private lands comprise 24% of the GYA, Indian reservations comprise 4%, and 3% of the lands in the GYA are state lands. The GYA extends across 17 counties in 3 states. Cooperative agreements and interagency planning and coordination aid in managing the area as an ecological unit, while recognizing the different mandates of the land management agencies.

With the national growth in winter activities such as snowmobiling and ski touring, winter visits to the 3 parks have increased from virtually none 30 years ago to more than 100,000 per year by 1980. The parks' winter activities have become an important part of the region's tourism industry. Increased winter use has raised concerns about impacts on park resources and values, and placed significant demands on the parks' facilities, equipment, and personnel. These demands also affect adjacent national forests and local communities. Until recently when increased and new uses appeared, they were addressed according to established NPS policies with little additional funding or personnel. It is now apparent that winter activities are an integral part of the visitor experience in the GYA, and that more specific policies and management direction are needed to guide winter use in the parks and protect sensitive resources.

The outcome of this EIS is the development of a plan for each park addressing existing and potential impacts on resources and values from winter recreational uses. A plan of this sort, termed "programmatic," is general in nature. It is aimed at describing a program for winter use by stating objectives and goals and determining the types of uses that are consistent with those goals. It describes the conditions under which certain activities are acceptable and provides general standards for management. It also provides an overall allocation of lands where certain activities are or are not consistent with objectives.

An EIS is necessary to evaluate alternative choices for plans while revealing the possible environmental impacts of activities that may be included in the plans. Because a plan of this type is general in nature, an analysis of environmental impacts need only be conducted at a general level. The type and amount of data relating to possible impacts is presented at the general level and is not exhaustively detailed and "site-specific." Detailed and site-specific data would be required of analysis for a specific activity, such as the construction of a single facility.

The purpose of and need for action in an EIS is a brief statement specifying the underlying purpose and need to which the agency is responding in proposing the alternatives, including the proposed action. The need to develop a plan through an EIS is indicated by the difference

between overall desired condition and the conditions that presently exist. The desired condition reflects the parks' mandates, and is articulated below as a series of general objectives. Documentation of the existing condition is based on parks' monitoring, levels of present winter recreational use, and other information available through the winter visitor use assessment (GYCC 1999). Existing conditions reflect management and public concern about impacts on resources and visitor experiences that conflict with the stated objectives. The final plan will be designed to move the existing condition toward the desired condition.

PURPOSE AND NEED FOR ACTION

Desired Condition

Proceeding from the NPS mandates, which include legislation, regulations, executive orders, and governing policies, the following statements summarize the desired condition of the three parks for winter use. These bulleted statements may be viewed as objectives for a new winter use plan:

- Visitors have a range of appropriate winter recreation opportunities from primitive to developed. Winter recreation complements the unique characteristics of each landscape within the ecosystem.
- Recreational experiences are offered in an appropriate setting; they do not take place where they will irreparably impact air quality, wildlife, cultural areas, the experiences of other parks' visitors, or other parks' values and resources.
- High quality facilities are provided in parks to support the need for safety and enhanced visitor experiences.
- Conflicts among user groups are minimal.
- Visitors know how to participate safely in winter use activities without damaging resources.
- Oversnow vehicle sound and emission levels are reduced to protect employee and public health and safety, enhance visitor experience, and protect natural resources.

Existing Condition

Despite interagency cooperative efforts, including working with other federal and state agencies, counties, communities, and a variety of interest groups, many unresolved issues and concerns exist about winter use in the three parks. Land managers, constituencies, and users of public lands disagree about the appropriateness of certain uses, the amount of various uses being provided, and the effects of those uses. These unresolved issues and concerns contrast with the desired condition expressed above, and represent the need for a new plan.

- ***Visitor Access:*** Access to most locations is limited to those who can afford to ride a snowcoach or snowmobile. Access for personal motorized use via snowmobile has increased greatly since the beginnings of the winter program in the three parks. Snowmobile use, in current numbers, is in conflict with use of parks' facilities by other user groups.
- ***Visitor Experience:*** A variety of winter use conflicts has been identified involving the relationship between users and among different user groups, which affects how people experience the parks. At destination facilities and trails open to both motorized and nonmotorized users, nonmotorized users express dissatisfaction with the sound, odor, and quantity of snowmobiles. These vehicles affect the solitude, quiet, and clean air and other resource values that many people expect and wish to enjoy in national parks.
- ***Visitor Safety:*** The current level of snowmobile accidents, unsafe users, inherent winter risks, and conflicts between users are of concern from the standpoint of public safety.
- ***Resources:*** Parks have documented health hazards from snowmachine emissions, harassment and unintended impacts on wildlife from groomed trails and their use, degradation of air quality-related

values, and impacts on the natural soundscape. Many people strongly object to the degradation of inherent parks' values, as well as how these impacts affect people and their recreational opportunities.

Scope of Analysis — Range of Alternatives Considered

The scope of analysis determines the range of alternatives to be considered. The analysis in this EIS is limited to recreation during the wintertime (about December 15 through March 15, annually).

Geographically, the analysis is limited to recreation management within the boundaries of the three national park units.[1] Recreational use considerations and supporting facilities are limited to those that are technically possible at the present time or are feasible for development and implementation.

The range of alternatives presents options for motorized and nonmotorized winter recreational use in the three park units considering reasonably expected technological improvements in emissions and sound of snowmachines. One alternative must evaluate the impacts of current winter use (per the settlement agreement and CEQ regulations). In this instance, "no action" is interpreted as current management, which is appropriate for programmatic planning.[2]

The scope of this EIS, in terms of the decision to be made, is the winter recreation program. Any winter use may overlap or potentially affect other parks' management concerns. These include wildlife management (particularly bison), concession facilities and their management, and transportation infrastructure. To the extent possible, the impact analysis considers ramifications on other management issues. However, it is not possible in this EIS to evaluate the entire concession program, wildlife program (including animal carrying capacities), or transportation system.

For example, existing facilities for fuel storage and solid waste storage and handling in YNP are inadequate for current winter use levels. Wastewater treatment facilities in YNP are insufficient at current winter and summer use levels. It is not within the scope of this analysis to consider alternatives for improving basic infrastructure needs to increase capacity. This is not feasible in the present fiscal climate, and given current use levels and their impacts on resources. In addition separate analyses are proceeding to bring some of the aging infrastructure into compliance. The scope of this analysis is a programmatic assessment of facilities that are intrinsic to winter recreation experiences and opportunities, such as trails and warming huts.

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[1] As a matter of process under CEQ regulations, the impacts of park management that are known or suspected to occur at other times and places must be disclosed in the EIS. In this EIS, economic impacts outside park boundaries are disclosed in the socioeconomic impacts section. Physical and resource effects are disclosed in the sections on adjacent lands and cumulative impacts.

[2] Many commenters on the DEIS stated that NPS must have a "no action" alternative — meaning no snowmobiling — to have a full range of alternatives, and that the court settlement showed that to be the appropriate course of action. The park service's interpretation of "no action" means no change in general management direction from the present. The settlement agreement did not include any concessions to claims by The Fund for Animals, nor did it remove any options within the park service's discretion for park management from the range of alternatives to be considered. In approving the settlement agreement, the court asserted that a comprehensive winter use EIS (in accordance with CEQ regulations) would be written.

COOPERATING AGENCIES

The NPS has been joined in this FEIS by nine cooperating agencies: the U.S. Forest Service; the States of Idaho, Montana, and Wyoming; and the Counties of Gallatin and Park, Montana, Park and Teton, Wyoming, and Fremont, Idaho

STATES AND COUNTIES WHERE THE PROPOSED ACTION IS LOCATED

Idaho: Fremont County

Montana: Gallatin and Park Counties

Wyoming: Park and Teton Counties

PUBLIC INVOLVEMENT BEFORE THE RELEASE OF THE DRAFT PLAN AND EIS

Public scoping comments on the Draft Winter Use Plans/EIS for YNP, GTNP, and the Parkway were accepted from April 14, 1998 to July 18, 1998. Scoping brochures were mailed to about 6,000 interested parties, and 12 public meetings were held throughout the GYA and in Idaho, Montana, and Wyoming. In addition to local and regional meetings, four national meetings were held in Salt Lake City, Denver, Minneapolis, and Washington D.C. About 1,998 comment letters were received (about 1200 of these were form letters), from which about 15,000 discrete comments were obtained. Scoping respondents include: businesses; private and non-profit organizations; local, state and federal agencies; and the public at large. Comments were received from 46 states and several foreign countries.

NPS determined from the comments seven major issues to be evaluated by alternatives in the DEIS:

- Visitor use and access
- Visitor experience
- Air quality
- Snowmobile sound
- Human health and safety
- Social and economic impacts
- Natural resources

PUBLIC INVOLVEMENT AFTER THE RELEASE OF THE DRAFT PLAN AND EIS

The Draft Winter Use Plans/EIS was released to the public in July 1999 for a 90-day review period scheduled to end November 30, 1999. This review period was extended until December 15, 1999. Public hearings were held in October 1999 in Idaho Falls, Idaho; Jackson and Cody, Wyoming; West Yellowstone and Livingston, Montana; and Lakewood, Colorado.

By the end of the comment period, NPS had received about 46,500 documents commenting on the Draft Winter Use Plans/EIS – 6,300 unique documents and 40,200 form documents. Each document was numbered, and comment information recorded. This system helped NPS personnel analyze the comments and compose the responses. See Volume III for comments and responses to the DEIS.

Many commenters expressed consternation about the lack of a "no snowmobiling" alternative in the DEIS, and suggested that impact descriptions and data to support the EIS and the preferred alternative were not detailed enough. In some cases the NPS has added information to support the analysis of impacts in this FEIS. Additionally, NPS is engaged in programmatic planning, rather than project-specific planning; therefore analysis and data collection have been conducted on a reconnaissance level. Further, where data is lacking or unavailable even at that level, CEQ regulations provide for the decision process to continue based on best available data and professional application of credible methods.

Many people stated they could not support any of the DEIS alternative "mixes." An inordinate amount of criticism was levied on the preferred alternative — to the point that constructive comments on the other alternatives were greatly lacking. Three additional "alternatives" were proposed: Revised Alternative E (in various forms provided by cooperating agencies and the Blue Ribbon Coalition), the Citizens' Solution (provided by a consortium of conservation groups), and the Natural Regulation Alternative (provided by The Fund for Animals).[3] All such comments were read as the decisions that people would like to see the NPS make, based upon their opinions about impacts and their interpretations about laws.

The body of comment included little substantive information beyond that disclosed in the DEIS, and did not demonstrate that an alternative (or an alternative feature) did not belong in the range of choices available for the decision maker. Given the ability of a decision maker to mix features from the FEIS range of alternatives, much of the criticism in the public comment does not apply to the analysis. Regarding the great amount of comment on the preferred alternative, and perceived lack of justification for it, the NPS responds by saying that such criticism is more appropriately applied to the decision when it is made. In fact, the NPS changed the preferred alternative between draft and final EIS whereupon most of these comments no longer apply.

[3] Features of Revised Alternative E and The Citizens' Solution were covered within the DEIS range of alternatives. Certain features were either considered to be implementation details or outside the scope of analysis. The Natural Regulation Alternative, by advocating no motorized access or groomed routes, was considered outside the scope of analysis — although some alternatives close sections of the parks to motorized use, and adaptive management could conceivably result in other sections being closed over time.

Some commenters said that the desired conditions or objectives were too general, and that there is no demonstrated need for management change. In effect, such comments missed the real issues that are conveyed by statements of existing conditions. The NPS responds by explaining that this is a programmatic EIS leading to a plan, which is general in nature. In addition issues regarding resource impacts, health and safety, and visitor experience are documented sufficiently by the NPS to indicate the need for major management changes supported by a new plan.

Given the scope of analysis, the NPS developed alternatives (alternative plans) as possible ways to proceed from the current condition toward the desired condition. The NPS maintains that public access during the winter is an appropriate objective to be achieved. Accommodating a variety of recreational uses is also valid. In each case, activities must be evaluated in terms of impacts on parks' resources and values, health and safety, and visitor enjoyment. Alternatives that vary the location, amount and proximity of uses are needed to assess the relative impact or change from the current condition. The EIS expresses impacts or changes in terms that allow people to understand how each alternative satisfies the purpose and need for action. It is unreasonable to expect that all alternatives would address all aspects of the purpose and need equally, or that all alternatives worthy of consideration would have no impacts. In the final analysis, the NPS concludes that the purpose and need for action articulated in the EIS is appropriate, and that the range of alternatives considered in detail is adequate.

It is the responsibility of the NPS decision maker, in this case, the Rocky Mountain Regional Director, to weigh the environmental impacts and benefits of all alternatives (and alternative features) considered in detail in this FEIS against the parks' mandates. The decision maker must consider any other factors that may weigh in the decision, including social and economic considerations and public comments, and make a determination about the best way to meet the need for action. The determination and its rationale must be fully explained in a record of decision. There is no actionable or legal decision made until that time.

ALTERNATIVES

Formulation of Alternatives

The alternatives for the Winter Use Plans and Environmental Impact Statement for Yellowstone National Park (YNP), Grand Teton National Park (GTNP) and the John D. Rockefeller, Jr., Memorial Parkway (the Parkway) were formulated in response to the major issues and concerns raised through public and internal scoping. In addition to the scoping process, the National Park Service (NPS) and the cooperating agencies met in Idaho Falls, Idaho in October 1998 to formulate initial concepts for alternatives. Twenty-five participants and about 10 observers attended the 3-day workshop. Later, similar workshops were held with park staffs in both parks. In total, over 35 alternative concepts were generated from the 3 workshops. For a complete discussion of the concepts generated during the workshops see Appendix A.

The NPS planning team evaluated the concepts in terms of their responsiveness to the major issues and concerns, the decision to be made, and the purpose and need for the Winter Use Plans. The concepts were also evaluated against their adherence to current law, park management guidelines, and NPS mandates and policies. Lastly, each concept was evaluated for its economic

and technical feasibility. The concepts that best met the above criteria were packaged into the range of alternatives discussed below. Each alternative proposed considers a different means of achieving the desired condition of the parks in the winter while minimizing impacts to park resources.

Alternative A - No Action

This alternative reflects current use and management practices in the parks and meets the requirement for including a no action alternative in an EIS.[4] Alternative A is a baseline for analysis and reflects existing conditions. Other alternatives are intended to improve the existing condition in one or more major issue areas. Issues associated with alternative A include visitor access difficulties, visitor experience conflicts, unsafe conditions, and resource impacts.

Alternative B

This alternative provides a moderate range of affordable and appropriate winter visitor experiences. Key changes in recreational opportunities include: plowing the road from West Yellowstone to Old Faithful to allow mass transit access by wheeled vehicles, moving the CDST to a year-round path from Moran to Flagg Ranch, and phasing out snowmobile use on Jackson Lake.

Over the next 10 years, an advisory committee would make recommendations on phasing and implementing sound and emission standards for air quality and motor vehicle sound issues. By winter 2008−2009, strict emission and sound requirements would be required by all vehicles entering the parks. In addition this alternative emphasizes an adaptive approach to park resource management, which would allow the results of new and ongoing research and monitoring to be incorporated as it becomes available. Adaptive management increases the Park Service's ability to solve visitor access and experience issues and resource issues over time. Using the criteria stated within Executive Order (EO) 11644 (as amended) and its implementing regulation (36 CFR 2.18), monitoring results demonstrating disturbance to wildlife or damage to park resources would be cause to implement actions for mitigating these conditions (for example, closure to winter visitor use or trail restrictions).

Alternative C

This alternative provides maximum winter visitor opportunities for a range of park experiences, with emphasis on motorized recreation, while mitigating some natural resource impacts and safety concerns. Key changes in recreational opportunities include: plowing the road from West Yellowstone to Old Faithful to allow access by wheeled vehicles, providing a widened highway corridor to accommodate the CDST, and providing additional groomed trails for both motorized and nonmotorized uses.

[4] CEQ 40 Most Asked Questions, question number 3. Where an existing program is being evaluated, "no action" is "no change in management." "No action" may be thought of as continuing with the present course of action until the action is changed. CEQ states that in such instances, "to construct an alternative based on no management at all would be a useless academic exercise."

This alternative directly addresses issues that arose during scoping about potential impacts of management change on local economies. It shows how the range of winter opportunities could be preserved, applying mitigation primarily in the areas of air quality and sound impacts.

Alternative D

This alternative emphasizes opportunities for visitor access to the unique winter aspects of the parks (for example, geysers, geothermal areas, wildlife, and scenic vistas), and protection of those qualities and natural resources by phasing in clean and quiet modes of travel. It focuses winter visitor activities near destination areas and gateway communities. Key changes in recreational opportunities include: eliminating motorized oversnow access to Yellowstone through its East Entrance, limiting snowmobile use in Grand Teton and the Parkway to the CDST and the Grassy Lake Road, eliminating wheeled-vehicle access from Colter Bay to Flagg Ranch to accommodate oversnow vehicles on the groomed highway surface, and eliminating snowmobile use on Jackson Lake.

Emphasizing uses in different areas of the park minimizes conflicts between nonmotorized and motorized users, and addresses issues about visitor access and experience. Support facilities would have minimal amenities. In this alternative, visitor access routes and timing would be modified to provide safer conditions. Over time, issues regarding impacts on natural resources would be addressed, particularly in Grant Teton and on the east side of Yellowstone.

Alternative E

This alternative emphasizes the protection of wildlife and other natural resources while allowing park visitors access to a range of winter recreation experiences. It uses an adaptive planning approach that allows the results of new and ongoing research and monitoring to be incorporated. Key changes to current recreational opportunities are: eliminating motorized oversnow access in Grand Teton and the Parkway except for use on the Grassy Lake Road and north of Flagg Ranch into Yellowstone, and eliminating all winter motorized use on Jackson Lake.

This alternative addresses the full range of winter use issues in Yellowstone over time, but the current condition would prevail in the short term. Using the criteria stated in EO 11644 (as amended) and its implementing regulation (36 CFR 2.18), monitoring results demonstrating disturbance to wildlife or damage to park resources would be cause to implement actions for mitigating these conditions (for example, closure to snowmobile use). Alternative E calls for instituting an advisory committee to make recommendations about emission and sound standards. Local, county, state, and federal agencies as well as representatives from the snowmobile industry and environmental groups would participate on this committee. In Grand Teton and the Parkway, the full range of issues are addressed more immediately by limiting oversnow motorized use to the north end of the park, thus separating uses and eliminating most resource and visitor experience conflicts relating to snowmobile use.

Alternative F

Alternative F emphasizes wildlife protection. Key changes in recreational opportunities include: eliminating all winter access to Yellowstone’s interior through its North and West Entrances,

eliminating motorized oversnow access in Grand Teton and the Parkway except for use on the Grassy Lake Road and north of Flagg Ranch into Yellowstone, and eliminating all winter motorized use on Jackson Lake.

For YNP this alternative addresses issues regarding protection of wildlife resources by focusing winter visitor activities near scenic areas in the eastern and southern portions of YNP. These areas are generally outside important winter range for large ungulate wildlife species. In Grand Teton and the Parkway, the full range of issues is addressed by limiting oversnow motorized use to the north end of the park, thus separating uses and eliminating most resource and visitor experience conflicts relating to snowmobile use.

Alternative G - Preferred Alternative

This alternative emphasizes clean, quiet access to the parks using the technologies available today. It would allow oversnow access on all routes currently available via NPS-managed snowcoach only. Other key changes in recreational opportunities include: eliminating winter plowing on the Colter Bay to Flagg Ranch route, making Flagg Ranch a destination via oversnow transport, and eliminating all winter motorized use on Jackson Lake.

This alternative addresses the full range of issues regarding safety, natural resource impacts, and visitor experience and access. It addresses the issues in a way that would make it necessary for local economies to adapt, and for snowmobile users to access the parks using a different mode of transport.

MITIGATION

Alternatives analyzed in this EIS would produce environmental effects, both beneficial and adverse. These are disclosed in Chapter IV. For adverse impacts, additional actions are suggested for the purpose of lessening the magnitude, duration, or intensity of the impact. These actions, termed mitigation (defined in 40 CFR §1508.20), are recommended as choices for the decision maker not already included in the alternative.[5] A key mitigation feature for most alternatives is the limitation on snowmobile use in the interim until recreation carrying capacities can be set.

IMPACTS

Table S-1 summarizes the seven alternatives. Table S-2 outlines potential impacts. The FEIS provides detailed explanations of the impacts, descriptions of the methods of impact analysis, and supporting references.

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[5] Many people who commented on the Draft Environmental Impact Statement (DEIS) suggested alternative features or different mixes of alternative features. Some suggestions were appropriate as mitigation for certain types of impacts. Most such suggestions flow logically from the determination of potential impacts disclosed in this EIS. The EPA suggested that limitations on vehicle numbers would be necessary as an approach to addressing air quality impacts because the benefits of alternative technologies would not necessarily offset the impacts of increasing numbers. Some cooperating agencies suggested it would be reasonable to limit numbers as an interim measure until a recreation carrying capacity could be set. Other suggested measures include establishing rationing or reservation systems, permits on a first-come, first-served basis, or other means to limit daily and annual use. If a measure or measures were selected they would become part of the ROD (see *Decision to be Made in* Chapter I).

S-1. Summary of Alternatives

ALTERNATIVE A No Action	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE F	ALTERNATIVE G Preferred Alternative
Visitor Use & Access						
Yellowstone · Maintain current 180 miles of groomed oversnow motorized road · Maintain current 37 miles of groomed nonmotorized · Maintain 76 miles of plowed road (include Hwy 191 to Cooke City) · Existing winter season from mid December to mid March **GT/JDRMP** · 100 miles plowed road · 33.9 miles groomed motorized trail · 35.6 ungroomed motorized trail or area · 26.4 ungroomed non- motorized trail or area	**All Units** · Increase interpretive opportunities **Yellowstone** · Establish 6 miles of new oversnow motorized trails · Establish 10 miles of new nonmotorized trails · Allow all-wheeled public shuttle vehicle access by plowing the road from West Yellowstone, MT to Old Faithful · Lengthen season by two weeks from the West Entrance · Increase size and number of warming huts and other day-use facilities · Continue scientific studies in re: impacts of winter visitor use and park resources; close selected areas or road segments if no other possible mitigation method **GT/JDRMP** · Establish 6.5 miles of new nonmotorized trail · Continue current & add destination facilities · Provide interpretive ski tours · 5-year phase-out of snowmobiles on Jackson Lake	**Yellowstone** · Establish winter campsites (e.g. Old Faithful area) · Establish 10 miles of new oversnow motorized trails · Establish 20 miles of new nonmotorized trails · Allow all-wheeled private and public shuttle vehicle access from West Yellowstone, MT to Old Faithful · Lengthen season by two weeks in December from West Yellowstone to Old Faithful and two weeks in March from the South Entrance to West Thumb · Plow the road from Mammoth to Norris to Madison mid-Feb to mid-Mar to allow late-season access · Snowcoach only from Norris to Canyon to Fishing Bridge mid February to mid March · Increase size and number of warming huts and other day-use facilities **GT/JDRMP** · Establish 30.4 miles of new oversnow motorized trail · Establish 6 miles of new nonmotorized trail · Allow all-wheeled access by plowing the Moose-Wilson and Antelope Flats Roads · Allow both snowmobiles and snowplanes on Jackson Lake · Continue current & add destination facilities	**All Units** · Increase interpretive opportunities **Yellowstone** · Separate use by establishing 15 miles of new oversnow motorized trails in the W and SW areas, and 6 miles of new nonmotorized trails in the N and NW areas **GT/JDRMP** · Establish 18 miles of new oversnow motorized route by opening road north of Colter Bay to snowmobiles · Continue current & add destination facilities · Increased and enhanced visitor programs facilities and interpretive opportunities	**All Units** · Continue scientific studies in re: impacts of winter visitor use and park resources; close selected areas or road segments if no other possible mitigation method **Yellowstone** · Restrict backcountry skiing to use of designated trails or routes only in important winter range **GT/JDRMP** · Establish 8.6 miles of new nonmotorized trail · CDST eliminated through GTNP · Oversnow motorized uses are eliminated except for Grassy Lake Trail and groomed motorized route north of Flagg Ranch	**Yellowstone** · Close sections of road from the West Entrance to Madison Junction and Madison Junction South to Old Faithful and the road segments from Mammoth south to Norris Junction and from Norris Junction south to Madison Junction · Restrict skiing to use on front-country designated trails. Backcountry use would be prohibited · Winter use season from mid-December to early March **GT/JDRMP** · Same as Alternative E	**All Units** · Increase interpretive opportunities · Snowcoach only travel **Yellowstone** · Establish 11 miles of new nonmotorized trail **GT/JDRMP** · Continue current & add destination facilities · Establish 5 miles of new nonmotorized trail · Open the road from Colter Bay to the South Entrance to snowcoaches · Open the Grassy Lake Road from Flagg Ranch to the west boundary for snowcoach travel
Human Health & Safety						
All Units · Over-snow speed limit 45 mph except for the Moran to Flagg Ranch segment, which is 35 mph.	**All Units** · Prohibit late-night oversnow travel 11 P.M.. to 5 A.M. · Implement information and enforcement program **GT/JDRMP** · Separate auto use from snowmachine use by moving CDST to new pathway between Moran and Flagg Ranch · Separate motor and nonmotor uses on interior park road; allow nonmotorized use only from Taggert Lake Trailhead to Signal Mountain · Prohibit snowmachine use on CDST 8 P.M.. to 5 A.M. to allow for groomers	**GT/JDRMP** · Move the CDST to a widened highway shoulder between Colter Bay and Flagg Ranch	**All Units** · Prohibit late-night oversnow travel · Implement information and enforcement program **Yellowstone** · Close East Entrance road · Groom from West Yellowstone to Madison to Old Faithful more frequently **GT/JDRMP** · Move the CDST to unplowed road from Colter Bay to Flagg, and to widened highway shoulder from Colter to Moran · Nonmotor use only on interior park road	**All Units** · Reduce nighttime oversnow speed limit to 35mph **GT/JDRMP** · Separate motorized and nonmotorized opportunities	**All Units** · Prohibit night oversnow travel, sunset to sunrise **GT/JDRMP** · Same as Alternative E	**All Units** · Prohibit late-night oversnow travel
Local Communities & Adjacent Lands						
All Units · The 1999 Interagency Winter Visitor Use Assessment shows relationships and cooperative programs for winter use in the GYA · NPS visitor contacts are provided at visitor centers in West Yellowstone and Jackson Hole.	**All Units** · Implement information program in cooperation with local communities · Establish advisory committee to phase and implement emission standards	**All Units** · Implement information program in cooperation with local communities	**All Units** · Implement information program in cooperation with local communities	**All Units** · Establish advisory committee	**All Units** · Implement information program in cooperation with local communities	**All Units** · Implement information program in cooperation with local communities
Natural Resources						
All Units · Enforce current sound standards, 78dB(A) · Bio-lubes and fuels used by NPS	**All Units** · Establish advisory committee · Require new technologies · Phase in more stringent standards for oversnow vehicle emissions · All oversnow vehicle sound emissions must be at or less than 70 dB(A) · Monitor natural resources at current levels of administration, and use regulatory measures when necessary to prevent identified disturbances resulting from winter recreation use **Yellowstone** · Continue scientific studies in re: impacts of winter visitor use and park resources; close selected areas if no other possible mitigation method · Restrict nonmotorized use to designated important winter range **GT/JDRMP** · Phase in motorized use by snowplanes only on Jackson Lake	**All Units** · Enforce current sound standards, 78dB(A) · Manage wildlife same as in Alternative A · Phase in alternative fuel/lube sales to public **Yellowstone** · Provide quiet nonmotorized environment by restricting Norris to Canyon to Fishing Bridge road to snowcoaches mid-Feb to mid-Mar	**All Units** · Oversnow vehicle sound emissions must be at or less than 60 dB(A) · Phase in alternative fuel/lube sales · Phase in more stringent standards for oversnow vehicle emissions **Yellowstone** · Restrict nonmotorized use to designated trails in important winter range, except in the Tower and Mammoth areas **GT/JDRMP** · Allow motorized use by snowplanes only on Jackson Lake (no snowmobiles on Jackson Lake)	**All Units** · Establish advisory committee to recommend emission standards for oversnow vehicles · Monitor natural resources at current levels of administration, and use regulatory measures when necessary to prevent identified disturbances resulting from winter recreation use **Yellowstone** · Restrict nonmotorized use in important winter range **GT/JDRMP** · CDST would be accessed via shuttle from east boundary to Flagg Ranch · Eliminate motorized use on Jackson Lake	**All Units** · Require new technologies for reducing snowmobile emissions as they are developed by industry **Yellowstone** · Close road from West Yellowstone to Madison to Old Faithful from Nov 1 to Apr 30 · Allow nonmotorized uses only on groomed trails in frontcountry · Shorten the season by two weeks in March **GT/JDRMP** · Same as Alternative E	**All Units** · Sound emissions must be at or less than 75dB(A) · Restrict oversnow motorized travel to snowcoaches which meet stringent air quality standards (current technologies exist that would accomplish this) · Require new technologies as they are made available · Manage wildlife same as in Alternative A **GT/JDRMP** · Discontinue all motorized use on Jackson Lake · Close important bighorn sheep winter habitat to backcountry use

S-2. Summary of Effects*

***Summary Statements Above Are Abbreviated And Taken Out Of Context To Provide A Quick Comparison By Element.**
The Reader Is Encouraged To Review The Supporting Analysis In Chapter IV.

ALTERNATIVE A No Action	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE F	ALTERNATIVE G Preferred Alternative
Socioeconomic						
· Social: continued values and beliefs conflicts · No policy related impacts on economics would result under alternative A. · Continued high cost of winter visitor access.	· Negligible to minor effects on local & state economies. · Major negative effect on small gateway communities (West Yellowstone). · Moderate negative effects on total nonmarket visitor benefits (through reduced visitation). · Minor to moderate benefit to low-income visitors.	· Negligible to minor effects on local & state economies. · Major negative effect on small gateway communities (West Yellowstone). · Moderate negative effect on total nonmarket visitor benefits (through reduced visitation). · Minor to moderate benefit to low-income visitors.	· Negligible to minor effect on local and state economies. · Minor negative effect on total nonmarket visitor benefits (through reduced visitation).	· No short-term effects compared to current condition.	· Negligible to minor effect on local and state economies. · Larger, major adverse effect on the economies of small gateway communities (W. Yellowstone and Gardiner). · Minor negative effect on total nonmarket visitor benefits (through reduced visitation).	· Minor effect on local and state economies. · Larger, major adverse effect on the economies of small communities within the GYA. · Minor negative effect on total current trip nonmarket visitor benefits (through reduced visitation).
Cultural Resource						
· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.
Air Quality and Public Health						
· Continued minor and adverse effects from emissions exposure parkwide. · Continued moderate and adverse local effects at major staging areas. · Continued adverse impacts on employees who work at entrances, destination, and staging areas. · Vehicular emissions would continue to cause localized and perceptible visibility impairment near vicinity of the West Entrance, Old Faithful and Flagg Ranch. · Emissions along heavily used roadways would result in localized visibility impairment.	· Major beneficial effects would occur at the West Entrance, Old Faithful and Flagg Ranch due to reduced PM_{10} and CO. · Moderate to minor beneficial effects dye to reduced CO and PM_{10} concentrations at other locations where snowmobiling is permitted, once strict emission requirements are implemented. · Minor beneficial effects due to reduced CO concentrations along the Flagg Ranch to Colter Bay roadway and the Teton Park Rd. · Relative to existing condition, improved visibility at West Entrance and Old Faithful. · Vehicular emissions would not cause any perceptible visibility impairment in the vicinity of W. Entrance or along park roadways.	· Major beneficial effects at the W. Entrance and along the roadway to Madison and Old Faithful. · Moderate reductions in CO at the Old Faithful staging area. · Minor reductions in CO at Flagg Ranch and along the road to Colter Bay. · Minor to moderate adverse effects (compared to alternative A) where oversnow vehicles would be permitted. · Relative to existing condition, improved visibility at West Entrance. · Vehicular emissions would not cause any perceptible visibility impairment in the vicinity of W. Entrance or along the roadways. · Perceptible visibility degradation could occur in the vicinity of Old Faithful and Flagg Ranch during periods of high use.	· Moderate and major beneficial effects at the West Entrance and along the road to Old Faithful. · Increased traffic at Flagg Ranch and on the road to Colter Bay would result in major adverse impacts to air quality if mitigating use limits were not implemented. · Moderate beneficial effects would occur where snowmobiling is permitted, once strict emission requirements were implemented. · Relative to existing condition, improved visibility at W. Entrance and Old Faithful. · Vehicular emissions would cause localized, perceptible, visibility impairment near the vicinity of W. Entrance and in the area around Old Faithful and Flagg Ranch. · Vehicular emissions along roadways would not result in perceptible visibility impairment.	· In the short term, effects would be the same as described in No Action. · In the long term, negligible to moderate beneficial improvements in air quality near the W. Entrance and other staging areas in YNP-- depending on emissions standards required by FACA committee. · Moderate and major beneficial impacts would occur in GTNP due to the prohibition of snowmobiles on the roadway from Colter Bay to Flagg Ranch and Teton Park Road. · Vehicular emissions would continue to cause localized and perceptible visibility impairment near vicinity of the W. Entrance, Old Faithful and Flagg Ranch. · Emissions along heavily used roadways would result in localized visibility impairment.	· Moderate improvements to visibility in W. Entrance vicinity. · Negligible beneficial effects at Old Faithful. · Negligible to minor adverse effects would occur at Flagg Ranch. · Moderate and major beneficial effects to air quality would occur on the road from Flagg Ranch to Colter Bay and Teton Park Road. · Vehicular emissions would not cause any perceptible visibility impairment in the vicinity of W. Entrance or along the roadways. · Perceptible visibility degradation could occur in the vicinity of Old Faithful and Flagg Ranch during periods of high use.	· Major beneficial effects in air quality at the W. Entrance and along the road to Old Faithful. · Minor beneficial effects at Old Faithful and Flagg Ranch due to reduction in CO and major beneficial effects from the reduction of $PM_{10.}$ · Major beneficial reductions in CO and PM_{10} are predicted along the roadway from Flagg Ranch to Colter Bay. · Vehicular emissions would not cause any perceptible visibility impairment in the vicinity of W. Entrance along park roadways or in the vicinity of Old Faithful and Flagg Ranch.
Public Safety						
· Continued minor adverse effects to visitor and employee safety along the road from W. Entrance to Old Faithful and the CDST. · Continued minor to moderate adverse effects on winter visitors and employees who use the E. Entrance.	· Moderate beneficial improvements due to mass transit in YNP and separation of uses in GTNP, including new CDST pathway. · Minor beneficial improvements in the parks due to the introduction of several positive safety-oriented measures in the absence of any additional safety risks.	· Moderate adverse effects in YNP due to the potential for increasing visitor conflicts and vehicle/animal collisions. · Minor improvement due to widened highway shoulder for the CDST.	· Minor beneficial improvements in the parks due to the introduction of several positive safety-oriented measures in the absence of any additional safety risks. · Minor improvement due to widened highway shoulder for the CDST and removal of wheeled vehicle traffic from Colter Bay to Flagg Ranch.	· Negligible improvements, as compared to alternative A, in all three-park units due to oversnow nighttime speed limits. · Moderate beneficial improvements in GTNP due to decrease in oversnow motorized travel and elimination of the CDST in the park.	· Major beneficial improvements, as compared to alternative A, in YNP and GTNP as a result of the nighttime closure and the overall elimination of oversnow travel on north and west side of YNP and the CDST. · Minor to moderate improvements (at existing use levels) due to backcountry closures.	· Improvements would be major and beneficial, as compared to alternative A, in the parks due to the elimination of all potential snowmobile accidents, implementation of park- wide mass transit system. And removal of wheeled vehicle traffic from Colter Bay to Flagg Ranch.
Geothermal Resources						
· Minor adverse long term impacts to geothermal features near groomed roads, around destination areas, and near winter trails in the backcountry.	· As in alternative A minor adverse impacts would occur near staging areas, roads, destination areas, and near winter trails. · Adaptive management provisions would mitigate these effects over the long term.	· Minor incremental long-term degradations to, and in some cases, permanent loss of certain features because of increased access.	· General continued adverse impacts as in A for features near existing groomed routes and facilities.	· As in alternative A minor adverse impacts would occur near staging areas, roads, destination areas, and near winter trails. · Adaptive management provisions would mitigate these effects over the long term.	· Elimination of human access to backcountry and along the north and west road segments would greatly decrease potential impacts.	· Negligible to minor improvements (over alternative A) due to mass transit and enhanced visitor awareness programs. · As in alternative A, minor adverse impacts would occur near staging areas, roads, destination areas and near winter trails. · Adaptive management provisions would mitigate these effects over the long term.
Water and Aquatic Resources						
· Deposition into snow pack would continue to occur from two-cycle engine emissions along groomed park roads in YNP and GTNP. · Continued high risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (22% of the groomed trail system and on the frozen surface of Jackson Lake).	· Protection through the monitoring and scientific studies provisions. If adverse effects occur that cannot be mitigated, the activity specifically causing the effect would be terminated. · Moderately decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high-risk segments along the Madison and Firehole Rivers). Vehicle miles traveled on high-risk segments reduced by 65%.	· Minor improvements on the effects from pollution deposited in the snow by selling ethanol-blend fuels and low-emission lubricants. · Moderately decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high risk segments along the Madison and Firehole Rivers). Vehicle miles traveled on high-risk segments reduced by 62%. Snowmobiles phased out from Jackson Lake.	· Slightly decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high risk segments along Yellowstone Lake). Vehicle miles traveled on high-risk segments reduced by 14%, no snowmobiles on Jackson Lake.	· Same as Alternative A for YNP. · In GTNP, eliminates risk of pollutants entering Jackson Lake. · Protection through the monitoring and scientific studies provisions. If adverse effects occur that cannot be mitigated, the activity specifically causing the effect would be terminated.	· Greatly decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high-risk segments along the Madison, Firehole, Gardner and Gibbon Rivers and Jackson Lake). Vehicle miles traveled on high-risk segments reduced by 74%. All motorized use eliminated from Jackson Lake.	· Greatly decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high risk segments along the Madison, Firehole, Gardner and Gibbon Rivers). Vehicle miles traveled on high-risk segments reduced by 84%. All motorized use eliminated from Jackson Lake. · Protection through the monitoring and scientific studies provisions. If adverse effects occur that cannot be mitigated, the activity specifically causing the effect would be terminated.

ALTERNATIVE A No Action	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE F	ALTERNATIVE G Preferred Alternative
Wildlife - Ungulates						
· Effects of groomed surfaces and plowed roads on animal movements - unknown to what extent any beneficial effects outweigh negative effects. · Effects related to displacement and fragmentation are minor to moderate, adverse, and short-term. · Risk of collisions with snowmobiles is negligible, adverse, and short-term. · Risk of collisions with wheeled vehicles is minor, adverse, and short-term. Effects of nonmotorized use – adverse, minor and short-term. · Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, moderate and short-term. Impacts to bighorn sheep in GTNP would be moderate to major and long-term if no mitigation is applied. · Effects from visitor use of winter support facilities on displacement would be adverse, minor, and short-term.	· Effects related to groomed roads would decrease due to the plowing of the road from West Yellowstone to Old Faithful. Plowing may increase road-kill mortalities, but implementation of mass transit would ameliorate effects. · Effects related to snowmobiles would decrease in YNP. In GTNP, separation of the CDST from the roadway may increase collisions and displacement effects. · Effects related to nonmotorized use would be negligible; additional routes would not be located in areas critical to wildlife. · Backcountry uses in certain winter ranges would be restricted or prohibited in YNP, thus effects would decrease and become negligible to minor. Impacts to bighorn sheep in GTNP would remain the same - moderate to major and long-term. · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.	· Effects on wildlife associated with oversnow and wheeled vehicles increase. Plowing of the road from Yellowstone to Old Faithful to accommodate private vehicles and the establishment of a groomed snowmobile trail from GTNP's south boundary to Moran along the eastern park boundary may negatively impact ungulates, especially on limited winter range in GTNP. The periodic diversion of the CDST near Jackson Lake could impact moose. · Effects related to nonmotorized activities remain the same as Alternative A, but may slightly increase because more opportunities are provided. Moose may be impacted near the Gros Ventre River in GTNP. · Effects related to backcountry use would remain the same as Alternative A. · More winter facilities are proposed; including campsites in YNP – thus associated effects would increase.	· Effects of groomed roads and snowmobiles would decrease in both parks. In GTNP, no opportunities for snowmobile use of ungroomed trails would exist. · Effects related to plowed roads and wheeled vehicles would remain the same in YNP and would decrease in GTNP because the road from Colter Bay to Flagg Ranch would not be plowed. · Effects of unregulated backcountry nonmotorized use in YNP on all ungulate species would be negligible to minor due to limitations on backcountry use and closure of the E. Entrance. In GTNP, effects of nonmotorized use on ungulates may increase because more use would be expected in areas where snowmobiling would now be prohibited (e.g., Antelope Flats). · Overall, this alternative decreases the effects on ungulates relative to Alternative A.	· Miles of groomed surface in GTNP greatly decreased, eliminating snowmobile use and its effects, from most of the park. Moose would benefit in GTNP by the elimination of the CDST. Effects would be much lower in magnitude than in Alternative A. Effects in YNP would be the same as Alternative A. · Effects of nonmotorized use in GTNP would decrease in the Antelope Flats area, thus benefiting ungulates near important winter range in the park. · Effects of unregulated backcountry nonmotorized use in YNP on all ungulate species would negligible to minor due to limitations on backcountry use. · Overall, the effects on ungulates are generally the same (YNP) or much less than Alternative A (GTNP). · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.	· Effects of groomed surfaces and oversnow motorized use are negligible. In YNP, closing the west side of the park protects important ungulate habitat. · Miles of groomed surface in GTNP greatly decrease, effectively eliminating snowmobile use, and its effects, from most of the park. Moose would benefit in GTNP by the elimination of the CDST. · In YNP, all nonmotorized use in the backcountry is prohibited, thus eliminating all effects associated with off-trail travel. · Overall effects would be much lower in magnitude than in Alternative A.	· The effects of groomed surfaces would be less than Alternative A in GTNP. Risk of collision from oversnow vehicles would be nearly eliminated in all parks due to the prohibition on snowmobiling and late night travel. Moose would benefit in GTNP by the elimination of the CDST. · Mass transit would greatly reduce vehicle miles traveled and allow for the use of trained drivers. Consequently there would be the ability to control where and when stops are made. This feature would potentially benefit all species. · Effects related to plowed roads would be the same as Alternative A for YNP, and decreased in GTNP due to the elimination of wheeled vehicles north of Colter Bay. · In all parks, restrictions on backcountry travel would minimize effects associated with off-trail travel. Effects on bighorn sheep in GTNP would be eliminated because important sheep habitats would be closed to winter use. · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.
Wildlife – Threatened and Endangered Species						
· Effects of groomed surfaces on lynx unknown; negligible to major depending upon lynx abundance, distribution. · Displacement effects of oversnow vehicles are adverse, negligible, and short-term. · Risk of collision with wheeled vehicles negligible to minor for grizzly bears, wolves. · Effects of nonmotorized use: adverse, negligible, short-term on bald eagles; no effect on grizzly bears; no known effect on lynx, wolves. · Effects of unregulated backcountry nonmotorized use: adverse, minor, and short-term on bald eagles; adverse, negligible, short-term on grizzly bears; no known effect on lynx and wolves. · Effects of winter support facilities: adverse, negligible, short-term on grizzly bears; adverse, minor, short-term on wolves.	· Effects would be generally as stated for ungulates.	· Impacts to lynx may increase in GTNP because some of the new groomed routes are in potential lynx habitat (e.g., Two Ocean Lake, and diversions of the CDST). · The new snowmobile route in GTNP may displace ungulates, and consequently wolves, from the southeastern part of the park. · The extension of the winter use season from the S. Entrance to West Thumb, combined with increased winter support facilities may result in more grizzly bear-human conflicts as bears emerge from hibernation.	· Closure and elimination of use on the road from Fishing Bridge to the E. Entrance in YNP would generally benefit all species actively using habitat on the entire east side of the park. · Most other effects are generally the same as Alternative A with the exception of the elimination of unregulated backcountry use in YNP, which decreases effects, and the development of warming huts at Jenny Lake which may increase effects on lynx.	· Slightly decreases the potential effects compared to Alternative A. The elimination of snowmobiling from most of the GTNP would reduce effects associated with packed trails and displacement; restrictions on backcountry travel in YNP may decrease displacement effects associated with off-trail travel. · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.	· The closure of the winter season after 1 March would minimize the potential for bear-human confrontations and conflicts that could occur after the emergence of grizzly bears in the spring. · Closure of the roads from W. Entrance and Mammoth to Old Faithful would generally benefit listed species habitats on the entire west side of YNP. · In all parks, if protected species activity is detected, park managers can close the area to human activity to mitigate disturbance. · Potential effects would be the same or less than Alternative A.	· Effects related to oversnow vehicles on groomed roads decrease, a potential benefit to all species. Most visitors would be traveling on NPS-managed snowcoaches having the ability to control where and when stops are made. · Use of snowcoaches could continue to displace lynx as routes pass through lynx habitat, but effects of snowcoaches would be less than those of snowmobiles being fewer in number, slower, and quieter. · Effects related to plowed roads may decrease impacts to wolves/lynx because wheeled vehicles eliminated from Colter to Flagg. · Earlier opening increases potential for grizzly/human conflicts in YNP. Restrictions in backcountry areas would mitigate impact. · Effects of backcountry travel decrease. · Adaptive management used to adjust activities if impacts to wildlife are found.
Wildlife –Species of Special Concern						
· Effects of groomed surfaces negligible. · Displacement effects of oversnow vehicles would be negligible to minor (swans in YNP). · Effects of plowed roads on collisions and displacement would be negligible. · Effects of nonmotorized use in the front country – negligible (wolverines, sagebrush lizard) to minor (swans). In swan habitat, use may cause minor, short-term displacement and avoidance. · Effect of winter support facilities would be negligible to minor.	· Effects would be generally as stated for ungulates.	· Effects of motorized wheeled vehicles increase in YNP and effects of snowmobiles increase in GTNP. Swans may be affected in YNP as a result of private vehicles stopping near open water habitats. · Effects of nonmotorized activities in the front and backcountry are generally the same as Alternative A. · Effects related to huts increase because the number of proposed huts increases.	· The elimination of unregulated backcountry use in YNP may decrease associated effects. · Closure of the E. Entrance in YNP eliminates the need for avalanche control and thus may benefit wolverines. This closure and elimination of use on the road to Fishing Bridge would generally benefit species actively using habitat on the entire east side of the park. · Other effects generally the same as Alternative A.	· Effects the same as in alternative A. · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.	· Closure of the roads from W. Entrance and Mammoth to Old Faithful would generally benefit habitats on the entire west side of YNP, and potential effects on trumpeter swans would be eliminated in those areas. · Effects in GTNP would be lowered due to the virtual elimination of snowmobile use. · If protected species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance. · For all parks, overall effects are the same or less than Alternative A.	· Effects related to oversnow motorized vehicles are reduced because no snowmobiles would be permitted in the parks. · Effects related to groomed surfaces would decrease in GTNP benefiting martens. · The majority of visitors would be traveling on NPS-managed snowcoaches, and there would be the ability to control where and when stops are made, benefiting all species. · Effects associated with backcountry use are reduced from those in Alternative A. Bighorn sheep closures may benefit wolverines. · Adaptive management would adjust activities should impacts to wildlife be demonstrated.
Natural Soundscapes						
· Current non-natural sounds impact the soundscape in the three park units. · Moderate to major adverse effects occur because vehicles are audible over more than 200,000 acres, and they are audible more than 50% of the time over more than 26,000 acres. Audibility for more than 50% of the time is greatest relative to the W. Entrance to Old Faithful route and from Moran to GTNP south entrance. · The average sound level is highest along these routes and on Jackson Lake.	· Elimination of oversnow vehicles on the road from W. Entrance to Old Faithful would moderately reduce soundscape impacts. · Lowering all snowmachine sound emissions from 78 dB to 70 dB would reduce the area in which vehicles are audible more than 50% of the time by 38%. When implemented this would result in moderate beneficial effects. · Sound levels 4000 feet distant from travel ways would be reduced by a third, overall.	· Elimination of oversnow vehicles on the road from W. Entrance to Old Faithful would moderately reduce soundscape impacts. · The area in which vehicles are audible more than 50% of the time would be increased by 22% resulting in moderate to major adverse impacts on the soundscape. · Sound levels 4000 feet distant from travel ways would be slightly reduced overall resulting in negligible improvements.	· Reduction in snowmobile sound emissions from 78 dB to 60 dB would moderately reduce impacts on the soundscape. · Compared to quiet background conditions, this alternative would reduce by 44% the area in which vehicles are audible more than 50% of the time. Overall this alternative would result in moderate to major beneficial effects on the natural soundscape. · Sound levels 4000 feet distant from travel ways would be moderately reduced by about half.	· Compared to quiet background conditions, this alternative would reduce the area in which vehicles are audible at all by 16%. This reduction is due to the elimination of winter motorized use on Jackson Lake. · The alternative would not change the area in which vehicles are audible more than 50% of the time. · Sound levels 4000 feet distant from travel ways would be slightly reduced overall resulting in negligible improvements.	· In the absence of mitigating use limits, this alternative would increase by 24% the area in which vehicles are audible more than 50% of the time. This is a result of the shifting of use from closed segments to open segments on the south and east side of YNP. · Sound levels 4000 feet distant from travel ways would be reduced by about a third, overall.	· Elimination of snowmobile sound emissions, and limiting snowcoach dBAs in the short term to 75, long term to 70, would moderately reduce impacts on the soundscape. · Compared to quiet background conditions, would decrease by 47% the area in which vehicles are audible more than 50% of the time. · Sound levels 4000 feet distant from travel ways would be slightly reduced overall.

ALTERNATIVE A No Action	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE F	ALTERNATIVE G Preferred Alternative
Visitor Access & Circulation						
· Minor adverse impacts would continue due to the high cost of current winter access to YNP's interior · Parking at some staging areas is filled to capacity during peak use times resulting in minor adverse impacts. · Some conflict between motorized and nonmotorized use occurs.	· All areas of the parks currently accessible under alternative A would remain accessible under alternative B. · Visitor capacity would remain at levels equal to the no-action alternative · Mass transit shuttle would provide a less expensive means of winter access resulting in minor to moderate beneficial effects. · Moderate long-term beneficial improvements for safe snowmobile access on the CDST. · Grand Loop not available by single means of transport.	· Although plowed roads would allow for wheeled vehicle access in YNP, the lack of available parking at Old Faithful, Madison and Old Faithful would result in moderate adverse effects due to an overall reduction in winter visitor capacities. · Minor to moderate long-term beneficial improvements for safe snowmobile access from Jackson and Dubois to GTNP/Parkway, and north into YNP. · Private vehicles would provide a less expensive means of winter access. · Grand Loop not available by single means of transport.	· Minor adverse impacts would continue due to the high cost of winter access to YNP's interior. · Minor adverse effects would occur to overall park access because of E. Entrance closure in YNP. Winter season visitors using the E. Entrance represent 3% of winter season visitation or approx. 4,100 visitors · Negligible adverse effects to park access would occur in GTNP. Moderate long-term beneficial improvements for safe snowmobile access on the CDST.	· Minor adverse impacts would continue due to the high cost of winter access to YNP's interior. · Short-term access in YNP, same as in Alternative A. Long-term effects are unknown and would depend on future management decisions related to area closures. · Access to GTNP in general would not change, although modes of travel in some areas would change. Motorized access on Jackson Lake would be eliminated.	· Minor adverse impacts would continue due to the high cost of winter access to YNP's interior. · Major long-term adverse effect to current visitor access patterns at YNP due to elimination of two winter entrances. · Effects for GTNP would be the same as alternative E. · The Grand Loop experience would be eliminated.	· Minor adverse impacts would continue due to the high cost of winter access to YNP's interior. · Negligible long-term effects to YNP because level of access is not altered, only the mode of travel. · Minor adverse long-term effects in GTNP would occur because motorized access on Grassy Lake Road and Jackson Lake would be eliminated.
Visitor Experience						
All three park units · Little or no operational change would occur. Visitation would be influenced by the method of transportation available to visitors. · For visitors who prefer to visit the parks via snowmobile, the visitor experience would continue to be highly satisfactory. · Encounters with park wildlife and scenery would continue to be primary attractions, consequently the overall satisfaction of current winter visitors would remain high. · Current levels of snowmobile emissions and sound levels would continue to detract from critical characteristics of the desired winter experience for many visitors resulting in direct short-term major adverse impacts on visitor experience. · The perceived unsafe behavior of others and the occurrence of visitor conflicts would continue to have direct short-term minor to moderate adverse effects on the experience of some users. · Current motorized use would continue to deter some user groups from visiting or returning to the parks.	**All three park units** · The adaptive management provisions could result in sections of the park being closed to protect resources/values. Visitor opportunities currently afforded in those areas would be eliminated, resulting in direct short-term adverse effects to desired winter visitor experience. Long-term protection of these resources would be a major beneficial effect by providing for future enjoyment. · The reduction of snowmobile emissions and sound levels would in the long term greatly enhance opportunities for solitude, clean air, and natural quiet. This would result in moderate to major beneficial improvements to the desired visitor experience. **YNP** · Major to moderate adverse effects on desired winter experience for persons who wish to access the park via the W. Entrance via oversnow transport. · Plowed road from W. Entrance to Old Faithful could create berms of snow resulting in moderate adverse effects on opportunities to view scenery. · Opportunities to view wildlife and scenery as a solitary experience would be eliminated on the W. Entrance Road for those persons who are limited to motorized travel. · Would provide an opportunity for the winter experience at Old Faithful which has not been available to park visitors who do not wish to or who cannot afford to ride a snowmobile or snowcoach. **GTNP & Parkway** · Moderate beneficial changes relating to safety by separating user groups within the park, and by improving groomed surfaces. · Moderate beneficial improvement due to increased availability of information, interpretation, and winter programs.	**YNP** · Major to moderate adverse effects on desired winter experience, affecting the current winter visitors who access the park via the W. Entrance using oversnow transport. · The creation of snow berms along plowed roadways could cause moderate adverse effects to scenery viewing opportunities. · The addition of motorized and non-motorized trails would increase opportunities for winter experiences and would result in direct moderate beneficial improvements. · Affects on opportunities for solitude, clean air, and quiet (except during the late season) would be minor to moderate and adverse, except at W. Entrance. · In the vicinity of Old Faithful opportunities for clean air would be moderate and beneficial. · Moderate to major adverse effects would occur due to the complexities of park travel. · Visitors, who are unable, cannot afford, or do not wish to ride a snowmobile or snowcoach would have access via private automobile to Old Faithful. **GTNP & Parkway** · A full range of winter activities would be available to enhance opportunities for wildlife and scenery viewing. · Minor beneficial changes in safety due to improvement of the CDST. · Minor adverse effect in locating motorized and nonmotorized uses in close proximity. · Opportunities for use on groomed surfaces would increase. · Minor to moderate beneficial effect to visitor experience due to increased availability of information and trailside facilities. · Major adverse effect to opportunities for quiet and solitude. Opportunities to appreciate clean air also adversely affected.	**All three park units** · The reduction of snowmobile emissions and sound levels would, in time, result in moderate to major beneficial improvements in opportunities for solitude, clean air and, natural quiet. · Minor beneficial effect to visitor experience due to greatly increased availability of information, interpretation, and winter programs. **YNP** · The increase in trail opportunities would provide minor to moderate beneficial effects for all user groups. **GTNP & Parkway** · Minor to negligible adverse effects to opportunities for wildlife and scenery viewing. · Major beneficial improvements relating to safety by separating user groups within the park. · Widening the groomed surfaces of the CDST and removing adjacent wheeled vehicle traffic from Colter Bay to Flagg Ranch would be a moderately beneficial effect.	**All three park units** · The adaptive management provisions could result in sections of the park being closed to protect resources/values. Visitor opportunities currently afforded in those areas would be eliminated, resulting in direct adverse effects to desired winter visitor experience. Long-term protection of these resources would be a major beneficial effect by providing for future enjoyment. **YNP** · Negligible to moderate beneficial short-term improvements in opportunities to appreciate clean air, quiet, and solitude from the implementation of the standards set by the FACA committee. **GTNP & Parkway** · Wildlife and scenery viewing would remain unchanged for nonmotorized users and automobile occupants. · There would be major beneficial improvements relating to safety by eliminating snowmachines as a source of motor vehicle accidents, except on Grassy Lake road. · There would be major adverse effects on opportunities to participate in oversnow motorized activities. · There would be major beneficial effects relative to opportunities for quiet and solitude by eliminating snowmobiles- except on the Grassy Lake road. · Moderate to major improvements in air quality would result in greater opportunities to appreciate clean air.	**YNP** · The elimination of winter opportunities on the road segments connecting the West and North Entrances with Old Faithful would result in major adverse effects on the desired winter visitor experience. · If winter use increases in other areas of the parks minor effects are expected on visitor experience in those areas. **GTNP & Parkway** · Same as alternative E except for decline in experiential values around Flagg Ranch due to possible displaced motorized oversnow use from YNP.	**All three park units** · The adaptive management provisions could result in sections of the park being closed to protect resources/values. Visitor opportunities currently afforded in those areas would be eliminated, resulting in direct adverse effects to desired winter visitor experience. Long-term protection of these resources would be a major beneficial effect by providing for future enjoyment. · Opportunities to view wildlife and scenery as a solitary experience would be eliminated for those persons who are limited to motorized travel. · There would be major beneficial changes relating to safety by eliminating the possibility of snowmobile related motor vehicle accidents. · There would be a minor to moderate beneficial effect to visitor experience due to increased availability of information, interpretation and winter programs. · Opportunities to appreciate clean air would be greatly improved. Where oversnow motorized use occurs, via snowcoach, quiet and clean air would be facilitated by improved motorized technology. · The elimination of snowmobiles would result in major adverse effects to the experiences of visitors who prefer this mode of travel. · There would be a major beneficial effect relative to opportunities for quiet and solitude, for nonmotorized visitors.

***SUMMARY STATEMENTS ABOVE ARE ABBREVIATED AND TAKEN OUT OF CONTEXT TO PROVIDE A QUICK COMPARISON BY ELEMENT.**
THE READER IS ENCOURAGED TO REVIEW THE SUPPORTING ANALYSIS IN CHAPTER IV.

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PURPOSE OF AND NEED FOR THE ACTION

INTRODUCTION

In 1990 a Winter Use Plan was completed for Yellowstone National Park (YNP), Grand Teton National Park (GTNP), and the John D. Rockefeller, Jr., Memorial Parkway (the Parkway). In 1994 the National Park Service (NPS) and U.S. Forest Service (USFS) staff began work on a coordinated interagency report on Winter Visitor Use Management. This effort was in response to an earlier than expected increase in winter use. The 1990 Winter Use Plan projected 143,000 visitors for the year 2000. Winter visitors to YNP and GTNP in 1992-93 exceeded this estimate.

In 1994 the Greater Yellowstone Coordinating Committee (GYCC), composed of National Park Superintendents and National Forest Supervisors within the Greater Yellowstone Area (GYA), recognized the trend toward increasing winter use and identified concerns relating to that use. The GYCC chartered an interagency study team to collect information relative to these concerns and perform an analysis of winter use in the GYA. The analysis, *Winter Visitor Use Management: a Multi-agency Assessment*, was drafted in 1997 and approved by the GYCC for final publication in 1999. The assessment identifies desired conditions for the GYA, current areas of conflict, issues and concerns, and possible ways to address them. The final document considered and incorporated many comments from the general public, interest groups, and local and state governments surrounding public lands in the GYA.

In May of 1997, The Fund for Animals, Biodiversity Legal Foundation, Predator Project, Ecology Center, and five individuals filed suit in the U.S. District Court for the District of Columbia alleging failures by the NPS to comply with the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), and other federal laws and regulations in connection with winter use in the three national parks. The NPS subsequently settled the suit, in part, by an agreement to prepare a comprehensive environmental impact statement (EIS) addressing a full range of alternatives for all types of winter use in the parks. This EIS fulfills that portion of the agreement.

With the popularity of winter activities such as snowmobiling and ski touring growing nationally, winter visits to the three park areas increased from virtually none 30 years ago to more than 100,000 per year in 1980. The parks' winter activities have become an important part of the region's tourism industry. Increased winter use has raised concerns about impacts on parks' resources and values, and placed significant demands on the

parks' facilities, equipment, and personnel. These demands also affect adjacent national forests and local communities. Until recently, when increased and new uses appeared, demands were addressed according to established NPS policies with little additional funding or personnel. It is now apparent that winter activities are an integral part of the visitor experience in the GYA, and that more specific policies and management direction are needed to guide winter use in the parks and protect sensitive resources.

NATIONAL PARK SERVICE MANDATES

The Organic Act

These Plans and EIS jointly address winter use in YNP, GTNP, and the Parkway. The NPS and its basic mandate are authorized under the NPS Organic Act (16 USC 1, 2-4) and the General Authorities Act (16 USC 1a-1 through 1a-8):

> *"The Service thus established shall promote and regulate the use of the Federal areas known as National Parks…by such means and measures as to conform to the fundamental purposes of the said Parks…which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."*

Comments on the Draft Environmental Impact Statement (DEIS) indicate that many people feel they have a right to enjoy the park units using their choice of motorized access. These commenters refer to the NPS "dual mandate" of protection and enjoyment, citing needs of personal freedom and taxpayer rights. Such commenters tend to strongly support snowmobile access. The NPS response is that there are no unlimited freedoms implied in the mandate. The Organic Act clearly states such freedoms that are enjoyed in national parks are subject to the need to protect the parks' resources for enjoyment by future generations. Preservation is implicit. When an activity is identified as the source of impairment, management action must be taken.

Other comments indicate some people believe that the NPS is obligated to provide for businesses that have become dependent on visitor use and enjoyment of the parks. Some comments cited NPS policies to support this view, and they noted that the NPS encouraged early use of snowmobiles to enjoy YNP, in effect becoming a partner in developing this use. As in the personal freedom issue above, the initial and chief concern for the NPS under its mandate is to protect parks' resources and values. When there is a determination of unacceptable adverse impacts on these resources, management action must be taken even though it may affect present visitors and local economic concerns. A great many people commented that NPS must not put economic issues above resource issues.

The Redwood Act

The Redwood Act (March 27, 1978, P.L. 95-250, 92 Stat. 163, 16 U.S.C. 1a-1) affirms the basic tenets of the Organic Act and provides additional guidance on national park system management:

> *"The authorization of activities shall be construed and the protection management and administration of these areas shall be conducted in light of the high public value and integrity of the National Park system and shall not be exercised in derogation of the values and purposes for which these various areas have been established…."*

The restatement of these principles of park management in the Redwood Act is intended to serve as the basis for any judicial resolution of competing private and public values and interests in the National Park System (Senate Report No. 95-528 on S. 1976 pg.7).

Recently the United States Department of the Interior (USDI) solicited public comment on revised management policies for the NPS. The proposed policies, if adopted, would revise and clarify the interpretation by the NPS of the Organic Act mandate. The proposed policies are based on a premise that the Organic Act forbids broader categories of impairment given the many kinds of potential harms to resources. The proposed policies amplify the impairment analysis by addressing impairment of the resource in terms of the duration, extent, timing, and cumulative effect of various impacts. This creates a more comprehensive and flexible way of analyzing and managing potential impairments.

The proposed policies define the Organic Act impairment standard as "an adverse impact on one or more parks' resources or values that interferes with the integrity of the park's resources or values, or the opportunities that otherwise would exist for the enjoyment of them, by the present or a future generation." Parks' resources and values are defined by the Organic Act's fundamental purpose for all parks, as supplemented and clarified by the General Authorities Act, and any additional purposes stated in a park's establishing legislation or proclamation, as the resources and values of a park whose conservation is essential to the purposes for which the area was included in the national park system.

Park-Specific Legislation

The Yellowstone National Park Act (16 USC 21, *et seq.*), the Grand Teton National Park Act (16 USC 406d-1 *et seq.*), and the John D. Rockefeller, Jr., Memorial Parkway Act (P.L. 92-404) provide authority and direction for management of each park addressed in this EIS and these Plans. The establishment legislation is included in Appendix C.

Other Laws

The Clean Air Act (as amended, P.L. Chapter 360, 69 Stat. 322, 42 U.S.C. 7401 *et seq.*) provides for the prevention of significant deterioration of areas where air is cleaner than national ambient air quality standards (NAAQS), and for an affirmative responsibility to protect air quality related values including visibility. This Act also requires the prevention of any future impairment and the remedying of any existing impairment in Class I federal areas, which includes Yellowstone and Grand Teton National Parks. Other laws and their implementing regulations contribute to the management of resources in the parks, such as the Clean Water Act, National Historic Preservation Act, Archeological Resources Protection Act, Architectural Barriers Act of 1968, Americans

with Disabilities Act of 1990, Uniform Federal Accessibility Standards (UFAS), Rehabilitation Act of 1973, Secretary of the Interior's regulation 43 CFR 17-Enforcement on the Basis of Disability in the Interior Programs, and the Endangered Species Act.

Executive Orders

Executive Orders provide additional direction that must be considered as part of the purpose of and need for action. Executive Order (EO) 11644 (as amended by EO 11989) Use of Off-Road Vehicles on the Public Lands states in part:

> *"The widespread use of such vehicles on the public lands — often for legitimate purposes but also in frequent conflict with wise land and resource management practices, environmental values, and other types of recreational activity — has demonstrated the need for a unified federal policy…that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of these lands, to promote the safety of all users of those lands, and to minimize conflicts among the various users of those lands."* Further, "*[a]reas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats"* and *"areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands…."*

This order is amended by EO 11989, which adds:

> *"… the respective agency head shall, whenever he determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrence."*

The order defines off-road vehicles as "…any motorized vehicle that is capable of cross-country travel over …snow, ice, or other natural terrain." The order excludes vehicles used for official administrative travel, vehicles used for emergency purposes, or any vehicle that is expressly authorized for such travel. Oversnow motorized vehicles have been authorized to travel in the three national parks, but only on surfaces where motorized vehicles have been authorized to travel at other times of the year, meaning that these vehicles have been allowed only on roads, and in GTNP on the frozen surface of Jackson Lake and in the Potholes area (see the *History* section). The executive orders clearly provide direction for the use of oversnow motorized vehicles operating on roads, and that a determination about their impacts must be made.

Appendix C includes the full text of the executive orders described above.

Other Executive Orders considered in the purpose of and need for action are: EO 11990, Protection of Wetlands; EO 11988, Floodplain Management; EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations; and EO 11593, Protection and Enhancement of the Cultural Environment.

Regulations

General provisions in park service regulations address snowmobile use (36 CFR 2.18). Snowmobiling is generally prohibited except on designated routes and water surfaces available for motorized use at other times. In addition, snowmobiles are prohibited except where designated and "only when their use is consistent with the park's natural, cultural, scenic and aesthetic values, safety considerations, park management objectives, and will not disturb wildlife or damage park resources" (36 CFR 2.18(c)). Section (d) of this regulation lists additional limitations and prohibitions that apply where snowmobiles are allowed, including noise limits, speed limits, operator requirements, and machine appurtenances.

NPS Policies

Statements about management of visitor use, backcountry use, off-road vehicle use, and visitor safety and protection are made in the USDI National Park Service Management Policies (1988). On April 27, 2000 the Department of Interior announced a renewed commitment to enforce existing NPS regulations regarding snowmobile use in national parks. The commitment is based on the conclusion that parks have not done the requisite studies to determine whether snowmobiles adversely affect the parks' values and resources or other visitors. As explained above, compliance with regulations and executive orders depends upon such findings.[6]

1997 Court Settlement

Considerations embodied in the legal mandates discussed here prompted The Fund for Animals, et al., to sue the NPS in 1997. Specifically, the suit pointed out the failure of the NPS to: consult with USFWS on impacts of winter use on threatened or endangered species; prepare an EIS concerning winter use; and evaluate the effects of trail grooming on wildlife and other parks' resources. The outcome of the suit was provided for in a settlement agreement approved by the court in October 1997. The agreement committed the NPS to: write an EIS and determine a new winter use plan for the three park units; consult with USFWS; and evaluate the possible closure of a road segment in Yellowstone.[7]

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[6] News release of April 27, 2000: National Park Service Puts the Brakes on Escalating Snowmobile Use in the National Park System.

[7] Preparer's Note: Many people who commented on the DEIS felt that the court settlement was an affirmation of the claims and demands presented in the lawsuit. Many people disagreed with the range of alternatives presented in the DEIS. Because of the outcome of the lawsuit, many felt a "no action" alternative, interpreted as no grooming and no motorized use, was called for and should have been the park service's preferred alternative. The NPS response to this is that it agreed to prepare a comprehensive EIS that evaluates the impacts of winter use, where "no action" is interpreted as the current management situation. Existing winter uses must be reflected in alternatives to determine their impacts, as required by the Council on Environmental Quality. The NPS did not agree with the claims and demands of the plaintiff in the lawsuit, but it did agree that there are resource issues and concerns that need to be evaluated in light of the park service mandates. The purpose and need for action, which set the scope of analysis and the range of alternatives in the EIS, fulfill the settlement agreement.

PURPOSE OF AND NEED FOR ACTION

The outcome of this EIS is the development of a plan for each park addressing existing and potential impacts on resources and values from winter recreational uses. A plan of this sort, termed "programmatic," is general in nature. It is aimed at describing a program for winter use by stating objectives and goals and determining the types of uses that are consistent with those goals. It describes the conditions under which certain activities are acceptable and provides general standards for management. It also provides an overall allocation of lands where certain activities are or are not consistent with objectives.

An EIS is necessary to evaluate alternative choices for plans while revealing the possible environmental impacts of activities that may be included in the plans. Because a plan of this type is general in nature, an analysis of environmental impacts need only be conducted at a general level. The type and amount of data relating to possible impacts is presented at the general level and is not exhaustively detailed and "site-specific." Detailed and site-specific data would be required of analysis for a specific activity, such as the construction of a single facility.

The purpose of and need for action in an EIS is a brief statement specifying the underlying purpose and need to which the agency is responding in proposing the alternatives, including the proposed action. The need to develop a plan through an EIS is indicated by the difference between overall desired condition and the conditions that presently exist. The desired condition reflects the parks' mandates, and is articulated below as a series of general objectives. Documentation of the existing condition is based on parks' monitoring, levels of present winter recreational use, and other information available through the winter visitor use assessment (GYCC 1999). Existing conditions reflect management and public concern about impacts on resources and visitor experiences that conflict with the stated objectives. The final plan will be designed to move the existing condition toward the desired condition.

Desired Condition

Proceeding from the NPS mandates, which include legislation, regulations, executive orders, and governing policies, the following statements summarize the desired condition of the three parks for winter use. These bulleted statements may be viewed as objectives for a new winter use plan:

- Visitors have a range of appropriate winter recreation opportunities from primitive to developed. Winter recreation complements the unique characteristics of each landscape within the ecosystem.
- Recreational experiences are offered in an appropriate setting; they do not take place where they will irreparably impact air quality, wildlife, cultural areas, the experiences of other parks' visitors, or other parks' values and resources.
- High quality facilities are provided in parks to support the need for safety and enhanced visitor experiences.
- Conflicts among user groups are minimal.

- Visitors know how to participate safely in winter use activities without damaging resources.
- Oversnow vehicle sound and emission levels are reduced to protect employee and public health and safety, enhance visitor experience, and protect natural resources.

Existing Condition

Despite interagency cooperative efforts, including working with other federal and state agencies, counties, communities, and a variety of interest groups, many unresolved issues and concerns exist about winter use in the three parks. Land managers, constituencies, and users of public lands disagree about the appropriateness of certain uses, the amount of various uses being provided, and the effects of those uses. These unresolved issues and concerns contrast with the desired condition expressed above, and represent the need for a new plan.

- ***Visitor Access:*** Access to most locations is limited to those who can afford to ride a snowcoach or snowmobile. Access for personal motorized use via snowmobile has increased greatly since the beginnings of the winter program in the three parks. Snowmobile use, in current numbers, is in conflict with use of parks' facilities by other user groups.
- ***Visitor Experience:*** A variety of winter use conflicts has been identified involving the relationship between users and among different user groups, which affects how people experience the parks. At destination facilities and trails open to both motorized and nonmotorized users, nonmotorized users express dissatisfaction with the sound, odor, and quantity of snowmobiles. These vehicles affect the solitude, quiet, and clean air and other resource values that many people expect and wish to enjoy in national parks.
- ***Visitor Safety:*** The current level of snowmobile accidents, unsafe users, inherent winter risks, and conflicts between users are of concern from the standpoint of public safety.
- ***Resources:*** Parks have documented health hazards from snowmachine emissions, harassment and unintended impacts on wildlife from groomed trails and their use, degradation of air quality-related values, and impacts on the natural soundscape. Many people strongly object to the degradation of inherent parks' values, as well as how these impacts affect people and their recreational opportunities.

Community expectations for winter visitor use in and around the parks represent a part of the context for these issues and concerns. Different user groups are represented in all the communities around the parks, and are the sources of many concerns. Economic interests in communities develop in response to NPS policies and assist the public in access to and enjoyment of parks' experiences. Consistency in NPS policies is important in this relationship as well as protection of parks' resources and values.

Scope of Analysis — Range of Alternatives Considered

The scope of analysis determines the range of alternatives to be considered. The analysis in this EIS is limited to recreation during the wintertime (about December 15 through March 15, annually).

Geographically, the analysis is limited to recreation management within the boundaries of the three national park units.[8] Recreational use considerations and supporting facilities are limited to those that are technically possible at the present time or are feasible for development and implementation.

The range of alternatives presents options for motorized and nonmotorized winter recreational use in the three park units considering reasonably expected technological improvements in emissions and sound of snowmachines. One alternative must evaluate the impacts of current winter use (per the settlement agreement and CEQ regulations). In this instance, "no action" is interpreted as current management, which is appropriate for programmatic planning.[9]

The scope of this EIS, in terms of the decision to be made, is the winter recreation program. Any winter use may overlap or potentially affect other parks' management concerns. These include wildlife management (particularly bison), concession facilities and their management, and transportation infrastructure. To the extent possible, the impact analysis considers ramifications on other management issues. However, it is not possible in this EIS to evaluate the entire concession program, wildlife program (including animal carrying capacities), or transportation system.

For example, existing facilities for fuel storage and solid waste storage and handling in YNP are inadequate for current winter use levels. Wastewater treatment facilities in YNP are insufficient at current winter and summer use levels. It is not within the scope of this analysis to consider alternatives for improving basic infrastructure needs to increase capacity. This is not feasible in the present fiscal climate, and given current use levels and their impacts on resources. In addition separate analyses are proceeding to bring some of the aging infrastructure into compliance. The scope of this analysis is a programmatic assessment of facilities that are intrinsic to winter recreation experiences and opportunities, such as trails and warming huts.

DECISION TO BE MADE

The decision to be made will depend upon a plan that addresses the existing management situation and moves towards the desired conditions. The decision will be based greatly on the environmental impacts disclosed in this document, relative to NPS mandates. It will determine the level of allowable impact so that future generations of visitors can enjoy undiminished parks' resources and values. The record of decision will present the

[8] As a matter of process under CEQ regulations, the impacts of park management that are known or suspected to occur at other times and places must be disclosed in the EIS. In this EIS, economic impacts outside park boundaries are disclosed in the socioeconomic impacts section. Physical and resource effects are disclosed in the sections on adjacent lands and cumulative impacts.

[9] Many commenters on the DEIS stated that NPS must have a "no action" alternative — meaning no snowmobiling — to have a full range of alternatives, and that the court settlement showed that to be the appropriate course of action. The park service's interpretation of "no action" means no change in general management direction from the present. The settlement agreement did not include any concessions to claims by The Fund for Animals, nor did it remove any options within the park service's discretion for park management from the range of alternatives to be considered. In approving the settlement agreement, the court asserted that a comprehensive winter use EIS (in accordance with CEQ regulations) would be written.

selected alternative and the rationale for its selection, including factors considered other than environmental impacts. Facets of the decision include:

- The alternative from the Final Environmental Impact Statement (FEIS), or those features from several alternatives, selected to comprise a program to guide winter use management. This part of the decision will allocate the types of uses and general conditions and locations in which the uses are permissible. Features of various alternatives in the FEIS can be mixed as long as the analysis clearly presents the environmental effects of separate features.
- General standards for management within the various zones describing the selected alternative in the FEIS. These standards will indicate a need for management change in accordance with the plan.
- Key processes embodied in the plan's implementation such as adaptive management, if applicable, and specific monitoring requirements associated with the alternative that is selected.
- Specific mitigation measures that have been identified in the EIS as necessary to reduce the impacts of the selected alternative.
- Identification of any further actions that may be necessary to implement the decision, such as rule changes or policy waivers.

The decision *will not:*

- Be contrary to existing mandates or major policies.
- Include decisions for management of other programs outside winter recreational use, though it may impact other programs.
- Incorporate items that are more appropriately considered in other ongoing analyses or pending decisions.
- Apply to lands outside the three park units, though it may affect them.
- Include the details of plan implementation: some general actions that are approved in the plan could be *implemented* in a number of ways.[10]

Some specific implementation actions suggested by the plan, such as trail or warming hut construction, will require further site-specific NEPA analysis and a project level decision.

RESPONSE TO PUBLIC COMMENTS

This section and the preceding discussion on scope of analysis and range of alternatives respond to many comments on the DEIS that showed a need for more explanation about the NEPA process and the decision to be made.

Many commenters expressed consternation about the lack of a "no snowmobiling" alternative in the DEIS, and suggested that impact descriptions and data to support the EIS and the preferred alternative were not detailed enough. In some cases the NPS has added information to support the analysis of impacts in this FEIS. Additionally, NPS is engaged in programmatic planning, rather than project-specific planning; therefore analysis and data collection have been conducted on a reconnaissance level. Further, where data is lacking or unavailable even at that level, CEQ regulations provide for the decision process to continue based on best available data and professional application of credible methods.

[10] For example, the details of setting speed limits or open hours can be left to management's discretion. Such items could be changed as needs dictate without further environmental analysis.

Many people stated they could not support any of the DEIS alternative "mixes." An inordinate amount of criticism was levied on the preferred alternative — to the point that constructive comments on the other alternatives were greatly lacking. Three additional "alternatives" were proposed: Revised Alternative E (in various forms provided by cooperating agencies and the Blue Ribbon Coalition), the Citizens' Solution (provided by a consortium of conservation groups), and the Natural Regulation Alternative (provided by The Fund for Animals).[11] All such comments were read as the decisions that people would like to see the NPS make, based upon their opinions about impacts and their interpretations about laws.

The body of comment included little substantive information beyond that disclosed in the DEIS, and did not demonstrate that an alternative (feature) did not belong in the range of choices available for the decision maker. Given the ability of a decision maker to mix features from the FEIS range of alternatives, much of the criticism in the public comment does not apply to the analysis. Regarding the great amount of comment on the preferred alternative, and perceived lack of justification for it, the NPS responds by saying that such criticism is more appropriately applied to the decision when it is made. In fact, the NPS changed the preferred alternative between draft and final EIS whereupon most of these comments no longer apply.

Some commenters said that the desired conditions or objectives were too general, and that there is no demonstrated need for management change. In effect, such comments missed the real issues that are conveyed by statements of existing conditions. The NPS responds by explaining that this is a programmatic EIS leading to a plan, which is general in nature. In addition issues regarding resource impacts, health and safety, and visitor experience are documented sufficiently by the NPS to indicate the need for major management changes supported by a new plan.

Given the scope of analysis, the NPS developed alternatives (alternative plans) as possible ways to proceed from the current condition toward the desired condition. The NPS maintains that public access during the winter is an appropriate objective to be achieved. Accommodating a variety of recreational uses is also valid. In each case, activities must be evaluated in terms of impacts on parks' resources and values, health and safety, and visitor enjoyment. Alternatives that vary the location, amount and proximity of uses are needed to assess the relative impact or change from the current condition. The EIS expresses impacts or changes in terms that allow people to understand how each alternative satisfies the purpose and need for action. It is unreasonable to expect that all alternatives would address all aspects of the purpose and need equally, or that all alternatives worthy of consideration would have no impacts. In

[11] Most features of Revised Alternative E and The Citizens' Solution were covered within the DEIS range of alternatives. Certain features were either considered to be implementation details or outside the scope of analysis. The Natural Regulation Alternative, by advocating no motorized access or groomed routes, was considered outside the scope of analysis — although some alternatives close sections of the parks to motorized use, and adaptive management could conceivably result in other sections being closed over time.

the final analysis, the NPS concludes that the purpose and need for action articulated in the EIS is appropriate, and that the range of alternatives considered in detail is adequate.

It is the responsibility of the NPS decision maker, in this case, the Rocky Mountain Regional Director, to weigh the environmental impacts and benefits of all alternatives (and alternative features) considered in detail in this FEIS against the parks' mandates. The decision maker must consider any other factors that may weigh in the decision, including social and economic considerations and public comments, and make a determination about the best way to meet the need for action. The determination and its rationale must be fully explained in a record of decision. There is no actionable or legal decision made until that time.

BACKGROUND

Regional Setting

The GYA encompasses over 11 million acres and is considered one of the few remaining intact temperate ecosystems on earth. Within the area, YNP comprises 2.22 million acres, primarily in northwestern Wyoming and extending into south central Montana and eastern Idaho. GTNP encompasses an additional 310,000 acres and the Parkway includes 24,000 acres both located in Wyoming. YNP and GTNP comprise the strategic core of an upland plateau called the GYA (Figure1. Greater Yellowstone Area). Portions of six national forests — Gallatin, Custer, Shoshone, Bridger-Teton, Caribou-Targhee, and the Beaverhead-Deerlodge ¾ are within the GYA, as are the National Elk Refuge and Red Rocks National Wildlife Refuge. Public lands make up most of the area (69%). Private lands comprise 24% of the GYA, Indian reservations comprise 4%, and 3% of the lands in the GYA are state lands. The GYA extends across 17 counties in three states. Cooperative agreements and interagency planning and coordination aid in management of the area as an ecological unit, while recognizing the different mandates of the land management agencies.

The GYA encompasses a 3,500-square mile watershed that preserves one of the most significant and near-pristine aquatic environments in the United States. The surface water resources of YNP include over 1,000 streams comprising 3,785 miles of running water, and 175 lakes with a total surface area of 108,000 acres. The dominant water features of the parks include the headwaters of the Mississippi-Missouri and Snake-Columbia Rivers located along the Continental Divide. Major lakes in the GYA include Yellowstone and Jackson Lakes.

The climate of the GYA features long, cold winters from November until April. Snowfall ranges from 80 inches per season at Mammoth Hot Springs, to 200 to 400 inches at higher elevations. In the mountainous regions of YNP, 75% to 85% of annual precipitation falls as snow, while in the interior plateau regions, 45% to 65% falls as snow (Despain 1987). Winter snows in this region are light and powdery, although wind and warm temperatures compact snow into heavy, dense masses. January temperatures range from average daytime highs of 20°F to nighttime lows of -20°F, although lows

can reach -40°F. Occasionally dry years occur with light snow conditions in the winter. Weather conditions at YNP's North Entrance are generally the mildest in the area.

The GYA has developed a national reputation as a winter recreation center offering activities on national park and forest land, including snowmobiling, snowcoach tours, downhill skiing, cross-country skiing, wildlife viewing, and winter sightseeing. The parks and forests offer a broad range of activities to the winter visitor.

During the winter, plowed highways in the GYA provide automobile access to communities near the parks. Towns near park entrances are Gardiner, Cooke City and Silver Gate, and West Yellowstone in Montana; Cody, Dubois, and Jackson in Wyoming; and Island Park, Idaho. These communities provide a full range of visitor services, which complements the limited services offered in the parks.

History

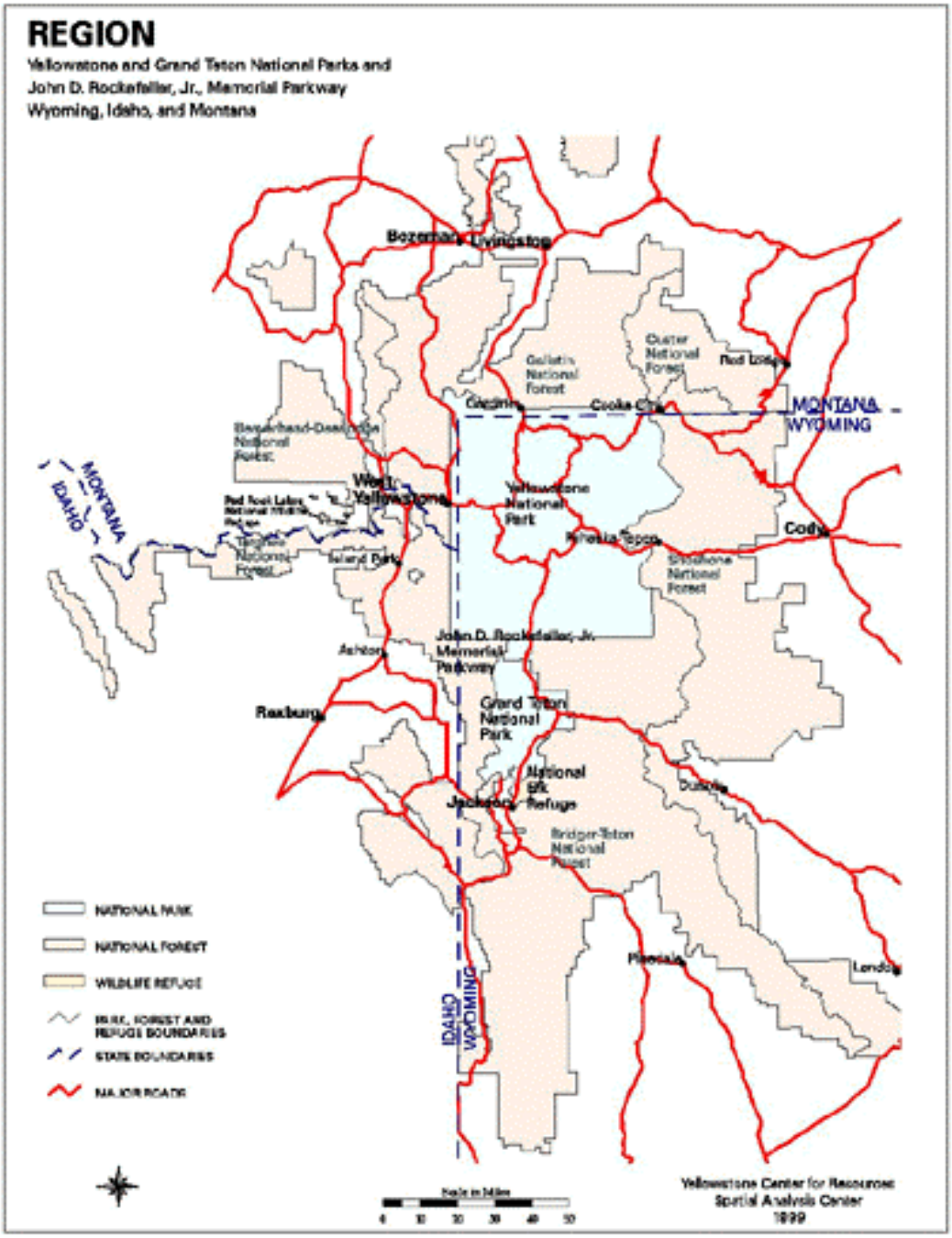
The history of snowmobile use and policy in YNP predates the establishment of GTNP and John D. Rockefeller, Jr., Memorial Parkway as they exist today. Yochim discusses this history in detail, and most of the following summary is derived from this source (1999).

Motorized oversnow use in YNP began in 1949, due primarily to the efforts of businesses in Cody, Wyoming. In 1948, local businesses asked the NPS to plow the roads into the park year-round. NPS declined, explaining that the roads were too poor to permit extensive plowing, plowing would be hazardous, and interior park facilities were not winterized. The first oversnow vehicles were snowplanes, which were the only oversnow machines used in the park until 1955.

In 1955, the NPS launched the Mission 66 program in an effort to distribute the increasing number of park visitors throughout the year, and ease the pressure of summer use. Communities around Yellowstone took advantage of this program in 1957 to renew the call for year-round plowing of park roads. The NPS in 1958 judged the proposal to plow roads as feasible but not practical.

In 1963, the first machines identifiable as snowmobiles entered the park. Visitors on snowmobiles increased from 1,000 in 1963 to 5,000 by 1966. During that time, six western senators and the Wyoming governor requested that NPS reconsider its decision not to plow roads in the winter. NPS initiated a high level commission culminating in a congressional hearing in Jackson, Wyoming, in 1967 and a statement that transportation in winter should be that which is most appropriate to the park. Oversnow transport seemed to best meet that need considering scenic values and snow trenches created by plowing. Most comments at the hearing were provided by business interests in the Yellowstone area and elsewhere, and all strongly supported plowing the roads. The outcome by the NPS was to deny the request, citing funding restrictions.

Figure 1. Greater Yellowstone Area.



click to enlarge map

In 1968 park administrators developed the first formal winter use policy in response to growing snowmobile use. The policy encouraged and permitted winter visitation by oversnow vehicles on snow roads. It instituted a grooming program to make oversnow travel more comfortable, and it authorized the park concessioner to open a lodging facility at Old Faithful. The policy was a simultaneous rejection of the plowing request, citing the possibility of tall snow berms interfering with the view for auto passengers and creating hazards for wildlife. The NPS also thought that plowed roads would facilitate through travel and hurt the economy of West Yellowstone. Consideration of restricting use to ski and snowshoe only was rejected because the NPS felt this would render the park's interior inaccessible to the public.

The NPS began grooming snow roads in 1971, and the Old Faithful Snow Lodge opened that same year. The NPS encouragement of oversnow access during this winter season caused the demand for road plowing to decline. From 1967 to 1977 snowmobile use increased and complaints about snowmobiles began to surface. Visitors and national park personnel raised issues of noise, air pollution, and impacts to wildlife. Concurrently, several studies were initiated, most of which focused on wildlife and the impacts to them.

The growing use of off-road vehicles, including snowmobiles, prompted President Nixon in 1972 to issue EO 11644 establishing a federal policy on off-road vehicle use in relation to resource issues. Because of this order, Yellowstone's superintendent immediately legitimized snowmobile use by designating all the park's interior roads for their use.[12] This action contrasts with actions taken in Glacier National Park, which performed an assessment of snowmobile use and closed the park to this use. The period from 1975 to 1982 represented continuing encouragement of the Yellowstone winter program with expanded facilities, including the reopening of the Mammoth Hot Springs Hotel and additional lodging at Old Faithful. Dogsleds were banned from the park due to conflicts with snowmobiles. In 1980, bison were noticeably using groomed roads to move about the park. Winter use had risen to about 70,000 visitors a year.

From 1983 to 1993, winter use increased steadily from 70,000 to 140,000 visitors per year. Concerns previously raised continued to escalate along with use. In 1990 the NPS issued the first environmental assessment of winter use, which developed a joint plan for YNP, GTNP and the Parkway. The plan did not alter winter programs in YNP significantly, but it did usher in the Continental Divide Snowmobile Trail (CDST) across GTNP and the Parkway. The item most notable about winter use following the 1993-1994 season is that the 10-year winter visitation target had been met in three years, triggering the need for additional evaluation and planning.

During the late 1980s, business interests in Riverton, Lander, Pinedale, and Dubois, Wyoming, engaged federal land managers to develop a trail linking the communities and

[12] The author of this information indicates that he could find no evidence of an environmental analysis or official finding accompanying the action to designate routes open for snowmobiles.

the Yellowstone snowmobile trails. The trail system, termed the CDST, was designed to boost the year-round economies of those cities. The segment through GTNP and the Parkway was established on an experimental basis in 1993 and operated under that status for three years. After the trial period, parks' officials in 1997 prepared a Finding of No Significant Impact (FONSI) based on the 1990 environmental assessment, plan, and three years of monitoring to approve the CDST and initiate rulemaking for snowmobile use in the parks. GTNP forwarded a proposed rule to allow snowmobile use on the CDST while closing the Potholes-Baseline Flats area to motorized use. To date, this rule has not been approved by the USDI.

From 1994 until 1999, events coalesced and stressed the importance of the issue of winter use recreation. The GYCC chartered a multi-agency working group to prepare an assessment of winter use in the national parks and national forests of the GYA. A final assessment report was issued in 1999 after significant involvement by state and local government representatives. Conditions during the winter of 1996-97 caused large numbers of bison to exit the parks (some, but not all, on groomed surfaces). Over 1,000 animals were killed for fear of brucellosis transmission to livestock. In 1997, The Fund for Animals filed suit on NPS over winter use issues (see section on 1997 Court Settlement earlier in this chapter).

CONSULTATION AND COORDINATION

Cooperating Agencies

State and county governments surrounding the GYA requested and were granted cooperating agency status (40 CFR §1501.6) in December 1997 and January 1998. The NPS requested that the USFS become a cooperating agency because of possible impacts on surrounding national forests from changes in the parks' winter use management; the USFS acceded. Agreements were developed to assign formal roles in the EIS process and establish expectations. The NPS held its first meeting with the cooperating agencies on February 13, 1998. Appendix A discusses coordination with cooperating agencies.

Because gateway communities, counties, and states are concerned that any change in visitor use patterns will affect local and regional economies, the primary basis for their status as cooperating agencies is special expertise in local and regional social and economic analysis. Each entity professed special expertise during the process of formulating cooperating agreements (Table 1).

Table 1. Cooperating agencies.

Cooperating Agency	Special Expertise and Available Resources According to the Agreements
US Forest Service	Recreation, wildlife and fish, facilities, wilderness resources, air and water quality, and special uses
The State of Idaho	Department of Commerce: Review and analysis of data on socioeconomics in Idaho; assistance in preparing public outreach information and planning and organizing meetings; assistance in coordinating peer review of socioeconomic information and data. Department of Fish and Game: biological and wildlife resources in Idaho that winter use activities in the park units may affect. Department of Parks and Recreation: winter use activities near the parks.
Fremont County, ID	Socioeconomic effects, snowmobile trail grooming and management
The State of Montana	Socioeconomic effects; impacts on wildlife and recreational snowmobiling; and environmental quality, including air and water quality issues.
Gallatin County, MT	Winter use socioeconomic effects
Park County, MT	Winter use socioeconomic effects
The State of Wyoming	Department of Commerce: Review and analysis of data on socioeconomics in Wyoming; review and analysis of information on winter use activities near the parks; assistance in preparing public outreach information and planning and organizing meetings; assistance in coordinating peer review of socioeconomic information. Department of Game and Fish: biological and wildlife resources in Wyoming that may be affected by winter use activities near the parks. Department of Environmental Quality: impacts to air and water quality
Park County, WY	Socioeconomic effects
Teton County, WY	Socioeconomic effects

In accordance with the Memoranda of Agreement signed by the NPS and the cooperating agencies, the major responsibilities of the agencies include the following related to their individual areas of expertise:

- Participating in the public scoping process, as well as meetings, conferences, and reviews for the purpose of preparing the EIS
- Providing technical assistance and advice
- Providing written comments, correspondence, or other information to the lead agency to facilitate EIS production
- Sharing and exchanging models, data, and other information
- Delivering all requested submittals according to the schedule developed by the lead agency
- Contributing staff and monetary resources

Veto or decision-making power does not accompany cooperating agency status. As the lead agency charged with carrying out the NEPA process under Sec. 102(2)(c) of NEPA, the NPS retains sole decision-making authority over the EIS and its process.

There were a number of comments on the DEIS relating to the designation of cooperating agencies. Many people objected to the inclusion of the counties in particular, feeling that

their involvement biased the decision-making process and the EIS; others felt that the NPS did not involve or listen to the cooperating agencies. Most cooperators stated that there was insufficient time or information to provide adequate input to the NPS, and that the NPS had not met the terms of the signed memoranda of agreement. Conversely, many of the cooperating agencies commented that they had provided good information that the NPS did not consider or incorporate. A table that illustrates the extent to which the NPS interacted with cooperating agencies is contained in Appendix A.

In response to these DEIS comments, the NPS notes that the state and local governments can be accorded cooperating agency status under CEQ regulations and under the Federal Advisory Committee Act (as amended by the Unfunded Mandates Act). The NPS believes that much of the criticism regarding the cooperating relationship stems from extremely short time frames for producing this EIS, which is noted in the cooperating agreements, and lack of experience. Few federal agencies have experience dealing with such a large number of cooperating agencies on a single NEPA project. With the exception of the USFS and the State of Montana, few of the cooperating agencies have experience producing EISs and the analyses necessary in their areas of special expertise.[13] [14]

The nature of special expertise was not well understood in the context of CEQ regulations. The cooperators expected to write portions of the EIS, including the alternatives. Although this is one possible application of cooperating status when requested by the lead agency, the NPS never requested this. The NPS expected the counties to make economic projections for the alternatives considered, and the states to provide environmental impact information on lands within their jurisdictions by alternative. Volume III of the FEIS includes the cooperating agencies' comments on the DEIS, along with the NPS responses to their key issues or substantive points. In response to many comments, the NPS has provided additional explanation in this chapter.

American Indian Tribes

The NPS is committed to recognizing the past and present existence of American Indians in the region, and the traces of their use as an important part of the cultural environment to be preserved and interpreted. NPS initiated consultation along with scoping in May 1998 in accordance with the Presidential Memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" and in compliance with a variety of laws, federal regulations, and agency management policies and directives. NPS mailed scoping brochures to the eight contemporary American Indian tribes then recognized by YNP and GTNP as traditionally affiliated with the GYA:

- Blackfeet
- Confederated Salish and Kootenai

[13] The CEQ definition of special expertise is: "statutory responsibility, agency mission, or related program experience." (40 CFR §1508.26)
[14] Montana has a state law governing environmental policy: Montana Environmental Policy Act.

- Crow
- Nez Perce
- Northern Arapahoe
- Northern Cheyenne
- Shoshone-Bannock
- Shoshone-Eastern Band

The scoping brochures provided an overview of winter recreation in the GYA. A separate mailing summarized yearly visitation levels, described the general planning process, presented a preliminary list of issues to be addressed, and solicited comments regarding additional issues or concerns. A separate mailing identified the locations of 16 public meetings to be held during summer 1998 in cities and towns throughout Wyoming, Montana, and Idaho, as well as in Salt Lake City, Denver, Minneapolis, and Washington D.C.

By April 1999, an additional 13 contemporary tribes had been recognized by YNP and GTNP as traditionally affiliated with the GYA:

- Assiniboine and Sioux
- Cheyenne River Sioux
- Crow Creek Sioux
- Flandreay Santee Sioux
- Gros Ventre and Assiniboine
- Kiowa Tribe of Oklahoma
- Lower Brule Sioux
- Oglala Sioux
- Rosebud Sioux
- Sisseton-Wahpeton Sioux
- Spirit Lake Sioux
- Standing Rock Sioux
- Yankton Sioux

On April 12, 1999, the NPS notified the 21 affiliated tribes by telephone of an upcoming affiliated tribal consultation meeting to be held at YNP on May 20, at which the Plans/EIS would be one of the planning projects and issues discussed. On April 23, NPS faxed invitation letters to the tribal consultation meeting to the affiliated tribes, and four days later the NPS mailed copies of the draft alternatives to the tribes. During the week of May 3, the NPS made follow-up telephone calls to each of the tribes, to confirm receipt of the draft alternatives and encourage participation in the affiliated tribal consultation meeting on May 20.

Because a tribal consultation meeting for a separate project — the DEIS for the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park — was to be held in YNP on May 21, representatives of non-affiliated tribes also attended the affiliated tribal consultation meeting on May 20. Twenty-one representatives of eleven tribes participated in discussions of the Plans/EIS. The 11 tribes were:

- Assiniboine and Sioux
- Cheyenne River Sioux
- Colville
- Confederated Salish and Kootenai
- Crow
- Oglala Sioux
- Onondaga Nation
- Rosebud Sioux
- Sisseton-Wahpeton Sioux
- Turtle Mountain Tribe
- Winnebago Tribe of Nebraska

At that meeting, tribal representatives voiced concerns that oversnow motorized vehicles, the grooming of road and trail surfaces, and the movement of people would negatively impact YNP's bison population.

The affiliated tribes received copies of the DEIS for review and comment in mid-September 1999, and were notified of six public hearings on the draft plans in late-September 1999. On October 6, 1999, members of the Assiniboine and Sioux (Fort Peck), Cheyenne River Sioux, Confederated Salish and Kootenai, Crow, Lac Courte Oreilles, Nez Perce, Rosebud Sioux, the Winnebago Tribe of Nebraska, and organizations met with Yellowstone and Grand Teton staff to discuss the Winter Use Plans as part of fall 1999 government-to-government tribal consultation meetings. The nine cooperating agencies were notified of this meeting, and some chose to participate.

On April 26, 2000, Yellowstone and Grand Teton staff again met with representatives of the Confederated Tribes of the Salish and Kootenai, Eastern Shoshone, Nez Perce Tribe, Oglala Sioux, Prairie Band of the Potawatomi, Rosebud Sioux Tribe, Shoshone-Bannock, Winnebago Tribe of Nebraska, as part of the Spring 2000 tribal consultation meetings and provided them with an update regarding the status of the Winter Use Plans/EIS.

The NPS will continue to consult with representatives of affiliated tribes as actions resulting from this plan are implemented. The goal of consultation is to insure that the affiliated tribes' interests and concerns are adequately addressed, as well as to develop and accomplish future programs in a way that respects the beliefs, traditions, and other cultural values of the American Indian tribes who have ancestral ties to the area.

State Historic Preservation Offices

In October 1995, a programmatic agreement was developed among the National Conference of State Historic Preservation Offices (SHPO), the Advisory Council on Historic Preservation (Council) and the NPS. In accordance with the agreement and pursuant to Section 106 of the National Historic Preservation Act [16 USC 470(f)], consultation with the Wyoming, Montana, and Idaho SHPOs and the Council was initiated in May 1998. The NPS sent copies of the scoping brochure (May 1998) and the draft preliminary winter use alternatives (December 1998) to the SHPOs and the Council. In accordance with their request, the NPS continued to consult with the Wyoming, Montana, and Idaho SHPOs and the Council regarding actions described in the Winter Use Plans/EIS that may affect cultural resources (Appendix E). The NPS mailed copies of the Draft EIS to each SHPO and the Council for review and comment. Before completion of the FEIS, the NPS contacted the SHPOs of all three states directly, and all offices stated that they had no comments on the DEIS and saw no need for further consultation.

U.S. Fish and Wildlife Service

The settlement agreement with The Fund for Animals et al. required the NPS to prepare a Biological Assessment (BA) and request formal consultation with the USFWS pursuant to Section 7(a)(2) of the ESA, 16 USC 1536(a)(2) and its implementing regulations. To comply, on February 16, 2000 the NPS requested from the USFWS an updated list of all federally protected threatened, endangered, proposed, or candidate species that might occur in the affected area (Appendix D).

A BA evaluates the effects of a preferred alternative on species listed under the ESA; it is not required to evaluate all alternatives to a proposed action. Because winter use is highly controversial, and the NPS was aware of the potential for considerable post-draft changes, it elected not to initiate consultation at the time the DEIS was issued. Instead, a BA was prepared for the FEIS preferred alternative, and subsequently submitted to USFWS on July 5, 2000.[15] Should the USFWS determine that there may be an adverse impact on any listed species, formal consultation will proceed between the two agencies.

PUBLIC INVOLVEMENT

Scoping

The NPS accepted public scoping comments from April 14 to July 18, 1998. Scoping brochures were mailed to about 6,000 interested parties, and 12 public meetings were held throughout the GYA and in Idaho, Montana, and Wyoming. In addition to local area and regional meetings, The NPS held four national meetings in Salt Lake City, Denver, Minneapolis, and Washington D.C. About 2,000 comment letters were received (about 1,200 of these were form letters), from which about 15,000 discrete comments were obtained. Scoping respondents included businesses; private and nonprofit organizations; local, state and federal agencies; and the public at large. Comments were received from 46 states and several foreign countries.

Summary of Public Scoping Comment

Comments received during scoping cover a full range of topics including issues, concerns, analysis questions, procedural questions, general opinions, and requests. Comments were sorted into the categories shown in Table 2.

The NPS addressed all comments received in one of two ways: 1) either they were analyzed in detail through the development of an alternative or as a possible impact of winter use; or 2) they were not analyzed further based on the rationale presented in Volume II, Appendix A. The NPS classified comments as major issues or concerns to be analyzed in detail based on relevance to the decision to be made. The following section, *Major Issues*, describes in greater detail those comment categories considered relevant. *Issues or Concerns Not Addressed in the Plans/EIS* describes specific types of comments not carried forward for in-depth analysis, and the rationale for their dismissal.

[15] Actions taken in accordance with *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act*, March 1998.

Table 2. Summary of comments received during scoping.

General Topic	Subtopic	Comment
Visitor Use and Access		
Facilities	Developed Facilities	Effects on visitor enjoyment during peak use periods when parking areas, roads, warming huts, and eating facilities are full
	Undeveloped Facilities	Effects on visitor enjoyment during peak use periods, when trails and other undeveloped facilities are at capacity
	Privatization	Effects of privatizing parks' facilities on the quantity, quality, and availability of services
Visitor Experience	User Conflict	Visitor's expectation of quiet, serene, experience or a more social setting, and the conflicts that can occur when different user groups overlap
	Suitable Ungroomed Terrain	Adequacy of ungroomed, nonmotorized areas in gentle terrain suitable for family activities and education outings near population centers
	Winter Recreational Activities	Adequacy of a range of winter visitor experiences defined for the parks
Visitor Access	Types of Access and Their Limitations	Access to most locations in the parks is limited to those who can afford to ride a snowmobile or snowcoach. Concerns include plowing of roads, segregation of user groups, access for disabled persons, parks closure in winter, and zone management
Recreational Demand	Visitor Use Trends and Carrying Capacity	Effects of increasing use on parks' resources, cumulative impacts of more users and additional uses; the actual or perceived amount of use versus the parks' capabilities
	Control Mechanisms	Management mechanisms that the parks can use to control visitor numbers, such as raising fees, reservation systems, lottery, season lengths, daily limits, dispersion techniques
	Summer versus Winter Use Comparisons	Comparison of the effects of summer versus winter use on visitors, employees, and the natural resources of the parks
Human Health and Safety		
Safety	Traffic Safety	The safety of visitors and employees traveling through the parks on all modes of transportation
	CDST	Concern about the safety of shared use by snowmobiles and automobiles on the US Highway 89/12/287 corridor
	Novice Users	Concern about the ability of novice snowmobile riders and skiers to respond to heavy traffic, high speeds, wildlife on trails, rapidly changing weather conditions, and varying trail conditions
Health	Pollution Effects	Effects of snowmachine emissions on the health of employees, visitors, and local residents

General Topic	Subtopic	Comment
Local Community and Adjacent Lands		
Economic Effects	Employment	The role of public lands and the associated tourist industry on the economic welfare of local communities, with an emphasis on employment opportunity
	Fiscal	Fiscal effects of possible changes in winter use (taxes, wages)
	Costs	Effects of commercial competition on cost of equipment rental, lodging, food, supplies
Social Effects	Communities	Housing, schools, hospitals, police and fire protection, and other infrastructure
	Quality of Life	Effects on the quality of life in local communities due to use patterns
	Social Structure, Values	Effects on the social structure and values in local communities due to winter use patterns
Adjacent Lands	Adjacent Lands	Effects of changing winter use patterns within the parks on nearby national forests and communities
Parks Infrastructure and Operations		
	Gasoline Storage Capacity	Limited storage tank capacity: fuel must be brought into the parks in the fall and stored; increasing demand for gasoline sold in the winter is exceeding capacity
	Waste Storage Capacity	Storage capacities for garbage and sewage are limited: increased visitor use is exceeding the capacity of facilities, which must capture and store wastes over the winter season
	Parks Personnel	Changes in winter use may alter parks administrative needs for providing visitor services
Natural Resources		
Geothermal Resources	Geothermal Resources	Concern about effects on geothermal resources from visitor-wildlife use, infrastructure, and operations
Air Quality	Particulates	Concern about airborne particulate matter exceeding NAAQS limits
	Visibility	Concern about visible air pollution from combustion exhaust, including machinery, vehicles, and wood burning
Water Quality	Surface Water	Effects of oil and gas effluent and airborne pollution from snowmobiles
	Soil Erosion	Concern about winter use as a cause of soil erosion, and consequent impacts on levels of sedimentation and aquatic life
Sound	Effects of Noise	Effects of high levels of sound on visitors, employees, and wildlife
Wildlife, Other than Bison	Effects of Skiers	Effects of backcountry skiing on various wildlife species
	Effects of Snowmobiles	Effects of snowmachine use on various wildlife species
	Carrying Capacity	Concern about the natural carrying capacity for wildlife, the physical constraints of the parks' resources, and how that may relate to winter use

General Topic	Subtopic	Comment
Bison	Migration/ Population	Concern about the effect of road grooming on bison migration from the parks, and how the population is affected as a result
	Carrying Capacity	Concern about the natural carrying capacity for bison, the physical constraints of the parks' resources, and how that may relate to winter use
Land Use	Land Use	Effects of parks activities on timber, mining, and hunting
Vegetation	Vegetation	Effects of winter use on vegetation
Cultural Resources	Effects on Cultural Resources	Concern about cultural and historic resources on the parks, and their status as United Nations Biosphere Reserve or World Heritage Site
Wilderness	Wilderness	Concern about the effects of winter use on wilderness
EIS Process		
	Cooperating Agencies	Concern about and requests for county involvement in the EIS process as cooperating agencies
	NEPA	NEPA process concerns and the effect of NEPA on the development of NPS policies
	Scientific Studies	Concerns about the role of scientific studies and data as applied to the analysis of winter use impacts
	Alternatives	Many comments suggested alternatives that should be considered

MAJOR ISSUES

This section summarizes the major issues that relate to the purpose and need for action for the future of winter use in the three NPS units. These issues parallel the existing conditions identified in the purpose and need for action. While common concerns exist among the issues, they are categorized for purposes of analysis and alternative formulation. Because the decision regarding the future of winter use in the GYA is programmatic, relevant issues are those that bear on: 1) winter programs that might be necessary to address existing circumstances and achieve desired conditions; and 2) the effects of those programs. An issue is defined as a point of contention about the specific possible environmental effect of a specific management action or program. Generally, comments on the DEIS about the details of implementing a program are not considered major issues. Implementation details will be important during future site-specific analyses under the new plan.

Another opportunity for public involvement is commenting on the DEIS. No new major issues were identified as a result of public comments on the DEIS. Volume III contains the analysis of public comments on the DEIS, and response to the comments.

Visitor Use and Access

Various user groups contend that the national parks offer either too much or not enough of various types of use. Some people are concerned that the parks do not offer an adequate range of winter experiences and will not be able to respond to future winter

recreation demand. Others suggested that winter experiences should include dogsledding, off-road motorized play areas, and increases in both groomed motorized and nonmotorized trails. Other people voiced concerns about too much winter use, suggesting that YNP close in part or altogether, for the winter season. Because of the amount of use relative to the available facilities, both ski and snowmobile use sometimes occurs on the same groomed surface. This adds to the perception of too much use, and leads to other issues relating to visitor experience and safety. Many people contend that motorized use has greatly affected opportunities for nonmotorized use in the surrounding GYA, displacing cross-country skiing to the parks. Another aspect of the issue relates to the affordability of winter access, and access for disabled, and old and young visitors. Some argue for increased availability of motorized access (via snowmobile in particular) to serve these access needs. Another issue is the high cost of winter access to the parks.

Visitor Experience

Expectations for quality winter recreation experiences are different for different user groups. This raises contention between groups for which quiet and solitude, and clean air needs conflict with the impacts of snowmobiles, especially when facilities for these different groups are in close proximity to each other. Skiers are easily affected or displaced by the sight, sound, and odor of snowmobiles. While skiing generally does not affect the quality of the snowmobiling experience, there are safety issues associated with slow traffic on groomed surfaces. In addition the quality of the visitor experience can be affected by the number of available support facilities (such as parking lots or rest rooms), the extent to which facilities are crowded, and the availability of information.

Human Health and Safety

Four primary health and safety issues were identified regarding winter visitor use:

- The effect of motorized vehicular emissions and noise on employees who are required to travel or work in areas with high traffic levels. Visitors may be subjected to some of the same impacts.
- Speed limits and the frequency of motor vehicle accidents and fatalities, as well as the number of nighttime collisions involving wildlife that often result in severe injury or fatality to both animals and people.
- Avalanche hazards.
- Safety problems where different modes of winter transport are co-located or in close proximity. A primary example is the CDST where wheeled-vehicles and snowmobiles share the highway right-of-way.

Social and Economic Issues

Many comments reflected the effect of changes in parks management actions on local communities. Local businesses provide services to visitors near both parks, and many local economies rely, in part, on revenues from parks visitors in the winter. Concern was voiced that eliminating oversnow travel and snowmobiles in particular or closing an entrance to a park during the winter could have a detrimental effect on local economies. Other commenters stated that concern for parks' resources should be elevated above economics.

Natural Resources

Impacts of winter use on natural resources revolve around three major issues.

- The impact of groomed surfaces and their use on wildlife: Over the last several years, bison have been removed from the population because they have migrated from YNP to state and private lands during the winter. Some people commented on the effect that backcountry skiing might have on wildlife, particularly the displacement of large ungulates from important winter range.
- Air quality: The effect of snowmobile emissions on air quality was identified as a concern with respect to health, natural resources, and aesthetic and wilderness values. For example, on high snowmobile use days in YNP, the visual evidence and odor of snowmobile exhaust is apparent in some areas. The effect of hydrocarbons, carbon monoxide, and particulates emitted by snowmobiles on water quality was also a concern.
- Oversnow vehicle sound: The sound levels of snowmobiles and snowcoaches were raised as issues with regard to aesthetics and wilderness values. For example, on some days it is difficult for most visitors to travel to an area in YNP where snowmachines cannot be heard. For this reason some people question whether the use of snowmobiles and snowcoaches is appropriate in the national parks. Other people state that the sound of snowmachines has no impact on their ability to enjoy the parks.

ISSUES OR CONCERNS NOT ADDRESSED IN THE PLANS/EIS

Privatization

Some comments proposed the privatizing of parks' facilities to alter the quantity, quality, and availability of services for winter use. Privatization is not within the scope of the decision to be made in this analysis. Existing park concessions are privately owned and operated, and they provide a number of services under contract with the NPS. Concession operations or changes to them are the subject of separate analyses by YNP and GTNP. Additionally, Congress recently passed new statutory provisions regarding concessions in parks, and the NPS will issue regulations implementing the new law soon.

Summer/Winter Use Comparisons

Some comments compared summer and winter use levels and autos versus snowmobiles to show that no problem exists and, winter use should not be limited. The purpose of this analysis is not to limit use. Rather it is to determine the potential effects of existing and projected winter use, then to decide what actions to take. Summer recreation entails a different set of circumstances, issues, and concerns. Therefore, the comparison is outside the scope of the decision to be made in this analysis.

Wildlife Carrying Capacities

Comments expressed concerns about the carrying capacity of the parks for bison and other wildlife species. Some commenters feel that knowing the natural carrying capacity would illuminate the significance of wildlife impacts from winter use. Determining or setting the carrying capacity for wildlife species, including bison, is a complex effort outside the scope of this study and the decision to be made. The NPS believes that this subject is best addressed in the broader context of the Bison Management EIS/Plan. Any determinations made in the final Bison Management EIS/Plan and decision may have a bearing on winter use. The planning teams on these two EISs/Plans are coordinating with each other to the greatest extent possible. It is sufficient for purposes of this

analysis to describe the nature of possible impacts on species of concern for the activities associated with winter use programs.

Land Use

Some comments expressed concern about the possibility of mining, logging, or hunting within parks boundaries. Such actions are not part of the proposal at hand, and other than hunting on the Parkway, these activities are not permitted within these parks. As such, these concerns are outside the scope of analysis.

Economic Effects: Costs

Some comments expressed concern about commercial competition by national parks concessioners on lodging, equipment rentals, food, supplies, or other items supporting winter recreational use. This concern is outside the scope of the decision to be made. This analysis and resulting decision does not bear on concession operations. See *Privatization*, above.

EIS Process

A number of people gave their perceptions of various portions of the EIS process. Such process concerns are not considered or addressed as issues, and except for the following discussion are dismissed without further analysis.

Cooperating Agencies

Some comments opposed and others favored county and state involvement, including tribal governments, as cooperating agencies in the EIS. NEPA allows for the inclusion of other government agencies — federal, state, and local — as cooperating agencies based on special expertise with respect to any environmental issue, or jurisdiction in law (40 CFR §1508.5, §1508.15, §1508.26).

NEPA and NPS Policy

Some comments expressed concern regarding the influence of NEPA on the development of national park policy. This is dismissed since NEPA, a procedural law, is required to assess the potential environmental impacts of any federal proposed action, including programmatic management plans such as this. NEPA is a decision-making tool that requires public involvement, attention to public issues, and development of alternatives that address the purpose and need for action. The decision maker or official, who will make a decision based on NEPA analysis, has discretion to decide the scope of analysis. The decision maker can orient the analysis to consider only alternatives that conform to existing policy, or broaden the scope to investigate alternatives for situations in which existing policy is inadequate. The Plans/EIS focus on alternatives within legal and regulatory boundaries and national policy direction.

Scientific Methods and Data

Some concerns addressed the use of scientific methods and data to determine or interpret the effects of winter recreational use. The analysis documented in this EIS is

programmatic. That is, it evaluates the possible general effects of the integrated winter recreation program in three national parks. Conversely a project analysis evaluates the potential site-specific effects of a proposed action. The scientific analyses and associated data needs are different for programmatic and site-specific levels of NEPA documentation. Programmatic assessments do not require detailed, site-specific data. Methods and data need to be sufficient to determine if the alternatives meet the purpose and need for action, and are within the scope of the decision to be made. This EIS uses the best available information, most definitive studies, and most applicable research.

Suggested Alternatives

A number of comment letters included alternative suggestions. Many of these suggestions were incorporated into the alternatives considered in detail in this EIS, while other suggestions were not. Alternatives considered but dismissed from detailed analysis are presented at the end of the *Alternatives* section in Chapter II. The cooperating agencies participated in a work session at the beginning of the alternative formulation process. The suggestions for alternatives or features to be considered were analyzed, and about 68% of the ideas were incorporated into the range of alternatives for the DEIS. The analysis of workshop ideas was published in DEIS Volume II, Appendix A.

OTHER PLANS AND ENVIRONMENTAL ANALYSES

There are other ongoing planning efforts that relate to some elements of this EIS/plan. As other plans are approved, they can incorporate relevant portions of the winter use plans. In reference to the previous discussion of the purpose of and need for action, some comments or possible issues are more appropriately dealt with in other plans or assessments. Related planning efforts include:

- The *Draft Commercial Services Plan* for YNP is scheduled for completion in 2000.
- The *Commercial Services Plan* for GTNP is in final draft and under review by the park superintendent.
- Grand Teton has recognized the importance of developing a comprehensive transportation plan, including winter transportation services. Prompted by the completion of a Jackson Hole transportation plan, GTNP has initiated a study of transportation needs and a data collection effort to determine how it can integrate with local plans.
- Yellowstone has taken a comprehensive look at its roads and transportation systems through several reports and studies. YNP is also a partner in the GYA Clean Cities Initiative.
- The *Bison Management Plan for the State of Montana and YNP* is scheduled for completion in summer 2000.
    - In the Bison Management EIS/Plan, alternative 2 would require closing several road segments to grooming in the winter or evaluating road segments for closure. The road segment closures analyzed under alternative 2 are from Mammoth to Norris, Norris to Madison, Madison south to Fountain Flats, and Madison west to West Yellowstone.
    - Alternative 3 calls for the research of effects of road grooming on bison. If research indicates bison use particular road segments, some road segments could be left ungroomed to help keep more bison inside the park.
    - Alternative 5 calls for plowing routes to bison capture facilities throughout the winter, including routes from West Yellowstone to Madison, Madison south to Fountain Flats, Madison to Norris, Norris to Canyon, and Canyon to Pelican Valley. These capture facilities would be operated from three to five years.

- Alternative 6 consists of two phases. Phase 1 requires that the road from West Yellowstone to a capture facility at Seven-Mile Bridge be plowed to pavement, thus eliminating oversnow travel. The Seven-Mile Bridge facility was assumed to operate for at least 10 years. Phase 2 would require a similar plowing regime to the one described in alternative 5. Phase 2 would be operational for two to three years.
- The modified preferred alternative would have no effect on winter road operations in YNP.
- Implementation of certain elements of the *Winter Use Plans for YNP and GTNP and the Parkway* could be deferred if the road plowing or closures analyzed in alternative 2, 5 or 6 of the *Draft Environmental Impact Statement for the Interagency Bison Management Plan for the State of Montana and YNP* are selected.

· On October 27, 1997, the United States District Court in Washington, D.C. approved a settlement agreement that called for the NPS to prepare an environmental assessment evaluating the closure of a winter road segment in YNP. The agreement settled a lawsuit filed by The Fund for Animals and others, which asserted that the NPS had failed to evaluate the effects of trail grooming in the parks on wildlife and other park resources. The *Environmental Assessment — Temporary Closure of a Winter Road in YNP* was published in November 1997. The FONSI for the environmental assessment states that the decision whether to close a road segment will be made by December 1, 2000. The decision was deferred because baseline information on wildlife movements needs to be gathered before evaluating the effects of closing the road segment. A one-year grace period before implementation would delay a road closure, if necessary, until the winter of 2001-2002. The FONSI also states that the NPS may modify or change this decision as a consequence of other planning processes underway or intended, such as the Winter Use Plans for YNP, GTNP, and the Parkway.

CHAPTER II
ALTERNATIVES INCLUDING THE PROPOSED ACTION

INTRODUCTION

This chapter presents detailed descriptions of alternatives, including the preferred alternative, that meets the purpose of and need for action. These alternatives present a clear basis of choice, while sharply defining different actions that are intended to address the major issues described in Chapter I. The alternatives were formulated purposefully to provide a range of different actions and strategies, so that the effects of actions could reasonably be determined and compared. Each alternative proposes actions that optimize one or more aspects of the purpose and need for action.

In addition to describing alternatives considered in detail, this chapter briefly discusses how alternatives were formulated, and lists alternatives that were considered but eliminated from detailed analysis. In accordance with National Environmental Policy Act (NEPA), alternatives and their effects are presented in a comparative form, and mitigation measures not already included in alternatives are described.

FORMULATION OF ALTERNATIVES

The alternatives for the Winter Use Plans and Environmental Impact Statement for Yellowstone National Park (YNP), Grand Teton National Park (GTNP) and the John D. Rockefeller, Jr., Memorial Parkway (the Parkway) were formulated in response to the major issues and concerns raised through public and internal scoping. In addition to the scoping process, the National Park Service (NPS) and the cooperating agencies met in Idaho Falls, Idaho in October 1998 to formulate initial concepts for alternatives. Twenty-five participants and about 10 observers attended the 3-day workshop. Later, similar workshops were held with park staffs in both parks. In total, over 35 alternative concepts were generated from the 3 workshops. For a complete discussion of the concepts generated during the workshops see Appendix A.

The NPS planning team evaluated the concepts in terms of their responsiveness to the major issues and concerns, the decision to be made, and the purpose and need for the Winter Use Plans. The concepts were also evaluated against their adherence to current law, park management guidelines, and NPS mandates and policies. Lastly, each concept was evaluated for its economic and technical feasibility. The concepts that best met the above criteria were packaged into the range of alternatives discussed below. Each

alternative proposed considers a different means of achieving the desired condition of the parks in the winter while minimizing impacts to park resources.

ALTERNATIVE DESCRIPTION

The conceptual basis for alternatives is varying the mix of winter recreation opportunities and facilities to meet the need for action or address major issues. Each alternative consists of up to five components: alternative actions, map, management zone descriptions, mitigation, and monitoring. All components are essential for a comprehensive understanding of each alternative. Table 11 summarizes the actions for each alternative by topic, and the components are summarized below.

Alternative Actions

The actions and assumptions common to all alternatives for the three parks are listed first, followed by actions common to all alternatives, but specific to each park. Following common actions, each alternative is explained in terms of its conceptual basis, the issues it responds to, and the specific programmatic actions, or features, that would be proposed for each park. Alternative maps show recreational zones and opportunities for each park, creating a picture of how the actions would be applied geographically.

Management Zones

For each alternative, the parks are divided into management zones. Management zones are defined as shown in Table 3 using the following characteristics.

- Desired resource condition or character
- Desired visitor experience
- Appropriate activities and facilities

Management zone definitions do not change by alternative, but their allocation to locations in the parks does change. The purpose of the management zone allocation is to detail the range of visitor experiences that would be provided, the resource parameters necessary to provide that experience, and to describe where in the parks each type of experience would occur. Consequently, each alternative description describes a different mix of visitor experiences and resource conditions for the parks. This approach considers and analyzes a diversity of appropriate experiences and underlying resource conditions, and helps structure future carrying capacity analyses.

Table 3. Management Prescriptions (Zones), Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan

Management Prescriptions (Zones) ⟶	1 Destination or Support Area	2 Plowed Road (wheeled vehicles)	3 Groomed Motorized Route (clean quiet travel)	4 Groomed Motorized Route	5 Groomed Motorized Trail (clean quiet travel)	6 Groomed Motorized Trail	7 Ungroomed Motorized Trail or Area (clean quiet travel)	8 Groomed Nonmotorized Trail	9 Ungroomed Nonmotorized Trail or Area	10 Backcountry Nonmotorized Area	11 Sensitive Resource Area (no winter use)
Resource Condition or Character	· Minimally to highly developed hubs of activity · Facilities and signs of human activity obvious, but natural elements also present · Moderate to high management and/or modification of resources to accommodate operational needs, resource protection, visitor enjoyment, and safety · As small as possible while still providing essential services · Visitor use may compromise natural resource values	· As narrow as possible to protect resources, but wide enough to accommodate safety pullouts, overlooks, and trailhead areas · Moderate to high management and/or modification of resources to accommodate operational needs, resource protection, visitor enjoyment, and safety · Good to excellent air quality · Visitor use may compromise resource values	· Smooth groomed snow surface · Generally gentle terrain · Good to excellent air quality · As narrow as possible to protect resources, but wide enough to accommodate safety pullouts, overlooks, and trailhead areas · Moderate to high management and/or modification of resources to accommodate operational needs, resource protection, visitor enjoyment, and safety · Visitor use may compromise resource values	· Same as 3 but with higher sound and vehicle exhaust levels; · Visitor use may compromise resource values	· Narrower, groomed but less maintained snow surface · Gentle to moderate terrain · Vehicles must meet sound and emission standards · Generally good to excellent air quality · Sound levels intermittent, low to moderate · As narrow as possible to protect resources, but wide enough to accommodate pullouts, overlooks trailheads, trailhead areas · Minimal modification of resources to accommodate operational needs, resource protection, visitor enjoyment, and safety · Visitor use may compromise resource values	· Same as 5 but with higher sound and vehicle exhaust levels; · Visitor use may compromise resource values	· Ungroomed snow surface · Marked except for frozen water surfaces · Gentle to moderate terrain · Vehicles must meet sound and emission standards · Generally good to excellent air quality · Sound levels intermittent, low to moderate · Wide enough to accommodate existing road corridor, pullouts, overlooks trailheads, trailhead areas · Low to moderate modification of resources to accommodate operational needs, resource protection, visitor enjoyment, and safety · Visitor use may compromise resource values	· Smooth groomed snow surface · Marked and signed · Generally gentle terrain · Creates predictable patterns of winter use and confines resource impacts to narrow corridors · Good to excellent air quality · Minimal modification of resources to accommodate operational needs, resource protection, visitor enjoyments, and safety · Visitor use may compromise resource values	· Ungroomed snow surface · Marked or unmarked · Gentle to steep terrain · Creates fairly predictable patterns of winter use and confines resource impacts to relatively narrow corridors · Good to excellent air quality · Minimal modification of resources to accommodate operational needs, resource protection, visitor enjoyments, and safety · Visitor use may compromise resource values	· Appears natural and untouched by humans · Gentle to steep terrain · Good to excellent air quality · Little to no evidence of visitor impacts · Little to no modification of resources to accommodate operational needs, resource protection, visitor enjoyments, and safety · Visitor use may compromise resource values	· Appears natural and untouched by humans · Gentle to steep terrain · Good to excellent air quality · Natural and/or cultural resource values so vulnerable that winter visitor use is not permitted
Visitor Experience	· Facilities convenient and blended with adjacent resources · Many opportunities for social interaction · High sound levels possible · High probability of encountering other visitors and NPS staff	· Destinations and natural attractions of high interest · High probability of encountering other visitors · Provides a sense of being in a natural park environment · Visitor experience mostly visual · Occasional quiet and solitude · Commercial or residential traffic on some stretches · Intermittent low to moderate sound associated with vehicular travel expected	· Destinations and natural attractions of high interest · Provides a sense of being in a natural park environment · High probability of encountering other visitors · Solitude occasionally possible, but not expected · Limited opportunities for challenge and adventure · Few outdoor skills needed · Some low-level sound associated with travel expected	· Same as 3 but opportunities for quiet not expected, Sight and smell of vehicle exhaust expected	· Natural attractions of high interest · Moderate probability of encountering other visitors · Chance to view the natural environment important · Solitude occasionally possible, but not expected · Some outdoor skills necessary · Some opportunities for challenge and adventure · Relatively quiet; sight and smell of vehicle exhaust not expected	· Same as 5 but opportunities for quiet not expected, · Sight and smell of vehicle exhaust expected	· Natural attractions of high interest · Moderate probability of encountering other visitors · Chance to view the natural environment important · Solitude occasionally possible, but not expected · Moderate outdoor skills necessary · Moderate opportunities for challenge and adventure · Relatively quiet; sight and smell of vehicle exhaust not expected	· Provides a sense of immersion in a generally natural landscape · Natural attractions of high interest · High probability of encountering other users · Solitude occasionally possible, but not expected · Provides some sense of adventure · Few outdoor skills needed · Quiet desirable but not essential for visitor enjoyment	· Provides a sense of immersion in a generally natural landscape · Natural attractions of high interest · Moderate probability of encountering other users; probability increases near destination areas · Moderate opportunities for solitude · Feels somewhat distant from most comforts, conveniences, and facilities · Generally requires a commitment to time-consuming and physically and mentally exerting activities · Provides opportunities for adventure and physical challenge · Outdoor skills needed	· Provides a strong sense of immersion in a very natural landscape · Natural quiet expected · Low probability of encountering other users; good opportunities for solitude · Provides strong sense of remoteness · Requires a commitment to time-consuming and physically and mentally exerting activities · Good opportunities for adventure and physical challenge · Outdoor skills such as route finding, avalanche hazard forecasting, and survival knowledge necessary	· None
Appropriate Activities and Facilities	· Visitor centers · Warming huts · Overnight lodging · Gas stations · Food services · Staging areas · Administrative facilities · Structured interpretive programs	· Wheeled vehicular travel only · Paved and unpaved roadways, signs, barriers · Interpretive media and display · Utilities · Scenic overlooks, restrooms, trailhead areas, pullouts	· Predominantly oversnow vehicular travel; some non-vehicular travel · Oversnow roads, signs, barriers · Interpretive media, programs and displays · Utilities · Scenic overlooks, restrooms, trailhead areas, pullouts	· Same as 3	· Predominantly oversnow vehicular travel; some non-vehicular travel · Oversnow trails, signs, barriers · Utilities, scenic overlooks, trailhead areas, restrooms	· Same as 5	· Predominantly oversnow vehicular travel; some non-vehicular travel · Oversnow roads, signs, barriers · Interpretive displays · Utilities, restrooms, scenic overlooks, trailhead areas	· Nonmotorized activities only, such as skiing and snowshoeing · Oversnow trails, markers, signs, barriers · Interpretive media · Scenic overlooks, trailheads	· Nonmotorized activities only, such as skiing and snowshoeing · Signs or other route markers	· Nonmotorized activities only, such as skiing and snowshoeing · No facilities	· Limited resource management activities · No visitor activities or facilities

Table 4. Monitoring Indicators by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan

Management Zone →	1 Destination or Support Area	2 Plowed road	3 Groomed Motorized Route Clean Quiet Travel	4 Groomed Motorized Route	5 Groomed Motorized Trail Clean and Quiet	6 Groomed Motorized Trail	7 Ungroomed Motorized Trail	8 Groomed Non-motorized Trail	9 Ungroomed Non-motorized Trail or Area	10 Backcountry Non-motorized Trail or Area	11 Sensitive Resource Area
Resource Value	**Indicators**										
Air Quality (Including employee and visitor health)	· Visibility · Odor · Park workers and visitors exposure to CO, particulate matter and VOC's	· Visibility · Odor · Park workers and visitors exposure to CO, particulate matter and VOC's	· Visibility · Odor · Park workers and visitors exposure to CO, particulate matter and VOC's · Develop exposure measurements for snowcoaches	· Visibility · Odor · Park workers and visitors exposure to CO, particulate matter and VOC's	· Visibility · Odor · Park workers and visitors exposure to CO, particulate matter and VOC's	· Visibility · Odor · Park workers and visitors exposure to CO, particulate matter and VOC's	· Visibility · Odor · Park workers and visitors exposure to CO, particulate matter and VOC's	· Visibility · Odor	· Visibility · Odor	· Visibility · Odor	· Visibility · Odor
Wildlife	· Bird and mammal habituation: effectiveness of garbage facilities · Harassment of ungulates	· Vehicle caused wildlife fatalities · Displacement/ fragmentation (trapped in road corridor) · Harassment · Bison movements on plowed surfaces	· Harassment/ ungulates · Carnivore and snowshoe track surveys · Bison movements on groomed surfaces	· Harassment/ ungulates · Carnivore and snowshoe track surveys · Bison movements on groomed surfaces	· Harassment/ ungulates · Carnivore and snowshoe track surveys · Bison movements on groomed surfaces · Habitat displacement/stress due to sound or vehicle movements	· Harassment/ ungulates · Carnivore and snowshoe track surveys · Bison movements on groomed surfaces · Habitat displacement/stress due to sound or vehicle movements	· Harassment/ ungulates · Carnivore and snowshoe track surveys · Habitat displacement/stress due to sound or vehicle movements	· Harassment/ ungulates · Habitat avoidance or displacement/ungulates · Carnivore and snowshoe track surveys	· Harassment/ ungulates · Habitat avoidance or displacement/ungulates / eagles/swans · Human/bear conflict during pre-denning and post denning period	· Harassment/ ungulates · Habitat avoidance or displacement/ungulates/ eagles/swans/wolverines · Human/bear conflict during pre-denning and post denning period	· Success of closure
Sound	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Success of closure
Water/ Snowpack	· Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, VOC's · Effects on roadside vegetation	→	→	→	→	→	→				· Success of closure
Geothermal Features	· Human caused damage to geothermal areas	→	→	→	→	→	→	→	→	→	· Success of closure
Safety		· Automobile incidents	· Snowmobile/ snowcoach incidents · Wildlife conflicts · Visitor conflicts	· Snowmobile/ snowcoach incidents · Wildlife conflicts · Visitor conflicts	· Snowmobile incidents · Wildlife conflicts · Visitor conflicts	· Visitor conflicts · Search and rescue · Wildlife conflicts	· Visitor conflicts · Search and rescue · Wildlife conflicts	· Visitor conflicts · Search and rescue · Wildlife conflicts	· Visitor conflicts · Search and rescue · Wildlife conflicts	· Search and rescue · Motorized tresspass · Wildlife conflicts	· Motorized and non-motorized tresspass
Visitor Experience	· Waiting lines · Perceptions of crowding attraction sites · Access to information · Parking · Affordability	· Smoothness of groomed surface · Encounter rates · Access to information · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air)	· Smoothness of groomed surface · Encounter rates · Access to information · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air, quiet and solitude)	· Smoothness of groomed surface · Encounter rates · Access to information · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air, quiet and solitude)	· Smoothness of groomed surface · Encounter rates · Access to information · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air, quiet and solitude)	· Encounter rates · Access to information · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air, quiet and solitude)	· Smoothness of groomed surface · Encounter rates · Access to information · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air, quiet and solitude)	· Encounter rates · Access to information · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air, quiet and solitude)	· Encounter rates · Access to information · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air, quiet and solitude)	· Encounter rates · Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air, quiet and solitude)	· Success of closure

Table 5. Adaptive Management Indicators by Management Zones, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan

Management Prescriptions (Zones) →	**1 Destination or Support Area**	**2 Plowed Road (wheeled vehicles)**	**3 Groomed Motorized Route (clean quiet travel)**	**4 Groomed Motorized Route**	**5 Groomed Motorized Trail (clean quiet travel)**	**6 Groomed Motorized Trail**	**7 Ungroomed Motorized Trail or Area (clean quiet travel)**	**8 Groomed Nonmotorized Trail**	**9 Ungroomed Nonmotorized Trail or Area**	**10 Backcountry Nonmotorized Area**	**11 Sensitive Resource Area (no winter use)**
Air Quality	· Odor · Visibility	· Odor · Visibility	· Odor · Visibility	· Odor · Visibility	· Odor · Visibility	· Odor · Visibility	· Odor · Visibility	· Odor · Visibility	· Odor · Visibility	· Odor · Visibility	· Visibility
Wildlife		· Vehicles cause wildlife mortality · Bison movements on plowed roads · Wildlife harassment or displacement due to vehicle sound or movement · Wildlife trapped by snow berms in road corridor	· Wildlife mortalities caused by oversnow vehicles. · Wildlife harassment or displacement due to vehicle sound or movement · Bison use of groomed surfaces · Lynx habitat effectiveness	· Wildlife mortalities caused by oversnow vehicles. · Wildlife harassment or displacement due to vehicle sound or movement · Bison use of groomed surfaces · Lynx habitat effectiveness	· Wildlife harassment or displacement due to vehicle sound or movement · Bison use of groomed surfaces · Lynx habitat effectiveness	· Wildlife harassment or displacement due to vehicle sound or movement · Bison use of groomed surfaces · Lynx habitat effectiveness	· Wildlife harassment or displacement due to vehicle sound or movement · Lynx habitat effectiveness	· Wildlife harassment or displacement due to visitor activity or movement · Lynx habitat effectiveness	· Wildlife harassment or displacement due to visitor activity or movement · Lynx habitat effectiveness · Human bear conflicts during pre and post denning periods.	· Wildlife harassment or displacement due to visitor activity or movement · Lynx habitat effectiveness · Human bear conflicts during pre and post denning periods.	· Wildlife harassment or displacement due to visitor activity or movement · Lynx habitat effectiveness · Human bear conflicts during pre and post denning periods.
Sound	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	· Distance and time human caused sound is audible	
Visitor Experience	· Perceptions of crowding · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Smoothness of groomed surface · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Smoothness of groomed surface · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Smoothness of groomed surface · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Smoothness of groomed surface · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Visitor satisfaction with opportunities to experienc park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	· Perceptions of crowding · Visitor satisfaction with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude.	

Monitoring and Adaptive Management

Table 4 summarizes specific indicators for monitoring natural resources and visitor experience in each zone. These indicators would be monitored to ensure protection of natural resources and park values and evaluate management success.

Alternatives B, G, and E include adaptive management provisions. Table 5 describes indicators and standards for adaptive management. Appendix I includes a complete listing of monitoring and adaptive management indicators, standards and potential management actions.

Mitigation

As with alternative actions, mitigation measures represent choices for the decision maker to incorporate based on consideration of the issues. Mitigation measures should flow logically from potential impacts disclosed in this environmental impact statement (EIS). They may involve minimizing impacts by limiting the degree or magnitude of the action, reducing or eliminating the effect over time by preservation and maintenance, or by avoiding the impact altogether. Proposed mitigation measures follow the alternative descriptions.

ALTERNATIVES

Actions and Assumptions Common to All Alternatives

- For all alternatives the NPS would determine visitor use capacities based on studies that set indicators and standards for desired visitor experiences and resource conditions. The NPS would monitor indicators to maintain the conditions for each management prescription. If necessary, techniques such as reservations, permits, and differential fees would be implemented. See zone descriptions, monitoring table, and Appendix H (Recreation Carrying Capacity).
- Unless otherwise noted, the parks would implement all actions the winter following the Record of Decision (ROD) for the winter use plans and EIS. The ROD would be signed no sooner than 30 days after the release of the Final Environmental Impact Statement (FEIS).
- If it can be demonstrated sufficiently for NPS to determine that a selected alternative feature substantially affects a concession operation prior to the expiration of its contract, the action will be implemented through negotiation or when a new contract is awarded.
- Several actions include possible road closures depending on the results of scientific studies. None of the actions preclude other closures for safety, resource protection, or other reasons as identified in 36 CFR 1.5 or 2.18.
- For the purposes of these alternatives, the following definitions are consistent throughout:
  - Oversnow motor vehicles: self-propelled vehicles intended for travel on snow, driven by a track or tracks in contact with the snow that may be steered by skis or tracks in contact with the snow. This term includes both snowmobiles and snowcoaches.
  - Snowmobiles: self-propelled vehicles intended for travel on snow, having a curb weight of not more than 1,000 pounds (450kg), driven by a track or tracks in contact with the snow, which may be steered by a ski or skis in contact with the snow.
  - Snowplanes: self-propelled vehicles intended for oversnow travel, having a weight of not more than 1,000 pounds (450kg) mounted on skis in contact with the snow, and driven by a pusher-propeller.
  - Snowcoaches: self-propelled, mass transit vehicles intended for travel on snow, having a curb weight of over 1,000 pounds (450kg), driven by a track or tracks and steered by skis or tracks, having a capacity of at least 8 passengers.

- At present no Environmental Protection Agency (EPA) standards exist for off-road vehicles. If the EPA adopts more stringent standards or measurement methods for vehicle emissions and sound levels than those identified in this document, the more stringent standards or methods would be required for off-road vehicles in the parks.
- The alternatives call for the use of sand, or an equally environmentally neutral substance, for traction on all plowed winter roads. No salts would be used. Before spring opening, sand removal operations would continue on all plowed park roads.
- Investigate and implement options to reduce the palatability and accessibility to wildlife of the hydraulic fluid used in snow groomers.
- When snow depth warrants and at periodic intervals, routine plowing operations would include laying back roadside snowbanks that could be a barrier to wildlife exiting the road corridor.
- All alternatives would continue to implement transition and action plans for accessibility and support the philosophy of universal access in the parks. The NPS would make reasonable efforts to ensure accessibility to buildings, facilities, programs, and services. The NPS would develop strategies to ensure that new and renovated facilities, programs and services (including those provided by concessionaires) are designed, constructed, or offered in conformance with applicable policies, rules, regulations, and standards (including but not limited to the Architectural Barriers Act of 1968; the Americans with Disabilities Act of 1990 (ADA): the Uniform Federal Accessibility Standards of 1984 (UFAS); and the Guidelines for Outdoor Developed Areas of 1999).
  - Architectural and Site Access and Programmatic Access: The NPS will evaluate existing buildings and existing and new programs, activities, and services (including telecommunications and media) to determine current accessibility and usability by disabled winter visitors. Action plans to remove barriers would be developed.
- Backcountry nonmotorized use would continue to be allowed throughout the parks except where designated otherwise (see Figures 3, 5, 6, 8, and 14, Zone 11 or area of designated trail use).
- The phrase gateway communities refers to the towns of Jackson and Cody, Wyoming, and Gardiner and West Yellowstone, Montana only.

Actions Common to all Yellowstone Alternatives

- In Yellowstone, the NPS would continue to plow Highway 191 and the road from Mammoth to Tower and Tower to the Northeast Entrance (Cooke City) throughout the winter.
- A designated route for *nonmotorized recreation* is defined as a marked or otherwise indicated oversnow travel way.
- Grand Canyon of the Yellowstone and the McMinn Bench bighorn sheep area would continue to be closed to winter use.
- Winter garbage storage facilities that are wildlife-proof would be constructed in the Old Faithful, Grant, Lake, and Canyon areas.

Actions Common to all Grand Teton and Parkway Alternatives

- In Grand Teton and the Parkway, the following roadways would continue to be plowed:
  - Highway 26/89/287 from the south boundary of the park to Moran
  - Highway 89/287 from Moran to Colter Bay
  - Highway 26/287 from Moran to the eastern park boundary
  - Teton Park Road from Moose Junction to Taggart Lake Trailhead, and from Jackson Lake Junction to Signal Mountain Lodge; from Highway 89/287 along the Pacific Creek road to the park boundary; from Kelly to the eastern park boundary; from Gros Ventre Junction to Kelly to Mailbox Corner; and the road to the eastern park boundary at Ditch Creek.
- Current winter closures would remain in effect on the Snake River floodplain, the Buffalo Fork River floodplain, the Uhl Hill area, Willow Flats, Kelly Hill, and Static Peak.

- Reasonable and direct access to adjacent public and private lands, or to privately owned lands within the park with permitted or historical motorized access, will continue via paved and plowed routes or via oversnow routes from GTNP.

Alternative A—No Action

This alternative reflects current use and management practices in the parks and meets the requirement for including a no action alternative in an EIS.[16] Alternative A is a baseline for analysis and reflects existing conditions. Other alternatives are intended to improve the existing condition in one or more major issue areas. Issues associated with alternative A include visitor access difficulties, visitor experience conflicts, unsafe conditions, and resource impacts (see *Existing Condition* and *Major Issues* in Chapter I). Figure 2. Alternative A for YNP, and Figure 9. Alternative A for GTNP and the Parkway show current management in the parks.

Actions Common to All Three Park Units

- The oversnow speed limit is 45 mph (miles per hour) throughout the parks except for the segment from Moran to Flagg Ranch, which is 35 mph.
- Bio-based fuels and lubricants are used by the NPS and are available for purchase in gateway communities.
- Current *Code of Federal Regulations* (36 CFR 2.18) requires that snowmobiles within the parks operate at or below 78 decibels as measured on the A-weighted scale at 50 feet at full throttle.
- The 1999 Interagency Winter Use Assessment shows relationships and cooperative programs for winter use in the Greater Yellowstone Area (GYA). NPS visitor contacts are provided at visitor centers in West Yellowstone and Jackson Hole.

Actions for Yellowstone National Park

- The following road segments represent about 180 miles of groomed road and are open to oversnow motorized vehicle travel from mid-December to mid-March:

  - Mammoth to Norris
  - Norris to Madison
  - Madison to West Yellowstone
  - Madison to Old Faithful
  - Old Faithful to West Thumb
  - West Thumb to South Entrance
  - West Thumb to Fishing Bridge
  - Fishing Bridge to East Entrance
  - Fishing Bridge to Canyon
  - Canyon to Norris

- Warming huts are located at Mammoth, Canyon, Indian Creek, Fishing Bridge, Madison, Old Faithful, and West Thumb. A new warming hut was approved for Norris in the 1990 Winter Use Plan for YNP. The warming huts at Canyon, Old Faithful, and Madison are scheduled for replacement.
- YNP provides 37 miles of groomed nonmotorized trails located near Mammoth, Canyon, Tower, Virginia Cascades, Blacktail Plateau, East Entrance, and Old Faithful.
- Nonmotorized travel is permitted throughout the park except in the Grand Canyon of the Yellowstone and McMinn Bench.

[16] CEQ 40 Most Asked Questions, question number 3. Where an existing program is being evaluated, "no action" is "no change in management." "No action" may be thought of as continuing with the present course of action until the action is changed. CEQ states that in such instances, "to construct an alternative based on no management at all would be a useless academic exercise."

- The winter operating season is from about mid-December to mid-March. Closures are implemented in mid-March to protect grizzly bears as they emerge from their dens.

Actions for Grand Teton and the Parkway

- The Moose-Wilson Road is plowed from the southwest boundary to the Granite Canyon Trailhead and from the corner near the Moose Visitor Center to the turnoff to the JY Ranch entrance. Oversnow motorized travel is permitted between the road segments.
- Ungroomed trails open to oversnow motorized vehicle travel are the Teton Park Road from Taggart Lake Trailhead to the summit of Signal Mountain and Jackson Lake Junction, and the two-track that parallels the eastern park boundary.
- Groomed trails for oversnow motorized use include: the Continental Divide Snowmobile Trail (CDST), which runs along the road shoulder from the east boundary to Flagg Ranch, and Grassy Lake Road.
- Destination and support facilities are at Moose, Triangle X, Colter Bay, and Flagg Ranch.
- Ungroomed trails for ski and snowshoe use are available from Taggart Lake Trailhead to Jenny Lake, along Antelope Flats Road, and near Death Canyon, Granite Canyon, Two Ocean Lake, Colter Bay, and Flagg Ranch.
- Snowmobile and snowplane use is permitted on the frozen surface of Jackson Lake.

Alternative B

This alternative provides a moderate range of affordable and appropriate winter visitor experiences. Key changes in recreational opportunities include: plowing the road from West Yellowstone to Old Faithful to allow mass transit access by wheeled vehicles, moving the CDST to a year-round path from Moran to Flagg Ranch, and phasing out snowmobile use on Jackson Lake.

Over the next 10 years, an advisory committee would make recommendations on phasing and implementing sound and emission standards for air quality and motor vehicle sound issues. By winter 2008−2009, strict emission and sound requirements would be required by all vehicles entering the parks. In addition this alternative emphasizes an adaptive approach to park resource management, which would allow the results of new and ongoing research and monitoring to be incorporated as it becomes available. Adaptive management increases the Park Service's ability to solve visitor access and experience issues and resource issues over time. Using the criteria stated within Executive Order (EO) 11644 (as amended) and its implementing regulation (36 CFR 2.18), monitoring results demonstrating disturbance to wildlife or damage to park resources would be cause to implement actions for mitigating these conditions (for example, closure to winter visitor use or trail restrictions). Adaptive management standards, indicators, and methods are described by management zone in Appendix I. See Figure 3. Alternative B for YNP, and Figure 10. Alternative B for GTNP and the Parkway.

Actions Common to All Three Park Units

- This alternative would be a commitment to developing acceptable measures for mitigating impacts, consistent with criteria in 36 CFR 2.18.
- To encourage public participation and address air quality and oversnow motorized vehicle sound concerns, establish an advisory committee.[17] The committee would include two

[17] Established by the Secretary of the Interior under the Federal Advisory Committee Act.

representatives each from cooperating agencies for this EIS, environmental groups, snowmobile industry representatives, NPS representatives, plus other state and federal experts. The committee would recommend phasing and implementation of the standards described below for all oversnow vehicles. Once the committee has formalized its recommendations, it would disband. In any case, the advisory committee would not remain in effect past the year 2010.

- By winter 2008−2009, allow oversnow motor vehicles in the park only when their emissions have been reduced by a minimum of 70% of hydrocarbons, 40% of carbon monoxide, and 75% of particulates (with no increase in other pollutants) compared to current 2-stroke engine emissions.[18] Limit all oversnow motorized circulation in the parks to mass transit oversnow vehicles if the technology to meet these standards is not available for implementation in the parks by winter 2008−2009.
- By winter 2008−2009, allow oversnow motor vehicles in the park only when their sound levels are at or below 70 decibels as measured on the A-weighted scale at 50 feet at full throttle. Limit all oversnow motorized circulation in the parks to mass transit oversnow motor vehicles (zone 3) if the technology to meet these standards is not available for implementation in the parks by winter 2008−2009.
- Require new technologies to further reduce oversnow vehicle emissions and sound as they are mass produced and available for public purchase.

- To improve groomed trail conditions and increase safety, prohibit late night motorized oversnow travel (about 11 P.M. to 5 A.M.). On the CDST, travel would be prohibited from about 8 P.M. to 5 A.M.
- To provide better access to visitor information and quality winter visitor experiences, take the following actions:
  - Increase interpretive opportunities. At YNP increase interpretive opportunities related to the unique aspects of YNP and the winter environment (geothermal, wildlife, and scenic). Provide interpretive opportunities for motorized users at destination areas and warming huts in both parks and on snowcoaches in the north and west sides of YNP. Provide interpretive ski tours and programs near Tower and Canyon in YNP. At GTNP, provide interpretive ski tours and programs through Moose, Colter Bay, and Flagg Ranch visitor services.
  - Implement an aggressive information and enforcement program to ensure that oversnow speed limits and rules are followed, and to encourage appropriate winter recreation behavior and etiquette. Possibly implement this program in partnership with state snowmobile associations and other snowmobile safety programs and associations.
  - To make visitors aware of all types of winter recreation opportunities, implement an information program on snow and trail conditions, points of interest, and available recreational opportunities. Implement this information program in part through partnerships that establish NPS/visitor contact opportunities in gateway communities and utilize state tourism program resources.

Actions for Yellowstone National Park

- To provide more opportunities for a motorized experience on narrower and less maintained trails (zone 5), groom the following trails:
  - Natural Bridge
  - Gull Point Drive
  - Lake Butte Drive

[18] Baseline emissions are defined as 1.18 grams per kilowatt-hour (g/kW-hr) brake-specific particulate matter, 202 g/kW-hr brake-specific unburned hydrocarbons, and 558 g/kW-hr brake-specific carbon monoxide. Measure emissions using the International Snowmobile Manufacturers Association 5-mode steady-state snowmobile engine test cycle as described in SAE-982017. Measure particulate matter emissions using a 90 mm Paliflex filtration of double-diluted exhaust gas following 40 CFR Part 86, Subpart N protocols (White and Carroll 1998.)

- Provide additional groomed nonmotorized trail (zone 8) opportunities in the following areas:
  - Indian Creek
  - West Entrance (The Barns)
  - Canyon
  - Riverside Drive
- Improve affordability through the addition of wheeled-vehicle access to the park's interior.
  - Plow the road from West Yellowstone to Madison and Madison to Old Faithful throughout the winter season (zone 2).
  - Offer a regularly scheduled shuttle bus from West Yellowstone to Old Faithful to address air quality and sound concerns. Offer the shuttle at low cost to the public ($30 to $40). Because parking is limited, use a reservation system to manage private vehicle and trailer access to Old Faithful and Madison.
  - Maintain groomed motorized routes (zone 3) throughout the winter season from:
    - The East Entrance to Fishing Bridge
    - Fishing Bridge to West Thumb
    - West Thumb to the South Entrance
    - West Thumb to Old Faithful, Mammoth to Norris
    - Norris to Canyon
    - Canyon to Fishing Bridge
    - Norris to Madison
  - Allow a planning and implementation period of 2 years. For example, plowing proposed for the interior sections of park road would not begin until 2002−2003.
- Keep the winter season for oversnow routes as the period from mid-December to mid-March. Closures are implemented in mid-March to protect grizzly bears as they emerge from their dens.
- Keep the plowed route from West Yellowstone to Old Faithful open from early December to mid-March and from mid-April to mid-November.
- Continue scientific studies and monitoring regarding winter visitor use and park resources. Close selected areas of the park, including sections of roads, to visitor use if scientific studies indicate that human presence or activities have a detrimental effect on wildlife or other park resources that could not otherwise be mitigated. The appropriate level of environmental assessment under NEPA will be completed for all actions as required by Council on Environmental Quality (CEQ) regulations (40 CFR parts 1500-1508).
  - Give a 1-year notice before any closure is implemented unless immediate closure is deemed necessary to avoid impairment of park resources.
- To address wildlife issues, restrict nonmotorized uses in wildlife winter range to travel on designated trails (zones 8 and 9).
- To provide better visitor service, increase the size and number of warming huts and other day use facilities. Place warming huts and restrooms at popular ski trailheads (for example, Tower), as support for motorized travel and staging areas (for example, Norris), and where existing facility size is currently inadequate to handle the dual function of warming hut and interpretive program staging area (for example, Canyon).

Actions for Grand Teton and the Parkway

- For access to trailheads, plow the Moose-Wilson Road from the southwest boundary to the Granite Canyon Trailhead and from the corner near the Moose Visitor Center to the turnoff to the JY Ranch. Plow the road from Mailbox Corner to the existing trailhead for Shadow Mountain (zone 2).
- Provide opportunities for oversnow motorized vehicles on groomed trails (zone 5):
  - Continue the CDST along the road shoulder from the east boundary to Moran, but move the trail to a new year-round path from Moran to Flagg Ranch. The path would be located east of the highway and separated entirely from the highway footprint. The path would be designed to take advantage of suitable resource conditions, topography,

and grade, so that the road could be groomed in the winter and used by bicyclists in the summer. Opportunities for interpretation and scenic viewpoints would be incorporated. Utilities that are currently located overhead and outside the highway corridor would be buried near the path, which may use portions of the existing utility corridor.

- Along Grassy Lake Road.

- Provide opportunities for oversnow motorized travel on ungroomed trails (zone 7):
  - Between the plowed segments of the Moose-Wilson Road.
  - On the two-track road along the park's east boundary from Mailbox Corner to Cunningham Cabin, and from the plowed end of the Ditch Creek Road to the east boundary.
- Over the first 5 years of the plans, phase out snowmobile use on Jackson Lake and permit only snowplanes after that time (zone 7).
- Provide ungroomed nonmotorized trails from Taggart Lake Trailhead to the summit of Signal Mountain, along Antelope Flats Road, and near Colter Bay, Death Canyon, Granite Canyon, Two Ocean Lake, and Flagg Ranch (zone 9).
- Continue destination and support facilities at Moose, Triangle X, Colter Bay, and Flagg Ranch and add warming hut facilities at Signal Mountain and Jenny Lake to provide for visitor services and interpretive opportunities.
- To provide better access to visitor information and quality winter visitor experiences, provide interpretive ski tours and programs through Moose, Colter Bay, and, Flagg Ranch visitor services.

Alternative C

This alternative provides maximum winter visitor opportunities for a range of park experiences, with emphasis on motorized recreation, while mitigating some natural resource impacts and safety concerns. Key changes in recreational opportunities include: plowing the road from West Yellowstone to Old Faithful to allow access by wheeled vehicles, providing a widened highway corridor to accommodate the CDST, and providing additional groomed trails for both motorized and nonmotorized uses.

This alternative directly addresses issues that arose during scoping about potential impacts of management change on local economies. It shows how the range of winter opportunities could be preserved, while applying minimal mitigation primarily in the areas of air quality and sound impacts. See Figure 4. Alternative C for YNP, and Figure 11. Alternative C for GTNP and the Parkway.

Actions Common to All Three Park Units

- Beginning in winter 2002−2003 sell only 10% ethanol blend fuels for all vehicles and synthetic low-emission motor lubrication oils for 2-stroke engines in the parks to address air quality concerns.
- Strictly enforce current sound standards for snowmobiles (at or below 78 decibels on an A-weighted scale at 50 feet at full throttle) and in GTNP, for snowplanes (at or below 86 decibels on an A-weighted scale at 50 feet at full throttle) to address concerns about sound, and continue to support ongoing research to develop field-reliable methods of testing oversnow vehicle noise levels.
- Implement an information program on snow and trail conditions, points of interest, and available winter recreation activities. This information program would be implemented in part through partnerships that establish national park visitor contact opportunities in gateway communities and utilize state tourism program resources.

Actions for Yellowstone National Park

- To provide more opportunities for winter use activities, increase the number of groomed trails for both motorized and nonmotorized uses.
  - To provide more opportunities for a motorized experience on narrower and less maintained trails (zone 6), groom the following additional areas for trail use:
    - Utility road southeast of Norris
    - Natural Bridge
    - Gull Point Drive
    - Lake Butte Drive
  - To provide more opportunities for nonmotorized trail experiences, groom portions of the following additional areas (zone 8):
    - Indian Creek
    - Norris
    - Fountain Flats Road
    - Lower Geyser Basin (Old Faithful)
    - Riverside Drive
    - West Entrance (The Barns)
- Improve affordability by adding wheeled-vehicle access to the park's interior:
  - Plow the road from West Yellowstone to Madison and Madison to Old Faithful throughout the winter season (zone 2). This road would remain open to the public throughout the fall but would close from mid-March to mid-April.
- Provide a greater range of winter recreation opportunities through the following actions:
  - Provide winter campsites in the park interior (for example, Old Faithful).
  - Maintain groomed motorized routes (zone 4) from mid-December to mid-March from the East Entrance to Fishing Bridge, Fishing Bridge to West Thumb, West Thumb to the South Entrance, and West Thumb to Old Faithful.
  - Maintain all other routes (Mammoth to Norris, Norris to Canyon, Canyon to Fishing Bridge, and Norris to Madison) as groomed motorized routes (zone 4) from about mid-December to mid-February.
  - From mid-February to mid-March, open the road from Norris to Canyon and Canyon to Fishing Bridge only for regularly scheduled mass transit snowcoaches (zone 3). This would provide opportunities to ski or snowshoe in a quiet environment.
  - From mid-February to mid-March, plow the road from Mammoth to Norris and Norris to Madison (zone 2) to allow continued late season access from the North Entrance to Old Faithful.
  - Allow a planning and implementation period of 2 years; for example, the plowing proposed for the interior sections of park road would not begin until 2002−2003.
  - Extend the length of the winter use season from the South Entrance to West Thumb by two weeks from mid-March to the beginning of April.
- Provide better visitor service by increasing the size and number of warming huts and other day-use facilities. Place warming huts and restrooms at popular ski trailheads (for example, Tower), as support for motorized travel and staging areas (for example, Norris), and where existing facility size is currently inadequate to handle the dual function of warming hut and interpretive program staging area (for example, Canyon). Provide four to five additional facilities.

Actions for Grand Teton and the Parkway

- Plow the Moose-Wilson Road and Antelope Flats Road to provide more opportunities for visitors who wish to drive through the park (zone 2).
- Provide opportunities for oversnow motorized use on groomed trails (zone 6):
  - The CDST would be accommodated on a widened highway shoulder for much of the distance from Moran to Flagg Ranch. Periodically along this length, where resource conditions and grooming requirements can be met, the trail would depart from the

edge of the highway to provide a scenic diversion especially between Colter Bay and Flagg Ranch.

- Grassy Lake Road.
- From the south boundary near Jackson to Moran along the eastern park boundary.

- To provide more opportunities for oversnow motorized use, develop ungroomed trails (zone 7, except that clean and quiet technologies would not be required) from Taggart Lake Trailhead to the summit of Signal Mountain and to Jackson Lake Junction.
- Provide opportunities for both snowmobile and snowplane use on the frozen surface of Jackson Lake (zone 7, except clean and quiet technologies would not be required).
- Provide opportunities for nonmotorized uses on groomed trails at Gros Ventre Campground and Two Ocean Lake (zone 8).
- Provide opportunities for nonmotorized uses on ungroomed trails from Taggart Lake Trailhead to Signal Mountain, and near Moose, Colter Bay, Death Canyon, Granite Canyon, and Flagg Ranch (zone 9).
- Continue the destination and support facilities at Moose, Triangle X, Flagg Ranch, and Colter Bay. Open campground facilities and overnight accommodations at Colter Bay. Add warming hut facilities at Jenny Lake, Signal Mountain area, and Two Ocean Lake to enhance visitor services and interpretive opportunities.

Alternative D

This alternative emphasizes opportunities for visitor access to the unique winter aspects of the parks (for example, geysers, geothermal areas, wildlife, and scenic vistas), and protection of those qualities and natural resources by phasing in clean and quiet modes of travel. It focuses winter visitor activities near destination areas and gateway communities. Key changes in recreational opportunities include: eliminating motorized oversnow access to Yellowstone through its East Entrance, limiting snowmobile use in Grand Teton and the Parkway to the CDST and the Grassy Lake Road, eliminating wheeled-vehicle access from Colter Bay to Flagg Ranch to accommodate oversnow vehicles on the groomed highway surface, and eliminating snowmobile use on Jackson Lake.

Emphasizing uses in different areas of the park minimizes conflicts between nonmotorized and motorized users, and addresses issues about visitor access and experience. Support facilities would have minimal amenities. In this alternative, visitor access routes and timing would be modified to provide safer conditions. Over time, issues regarding impacts on natural resources would be addressed, particularly in Grand Teton and on the east side of Yellowstone. See Figure 5. Alternative D for YNP, and Figure 12. Alternative D for GTNP and the Parkway.

Actions Common to All Three Park Units

- Emphasize clean quiet modes of travel to address air quality and sound concerns.
  - Beginning in 2002−2003, sell only 10% ethanol blend fuels for all snowmobiles and snowcoaches and synthetic low-emission motor lubrication oils for 2-stroke engines in the parks.
  - In winter 2007−2008, restrict travel to only those oversnow motor vehicles that can meet strict emissions and sound requirements.
    - Allow oversnow motor vehicles in the parks only when their emissions have been reduced by a minimum of 70% of hydrocarbons, 40% of carbon monoxide, and 75% of particulates (with no increase in other pollutants) from current 2-stroke

engine emissions.[19] Limit all oversnow vehicle circulation in the parks to mass transit oversnow vehicles if the technology to meet these standards is not available for implementation in the parks by winter 2008-2009.

- ❖ Allow oversnow motor vehicles in the park only when their sound levels are at or below 60 decibels as measured on the A-weighted scale at 50 feet at full throttle. Limit all oversnow motorized circulation in the parks to mass transit oversnow motor vehicles (zone 3) if the technology to meet these standards is not available for implementation by winter 2008−2009.

- Prohibit late night oversnow motorized travel (about 11 P.M. to 5 A.M.) to improve groomed trail conditions and increase safety.
- Implement an aggressive information and enforcement program to ensure that oversnow speed limits and rules are followed and encourage appropriate winter recreation behavior and etiquette. Possibly implement this program in partnership with state snowmobile associations and other snowmobile safety programs and associations.
- To increase interpretive opportunities related to the unique aspects of the parks' winter environment, provide interpretive programs at destination areas and warming huts in both parks, and in snowcoaches in the north and west sides of YNP. Provide interpretive ski tours and programs near Tower and Canyon in YNP and near Moose, Colter Bay, and Flagg Ranch in GTNP and the Parkway.
- Implement a visitor information program on snow and trail conditions, points of interest, and available recreational opportunities. Develop partnerships that establish national park visitor contact opportunities in gateway communities, and utilize state tourism program resources.

Actions for Yellowstone National Park

- Continue all currently groomed motorized routes, except for East Entrance to Fishing Bridge. Zone designation for all remaining groomed routes would transition from zone 4 to zone 3 by winter 2007−2008.
- The East Entrance to YNP would be closed throughout the winter to address safety and cost concerns (zone 11).
- Groom motorized routes from West Yellowstone to Madison to Old Faithful more frequently and to a higher standard to provide smoother riding conditions.
- Where possible, use separate areas for different winter uses.
  - ♦ Emphasize providing nonmotorized opportunities (zones 8 and 9) in the north and northwest areas of the park (near Mammoth, Canyon, and Tower). The following additional areas would be groomed:
    - ❖ Canyon Drives/Inspiration Point
    - ❖ Washburn Overlook
  - ♦ Emphasize motorized oversnow route and trail opportunities (zones 3 and 5) in the west and southwest areas of the park. The following additional areas would be groomed:
    - ❖ Mesa Road
    - ❖ Fountain Flats (Freight Road)
    - ❖ Natural Bridge
    - ❖ Riverside Drive
    - ❖ Gull Point Drive
- Nonmotorized uses in wildlife winter range would be restricted to travel on designated trails (zones 8 and 9) to address wildlife issues. Exclude backcountry areas near Mammoth

[19] Baseline emissions are defined as 1.18 grams per kilowatt-hour (g/kW-hr) brake-specific particulate matter, 202 g/kW-hr brake-specific unburned hydrocarbons, and 558 g/kW-hr brake-specific carbon monoxide. Measure emissions using the International Snowmobile Manufacturers Association 5-mode steady-state snowmobile engine test cycle as described in SAE-982017. Measure particulate matter emissions using a 90 mm Paliflex filtration of double-diluted exhaust gas following 40 CFR Part 86, Subpart N protocols (White and Carroll 1998).

(Bunsen Peak and Indian Creek) and Tower (Blacktail Plateau, Lost Lake, and Chittenden Loop) from this requirement.

- Keep the length of the winter use operating season as the period from about mid-December to mid-March.

Actions for Grand Teton and the Parkway

- Provide opportunities for oversnow motorized use on groomed routes (zone 3):
  - Do not plow the highway north of Colter Bay. The CDST would be accommodated as a groomed route on the snow-covered surface of the highway from Colter Bay to Flagg Ranch, and continue north into YNP.
- Provide opportunities for oversnow motorized use on groomed trails (zone 5):
  - The CDST would be accommodated on a widened highway shoulder from Moran to Colter Bay. From Moran to the east boundary, the trail would parallel the highway as it is now.
  - Grassy Lake Road.
- There would be no opportunities for oversnow motorized use on ungroomed trails, except for snowplane use on the frozen surface of Jackson Lake (zone 7).
- Provide opportunities for nonmotorized uses on ungroomed trails from Taggart Lake Trailhead to Signal Mountain, along Antelope Flats Road, along the east boundary two-track from the National Forest access point to Cunningham Cabin and near Moose, Colter Bay, Death Canyon, Granite Canyon, and Flagg Ranch (zone 9).
- Continue destination and support facilities at Moose, Triangle X, Colter Bay, and Flagg Ranch, and add warming hut facilities at Jenny Lake.
- Winterize facilities at Colter Bay to provide a suitable staging area for snowcoaches and snowmobiles.

Alternative E

This alternative emphasizes the protection of wildlife and other natural resources while allowing park visitors access to a range of winter recreation experiences. It uses an adaptive planning approach that allows the results of new and ongoing research and monitoring to be incorporated. Key changes to current recreational opportunities are: eliminating motorized oversnow access in Grand Teton and the Parkway except for use on the Grassy Lake Road and north of Flagg Ranch into Yellowstone, and eliminating all winter motorized use on Jackson Lake.

This alternative addresses the full range of winter use issues in Yellowstone over time, but the current condition would prevail in the short term. Using the criteria stated in EO 11644 (as amended) and its implementing regulation (36 CFR 2.18), monitoring results demonstrating disturbance to wildlife or damage to park resources would be cause to implement actions for mitigating these conditions (for example, closure to snowmobile use). Alternative E calls for instituting an advisory committee to make recommendations about emission and sound standards. Local, county, state, and federal agencies as well as representatives from the snowmobile industry and environmental groups would participate on this committee. In Grand Teton and the Parkway, the full range of issues are addressed more immediately by limiting oversnow motorized use to the north end of the park, thus separating uses and eliminating most resource and visitor experience conflicts relating to snowmobile use. Appendix I describes adaptive management

standards, indicators, and methods by management zone. See Figure 6. Alternative E for YNP, and Figure 13. Alternatives E and F for GTNP and the Parkway.

Actions Common to All Three Park Units

- This alternative would be a commitment to the development of acceptable measures for mitigating impacts consistent with criteria in 36 CFR 2.18.
- Encourage partnerships and public participation to address air quality and sound concerns. Establish an advisory committee.[20] The committee would include two representatives from cooperating agencies for these Plans/EIS, two representatives from environmental groups, NPS representatives, plus other federal, state, and snowmobile industry experts. The committee would recommend emissions standards and sound requirements for all oversnow vehicles for YNP and GTNP and the Parkway, as well as the phasing and implementation of those standards to the NPS. Once the committee had formalized its recommendations, it would disband. In any case, the advisory committee would not remain in effect past the year 2008.
- Decrease nighttime oversnow speed limit to 35 mph to increase safety; this speed limit would be in effect from sundown to sunrise.

Actions for Yellowstone National Park

- Continue scientific studies and monitoring related to park resources and winter visitor use. Close selected areas of the park, including sections of roads, to visitor use if scientific studies indicate that human presence or activities have a detrimental effect on park resources that could not otherwise be mitigated. The appropriate level of environmental assessment under NEPA will be completed for all actions as required by CEQ regulations (40 CFR parts 1500-1508).
  - Give a 1-year notice before any closure is implemented unless immediate closure is deemed necessary to avoid impairment of park resources.
- Restrict nonmotorized uses in wildlife winter range to travel on designated routes only (zones 8 and 9).
- Keep the length of the winter use operating season as the period from mid-December to mid-March.

Actions for Grand Teton and the Parkway

- Provide opportunities for oversnow motorized use on groomed routes (zone 3):
  - Provide a groomed route on the snow-covered surface of the highway north from Flagg Ranch.
  - Provide opportunities for oversnow motorized use on groomed trails (zone 5) on Grassy Lake Road.
- Provide opportunities for nonmotorized uses on ungroomed trails from Taggart Lake Trailhead to Signal Mountain, near Moose, at Flagg Ranch, and along the Moose-Wilson Road (zone 9). Monitor trail use. If the use of these trails exceeds an average of 75 skiers per day over 70% of the winter season, implement a grooming program (see Appendix I).
- Continue destination and support areas at Moose, Triangle X, Colter Bay, and Flagg Ranch to provide for at least a minimum of visitor facilities and services.
- Provide CDST users with shuttle service from the east boundary to the route terminus at Flagg Ranch (zone 2).
- Eliminate motorized use on Jackson Lake (Zone 9).

Alternative F

Alternative F emphasizes wildlife protection. Key changes in recreational opportunities include: eliminating all winter access to Yellowstone's interior through its North and

[20] Established by the Secretary of the Interior under the Federal Advisory Committee Act.

West Entrances, eliminating motorized oversnow access in Grand Teton and the Parkway except for use on the Grassy Lake Road and north of Flagg Ranch into Yellowstone, and eliminating all winter motorized use on Jackson Lake.

For YNP this alternative addresses issues regarding protection of wildlife resources by focusing winter visitor activities near scenic areas in the eastern and southern portions of YNP. These areas are generally outside important winter range for large ungulate wildlife species. In Grand Teton and the Parkway, the full range of issues is addressed by limiting oversnow motorized use to the north end of the park, thus separating uses and eliminating most resource and visitor experience conflicts relating to snowmobile use. See Figure 7. Alternative F for YNP, and Figure 13. Alternatives E and F for GTNP and the Parkway.

Actions Common to All Three Park Units

- Require technologies for reducing oversnow vehicle sound and emissions when they are mass produced and available for public purchase. Allow a 2-year grace period for implementation.
- To reduce the potential for vehicle-wildlife accidents, prohibit motorized travel on park groomed routes from sunset to sunrise.
- Implement an information program on snow and trail conditions, points of interest, and available recreational opportunities to make visitors aware of all types of winter recreation opportunities. This information program would be implemented in part through partnerships that establish additional park visitor contact opportunities at Jackson and Cody.

Actions for Yellowstone National Park

- To address concerns about the use of groomed roads by wildlife, close roads from West Yellowstone to Madison, Madison to Old Faithful, Madison to Norris, and Norris to Mammoth to all vehicular travel from November 1 to April 30. Allow no grooming on these routes (zone 11). If scientific monitoring indicates that the closures are not effective in limiting unnatural wildlife migration, the NPS would consider reopening these roads.
- Keep other road segments open to oversnow motorized travel.
- Allow nonmotorized uses only on designated groomed routes (zone 8). All other areas of the backcountry would be closed to winter visitor use (zone 11).
- To provide better visitor service, increase the size and number of warming huts and other day use facilities where existing facility size is currently inadequate to handle the dual function of warming hut and interpretive program staging area (for example, Canyon, West Thumb, Norris, and Fishing Bridge).
- Shorten the length of the winter use operating season to the period from mid-December to early March.

Actions for Grand Teton and the Parkway

Same as alternative E.

Alternative G—Preferred Alternative

This alternative emphasizes clean, quiet access to the parks using the technologies available today. It would allow oversnow motorized access via NPS-managed snowcoach only. Other key changes in recreational opportunities include: eliminating winter plowing on the Colter Bay to Flagg Ranch route, making Flagg Ranch a

destination via oversnow transport, elimination of the CDST through the park, and eliminating all winter motorized use on Jackson Lake.

This alternative addresses the full range of issues regarding safety, natural resource impacts, and visitor experience and access. It addresses the issues in a way that would make it necessary for local economies to adapt, and for snowmobile users to access the parks using a different mode of transport. See Figure 8. Alternative G for YNP, and Figure 14. Alternative G for GTNP and the Parkway.

Actions and Assumptions Common to all Three Park Units

- Permit only NPS-managed mass transit snowcoaches on designated oversnow roads.[21]
- Through the permitting process phase out all oversnow vehicles that do not meet the best available environmental standards for oversnow mass transit travel. Currently, the mass transit oversnow vehicle that produces the lowest emissions is the conversion van mat track.[22]
- Allow mass transit snowcoaches only when their sound levels are at or below 75 decibels as measured on the A-weighted scale at 50 feet at full throttle. Continue to work with snowcoach manufacturers and operators to meet a long-term goal to lower snowcoach sound levels to 70 decibels or lower.
- Require all new oversnow vehicles purchased by the parks to conform to the best environmental standards available, and that other vehicles are retrofitted whenever possible with new technologies designed to lower sound and emission levels.
- Prohibit late night oversnow travel from about 11 P.M. to 6 A.M.
- Implement an information program on snow and trail conditions, points of interest, and available recreational opportunities. Through partnerships, establish park visitor contact opportunities in gateway communities and utilize state tourism program resources.
- Allow a planning and implementation period of 3 (three) years.
  - In the winters of 2001-2003, allow existing commercial snowcoach operators to increase their fleet size and encourage snowmobile and other new operators to purchase coaches and reduce snowmobile numbers.
  - In 2002-2003 allow snowmobile use at a maximum of 50% of the current use level, at the South and West Entrances of YNP. Current snowmobile use levels would be maintained from the East and North Entrances of YNP.
  - In 2002-2003 for GTNP eliminate snowmobile use on the Teton Park Road and all motorized use on Jackson Lake.
  - In 2003-2004, all oversnow motorized visitor travel in the parks would be by snowcoach. Close the CDST through GTNP.
- This alternative includes an affirmative commitment to implement strategies designed to provide a reasonable level of affordable access to winter park visitors.
- Continue scientific studies and monitoring regarding winter visitor use and park resources. Close selected areas of the park, including sections of roads, to visitor use if scientific

[21] Note: The term "NPS managed" refers to permit management. In this case the mass transportation snowcoach system would be provided by private concessionaires who operate under a permit from the NPS. Under the terms of the permit or concessions contract, the NPS may stipulate, among other items, the type of services to be offered, cost to the public, and number of visitors that may be served or transported. The NPS may require that the types of vehicles used meet certain environmental and safety requirements. It is the responsibility of the NPS to monitor all services offered under permit to ensure that the public and the parks are being well served. These permits are generally offered for competitive bidding and are granted for a specific number of years.

[22] Estimates of emissions for conventional vans converted for oversnow travel indicate that the emissions increase once the conversion is made. For this reason adherence to EPA regulations for similar wheeled vans is neither appropriate nor required.

studies indicate that human presence or activities have a detrimental effect on wildlife or other park resources that could not otherwise be mitigated. The appropriate level of environmental assessment under NEPA will be completed for all actions as required by CEQ regulations (40 CFR parts 1500-1508).

- Give a 1-year notice before any closure is implemented unless immediate closure is deemed necessary to avoid impairment of park resources.

Actions for Yellowstone National Park

- Continue all existing groomed motorized routes (zone 3). Evaluate snowcoach service on the East Entrance Road if safety goals can be met. Management of avalanche danger on the East Entrance Road may mean unscheduled closures of the road to all travel.
- Provide nonmotorized opportunities (e.g., skiing and snowshoeing) (zones 8 and 9). Examples of existing roads or trails that would be groomed include Fountain Flats Road and portions of the East Entrance road.
- Where feasible, set parallel tracks on one or both sides of the snow roads to facilitate nonmotorized access.
- Increase interpretive opportunities related to the unique aspects of the winter environment by providing interpretive programs at destination areas and warming huts. Provide guided interpretive programs for organized groups on snowcoaches. Provide interpretive ski and snowshoe tours and programs such as near Tower, Canyon, Mammoth, Old Faithful, West Thumb, Madison, and West Entrance.
- Restrict nonmotorized uses in wildlife winter ranges and thermal areas to travel on designated routes or trails (zones 8 and 9).
- Implement the winter use season during the period from late November to mid-March.
- Reduce administrative snowmobile use from the 106 currently used and supplement with administrative snowcoaches, subject to available funding. Phase a limited number of administrative snowmobiles to a type that meet the best available emission and sound limits.
- Continue allowing personal non-recreation use of snowmobiles by employees and their families living in the interior of Yellowstone; however, subject to available funding, provide administrative snowcoaches for their use and encourage them to replace their current snowmobiles with clean and quiet machines.
- Allow limited use of snowmobiles by concessionaires. Require clean and quiet technologies as they are developed (through permit and contracts) and encourage the use of snowcoaches.

Actions for Grand Teton and the Parkway

- Provide opportunities for oversnow motorized trail use (zone 3) by snowcoaches only on the unplowed, groomed surface of the highway from Colter Bay to Flagg Ranch, and north into Yellowstone and the Grassy Lake Road
- The park would continue to provide access to inholdings and adjacent public and private lands using motorized means. This access would be a combination of plowed roads for wheeled-vehicle access, and staging areas for snowmachines traveling to immediately adjacent lands.
- Provide opportunities for nonmotorized ungroomed winter trail use (zone 9):
  - On the Teton Park Road from Taggert Lake Trailhead to Signal Mountain.
  - On Antelope Flats.
  - Near Colter Bay and Two Ocean Lake.
  - On the unplowed portion of the Moose-Wilson road.
- Continue destination and support facilities at Moose, Triangle X, Colter Bay, and Flagg Ranch, and add warming hut facilities along the Teton Park Road to provide visitor services and interpretive opportunities that focus on nonmotorized uses (zone 1).
- Limit backcountry nonmotorized use to designated routes to address wildlife issues in certain wildlife winter ranges, or close certain areas to all use.

- Winterize facilities at Colter Bay to provide a suitable staging area for snowcoach access.
- Discontinue the motorized use of Jackson Lake's frozen surface (no snowplanes or snowmobiles).
- Increase interpretive opportunities related to the unique aspects of the winter environment by providing interpretive programs at destination areas and warming huts. Provide guided interpretive programs for organized groups on snowcoaches. Provide interpretive ski and snowshoe tours and programs at locations such as Moose, Colter Bay, and Flagg Ranch visitor services.
- Phase in administrative snowmobile types that meet the best available emission and sound limits. Administrative use of snowmobiles in Grand Teton is limited to law enforcement, utility and maintenance access, and search and rescue or other use as approved by the superintendent. Converting this use to snowcoaches would limit the ability of park employees to respond effectively to emergencies in these areas.

MITIGATION

Alternatives analyzed in this EIS would produce environmental effects, both beneficial and adverse. These are disclosed in Chapter IV. For adverse impacts, additional actions are suggested for the purpose of lessening the magnitude, duration, or intensity of the impact. These actions termed mitigation (defined in 40 CFR §1508.20) are recommended as choices for the decision maker not already included in the alternative.[23]

Mitigation Common to All Alternatives

Water Resources

- Best management practices would be used during the construction, reconstruction, or winter plowing of trails and roads to prevent unnecessary vegetation removal, erosion, and sedimentation.
- New sanitary facilities would be constructed in locations using advanced technologies that would protect water resources.
- Separate winter-motorized trails from drainages to mitigate the routing of snowpack contaminants into surface water.
- Any new or reconstructed winter use sanitary facilities would be constructed in locations and with advanced technologies that would protect water resources.
- A focused monitoring program would reduce the uncertainty of impacts from oversnow vehicles, and if necessary indicate best management practices that might be implemented.

Wildlife, Including Federally Protected Species and Species of Special Concern

- NPS personnel would patrol sensitive resources to ensure compliance with area closures.
- Monitoring of eagle populations to identify and protect nests would continue. The park would continue to support the objectives of the Greater Yellowstone Bald Eagle Management Plan.
- Monitoring of wolf populations would continue.
- Lynx surveys would be undertaken to document the distribution and abundance of lynx in the parks and their relationship to packed surfaces. The presence of other carnivores would

[23] Many people who commented on the Draft Environmental Impact Statement (DEIS) suggested alternative features or different mixes of alternative features. Some suggestions were appropriate as mitigation for certain types of impacts. Most such suggestions flow logically from the determination of potential impacts disclosed in this EIS. The EPA suggested that limitations on vehicle numbers would be necessary as an approach to addressing air quality impacts because the benefits of alternative technologies would not necessarily offset the impacts of increasing numbers. Some cooperating agencies suggested it would be reasonable to limit numbers as an interim measure until a recreation carrying capacity could be set. Other suggested measures include establishing rationing or reservation systems, permits on a first-come, first-served basis, or other means to limit daily and annual use. If a measure or measures were selected they would become part of the ROD (see *Decision to be Made in* Chapter I).

be documented. The parks would abide by the recommendations of the Lynx Conservation Assessment Strategy.

- Monitoring grizzly bear populations would continue in accordance with the Interagency Grizzly Bear Management Guidelines and the parks' bear management plans.
- Monitoring and protecting trumpeter swan habitats and nests would continue, including the closure of nest sites, when warranted, to public access from February 1 to September 15.
- Monitoring potential or known winter use conflicts would result in area closures if necessary to protect wildlife habitat.

Cultural Resources

- Should the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony occur during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) would be followed.
- Trails and trailheads would be sited to avoid adversely impacting known cultural resources, including potential cultural landscapes. In addition, the use of natural materials and colors for all permanent signs erected would allow the signs to blend into their surroundings.

Mitigation Strategies for Each Alternative

Alternative A No Action (Current Management)

Wildlife

- Continue to implement closures around wolf dens and swan and eagle nests. Closures would be posted and enforced for the time during which the species is most sensitive to human disturbance.
- Enhance monitoring and evaluation of backcountry nonmotorized use in GTNP, and implement closures as necessary.
- Provide ramps or pullouts to reduce collisions between snowmobiles and moose along the CDST.
- Continue to monitor use of groomed and plowed surfaces by bison and other ungulates.
- Conduct snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes.

Alternative B

Air Quality

Threshold: Address the EPA's concern that unless use limits are implemented, air quality issues could develop in areas of the three park units where they currently do not occur, and the benefits of using less polluting fuels and lubes would be offset by increasing numbers of oversnow vehicles.

- Set winter visitor use numbers for all three park units not to exceed the 7-year peak daily average and the 7-year annual average until carrying capacity studies (such as mogul development on snow roads) are complete and clean, and quiet standards implemented. Cap use at Old Faithful at 1,000 vehicles per day. (See FEIS Appendix G for breakdown by vehicle type.)[24] The visitor scenario developed and illustrated in the visitor access impacts section for this alternative shows use distribution in the three parks at the current daily average snowmobile use level over the past 7 years with no net increase or decrease in use park wide. Therefore, the scenario illustrates numbers by gateway and road segment and can be interpreted as an interim visitor use limit. The interim cap on visitor use would be applied by gateway. Maximum limits would include both the annual average and the daily peak. The average for total annual and daily peak oversnow use is expressed below.

Table 6. Average total annual and daily peak oversnow use.

[24] A 7-year interim carrying capacity was suggested in Revised Alternative E.

Park	7-Year Average Annual Oversnow Vehicles	7-Year Average Daily Peak Oversnow Vehicles
Yellowstone	93,289	1,181
Grand Teton and the Parkway	25,312	300

Water and Aquatic Resources

- The new year-round CDST pathway in GTNP and the Parkway would be designed and sited to minimize impacts to all park resources including wildlife, vegetation, and wetlands. Any impacts to wetlands would be minimized and mitigated in accordance with NPS Wetland Guidelines. Any needed bridges would be designed to complement, not impact, floodplains in accordance with NPS Floodplain Management Guidelines.
- The use of bio-based fuels by the NPS and the availability of fuels in gateway communities may result in a minor decrease in pollutant deposition into snow.

Wildlife

- Continue to implement closures around known dens and nests.
- Enhance monitoring and evaluation of backcountry nonmotorized use in GTNP, and implement closures as warranted.
- Provide ramps or pullouts to help reduce collisions between snowmobiles and moose along the CDST.
- Continue to monitor the use of groomed and plowed surfaces by bison and other ungulates.
- Conduct snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes.

Alternative C

Water and Aquatic Resources

- Any portion of the CDST constructed in the widened highway shoulder would be designed to stabilize adjacent toe slopes, incorporate sufficient drainage, and protect stream banks at crossings.
- The use of bio-based fuels by the NPS and the availability of fuels in gateway communities may result in a minor decrease in pollutant deposition into snow.

Wildlife

- In YNP the campground use season should not be extended, and backcountry permits should not be issued in order to mitigate any possible impacts on grizzly bears due to the open road from the West Entrance to Old Faithful.
- The continued implementation of human use restrictions in the current Bear Management Area will help alleviate the risks of bear/human confrontations in spring habitats.
- Where motorized use occurs near active trumpeter swan habitats in open water, sign or plow the route to prevent vehicles from stopping.
- Backcountry monitoring and administration should be implemented in GTNP. Additional area closures could be imposed if monitoring indicates they are warranted for the protection of bighorn sheep and moose.
- The effects of winter use on wolves should be monitored. Areas would be closed as necessary to protect winter and denning habitats.
- The entire length of the new, groomed motorized trail from Jackson to Moran Junction, and the CDST from Moran Junction to Flagg Ranch should be patrolled to ensure that snowmobilers remain on the trail and do not illegally enter areas that are important winter range.
- The effects of the warming hut in the Two Ocean Lakes area would be monitored. If human/bear conflicts arise, close the facility.
- Continue to monitor use of groomed and plowed surfaces by bison and other ungulates.

- Conduct snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes.

Alternative D

Air Quality

Threshold: Do not exceed National Ambient Air Quality Standards or Montana Ambient Air Quality Standards in the three park units.

- Set winter visitor use numbers for all three park units not to exceed the 7-year peak daily average and the 7-year annual average. Limit use at Old Faithful to a level not to exceed 1,000 vehicles per day. The visitor scenario developed and illustrated in the visitor access impacts section for this alternative shows use distribution in the three parks at the current daily average snowmobile use level over the past 7 years¾ no net increase or decrease in use park wide. Therefore, the scenario illustrates numbers by gateway and can be interpreted as interim caps.
- Relocate West Entrance.[25]
  - Encourage prepaid passes until construction is complete.
  - Require speed limit between 10 and 20 mph.
  - Using modeling, determine the maximum number of snowmachines permitted to enter each hour for all entrances (about 450 snowmachines per hour the West Entrance).[26]

Water and Aquatic Resources

- Any portion of the CDST constructed in the widened highway shoulder would be designed to stabilize adjacent toe slopes, incorporate sufficient drainage, and protect stream banks at crossings.

Wildlife

- Backcountry monitoring and administration should be implemented in GTNP. Additional area closures could be imposed if monitoring indicates such a closure is warranted for the protection of wintering bighorn sheep and moose.
- Providing wildlife escape routes along winter roads may mitigate some of the impacts caused by groomed road surfaces.
- Continue to monitor use of groomed and plowed surfaces by bison and other ungulates.
- Conduct snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes.

Alternative E

Air Quality

Threshold: Achieve the lowest vehicle emissions possible (comparable to alternative G) using current technologies. Encourage the use of new or less polluting technologies, and allow for current peak levels of visitor access including the use of snowmobiles.

For Yellowstone National Park: A point system would be administered to cap vehicle use when the maximum number of points is reached for each vehicle type (see Table 7). Under this system, higher polluting vehicles would amass more points. Credits would be earned for applying technologies that reduce emissions. This system would be accomplished through permit administration for snowcoach vehicles and a reservation

[25] These elements were suggested by the State of Montana.
[26] Modeling is not an exact science. The hourly number of snowmobiles in Montana DEQ's modeling analysis was plus or minus 40% due to a lack of sufficient weather and emissions data. For the West Entrance, a conservative estimate of 700 conventional snowmobiles per hour (minus 40%) equates to about 450 snowmobiles per hour.

program for snowmobiles. To encourage mass transit, snowcoach vehicles would not be limited as long as they carried at least five passengers. Since snowcoach transport is less limiting in terms of "visitation efficiency", there is an incentive for commercial enterprises to convert from snowmobile operations to mass transit.

Table 7. Point system for capping oversnow vehicle use.

Vehicle Type	Vehicle Points	Technology Credit†	Total	Max Daily Points**	Max Daily Vehicles§
Snowmobile without bio-fuels	10	0	10	1340	134 - 179
Snowmobile with bio-fuels	10	-2.5	7.5		
Snowcoach/conversion vans	1	0	N/A‡	200*	Up to 200
Snowcoach/Bombardiers	15	0	15	60	4 - 5
Snowcoach/Bombardiers with pollution reduction retrofits	15	-2.5	12.5		

†Variable: Increased credit would be earned proportionate to emission reductions as determined by standard testing methods. A 25% reduction is theoretically possible by changing fuels and lubricants.

‡N/A is indicated here because the number will generally be less than 0 for vehicles of this type

**Maximum daily vehicle points are derived from Compilation of Air Pollutant Emission Factors – Volume II: Mobile Sources, Table J-28. This source was used to identify the emission levels that were used by the State of Montana to model oversnow vehicle emissions at the West Entrance. They reflect the amount of CO grams per mile (g/mi) emitted by each vehicle type: roughly 1,000 g/mi (at 10 mph) for a snowmobile, 1,500 g/mi (at 10 mph) for a Bombardier and 109 g/mi (at 10 mph) for a conversion van. One point is assigned for approximately every 100 g/mi of CO emitted. Once the maximum points are reached each day no more would be allowed to enter the parks for each vehicle type.

§Technology credits are derived by assigning 1 credit for each 10% of emission reduction achieved (i.e., up to a 25%). Howard Haines, Montana DEQ, suggests that this level is possible. White, Carroll, and Haines, report reductions of carbon monoxide at 38% and reductions of particulate matter at 43% (SAE 972108, 1997). Reduction in emissions may be achieved through the use of bio-based lubricants and ethanol fuel. For vehicles utilizing those fuels, 2.5 credits would be deducted from the overall score for that vehicle type. Credits would be given for all other technological advances that reduce a level of pollutant in vehicle emissions as long as there is no corresponding increase in another pollutant. Credits may be adjusted yearly. Every incremental reduction in emissions by oversnow vehicles would earn a proportionate technology credit. A 25% reduction for bombardiers and snowmobiles is illustrated in the table to reflect a change in fuel and lubricant use.

*200 conversion van snowcoaches would accommodate a historic peak use day in YNP.

For Grand Teton: Cap the number of visitors on Grassy Lake Road to current peak use numbers (about 50).

Wildlife

- Backcountry monitoring and administration should be implemented in GTNP. Additional area closures could be imposed if monitoring indicates such a closure is warranted for the protection of bighorn sheep and moose.
- Continue to monitor use of groomed and plowed surfaces by bison and other ungulates.
- Conduct snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes.

Alternative F

Wildlife

- Recommended mitigation for this alternative includes closure of two additional areas in GTNP to backcountry use: Blacktail Butte and Wolff Ridge. Close the south- and west-facing slopes of Blacktail Butte from the valley floor to the summit, and close all aspects of Wolff Ridge. Additional closures could be imposed if monitoring indicates such a closure is warranted for the protection of wintering species.
- Backcountry monitoring and administration should be implemented in GTNP.

- In GTNP close important bighorn sheep winter range in the north and south Teton Range[27]
- Provide wildlife escape routes along motorized winter roads and trails.
- Continue to monitor use of groomed, ungroomed, and plowed surfaces by bison and other ungulates.
- Conduct snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes.
- Cap use at the average daily use for each road segment in each park. See visitor scenario for this alternative showing average daily use by segment under *Effects on Visitor Access*, alternative F, Chapter IV, and in Appendix G.
- Snowmobiles must be accompanied by a NPS-permitted guide and travel in groups of 6 to 11 (includes guide), except for Grassy Lake Road.
- To avoid the crepuscular hours when wildlife is most active, snowmobiles would be permitted to travel in the parks only between the hours of 9 A.M. and 3:30 P.M.
- Before entering the park all oversnow vehicle operators would be required to review a video highlighting appropriate procedures and behaviors to reduce wildlife impacts.

Alternative G—Preferred Alternative

Interim Snowmobile Use Limits

- During the winters of 2000-2001 and 2001-2002, hold visitation by snowmobiles as follows:
  - Set snowmobile use numbers for all three park units at levels not to exceed the 7-year peak daily average. The visitor scenario developed for alternative A (Appendix G) shows snowmobile use distribution at YNP gateways, and by road segments in the three parks at both the current daily average and peak average snowmobile use levels over the past seven years. The scenario provides numbers that can be expressed as interim visitor use limits. Maximum daily limits at the entrances would be set at the average peak day snowmobile use (see Table 8).
  - Cap use at Old Faithful at 1000 vehicles per day.
  - The maximum number of snowmobiles to be passed through the West Entrance would be limited to 400 snowmobiles per hour. For snowplane use on Jackson Lake reissue permits to permit holders of record and do not issue any new permits. Limit snowmobile use on Jackson Lake to 30 per day.

[27] Southern Tetons: 1) in the Prospectors Mountain and Mount Hunt areas (including peak 10,988), all areas above 3,000 meters (m) (9,900 feet (ft.)), and south-facing slopes on Mount Hunt above 2,600 m (8,580 ft.); 2) the slopes of Static Peak above 3,300 m (10,890 ft.) (does not affect Albright Peak); and 3) the south-facing slopes above 3,000 m (9, 900 ft.) along the north side of Avalanche Canyon and the north fork of Avalanche Canyon.
Northern Tetons: 1) in the Ranger-Doane-Eagles Rest area (including peaks 10,298, 10,881, 10,023, 10,686), all areas above 3,000 m (9,900 ft.), and south-facing slopes of Eagles Rest above 2,600 m (8,580 ft.); 2) in the Elk Mountain-Owl Peak area, all areas above 3,000 m (9,900 ft.), and south-facing slopes above 2,600 m (8,580 ft.); 3) on Forellen Peak, all areas above 2,800 m (9,240 ft.) and south-facing slopes above 2,500 m (8,250 ft.); and 4) the ridge crest and south-facing slopes of the cliffs at the mouth of Moose Creek (also known as the Lower Berry Cliffs) above 2,300 m (7,590 ft.).

Table 8. Interim cap on snowmobile use in alternative G for Yellowstone/Grand Teton/Parkway area road segments.

Road Segments	Average Peak Day* Snowmobile Use	Average Daily Snowmobile Use
Mammoth to Northeast Entrance	0	0
Mammoth to Norris	40	30.5
West Entrance to Madison	975	554.2
Madison to Norris	435	247.0
Norris to Canyon Village	325	184.5
Canyon Village to Fishing Bridge	260	148.1
Fishing Bridge to East Entrance	65	36.4
Fishing Bridge to West Thumb	220	125.1
Madison to Old Faithful	860	488.6
Old Faithful to West Thumb	370	209.4
West Thumb to Flagg Ranch	275	175.8
Grassy Lake Road	40	24.2
Flagg Ranch to Colter Bay	40	24.3
Colter Bay to Moran Junction	40	24.3
Moran Junction to East Entrance	40	24.3
Moran Junction to South Entrance	0	0
Teton Park Road	20	10.4
Moose-Wilson Road	5	3.0
Antelope Flats Snowmobile Route	0	0

*Average daily use numbers are provided for information. The average daily peak use shown in this column, rounded to the nearest five snowmobiles, is considered the maximum

Wildlife

- Continue to assess grizzly bear abundance, distribution, and habitat selection, including the location of dens. The information obtained will assist park managers in protecting important habitats and planning recreational activities that minimize disturbance to bears.
- Conduct snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes.
- Continue to monitor use of groomed, ungroomed, and plowed surfaces by bison and other ungulates.

Research Needs

All alternatives call for determining visitor use carrying capacities. Visitor carrying capacities would be based on studies that set indicators and standards for desired visitor experiences and resource conditions. These carrying capacities would require that indicators be monitored to ensure that desired experiences and conditions are maintained. Resource inventory, monitoring, and adaptive management are proposed and require the establishment of baselines and thresholds upon which to assess the degradation to park resources. Although EOs 11644 and 11989 and their implementing regulation 36 CFR §2.18 direct the NPS to manage certain resources for their protection, they provide little

guidance as to acceptable thresholds. The research needs identified below will help to determine appropriate thresholds, evaluate management outcomes relative to these thresholds, and assist in the development of management alternatives and mitigation. Research findings will provide systematic feedback for winter use management and input for mitigation of unplanned or undesirable effects on park resources and visitor experiences.

- Research grizzly bear movements to provide information on bear expansion throughout the GYA. Specific information on grizzly bear movements, habitat use, and den locations will allow an evaluation of potential areas of grizzly/visitor conflict, and assist park managers in protecting important habitats and in planning recreational activities that minimize disturbance to bears. Specifically, the effects of snowmobiling on denned grizzly bears need to be discerned, and areas of potential conflict delineated.
- Conduct lynx surveys to evaluate population levels and distribution, especially in relation to winter recreation areas and other potential competitors. Because snow compacting activities (e.g., grooming, the use of oversnow motorized vehicles, and skiing) may allow other carnivores to compete with lynx in areas where they would otherwise be restricted by deep snow, it is important to determine whether these activities affect lynx in the parks. In addition to lynx surveys, recording the presence and abundance of snowshoe hares, the primary prey of lynx, can provide information on potential lynx habitats, and overtime serve as an index to predict lynx population densities and trends.
- Systematically survey and monitor ungulate winter ranges. Ungulates are highly stressed in the winter and their energy reserves are taxed. Winter visitors can further deplete ungulates' reserves by causing them to flee or by displacing them to lower quality habitats. The parks have implemented closures in some important ungulate wintering areas. Some of the alternatives call for additional restrictions and closures. To ensure the efficacy of regulating visitor use, it is necessary to survey and monitor ungulate ranges and assess potential and ongoing conflicts with winter recreation.
- Research and evaluate the impacts of winter recreation on wolverines. Wolverines occur in low-density populations and are one of the least studied carnivores in North America. They are believed to be extremely sensitive to human disturbance, especially during the denning period (Copeland 1996). This sensitivity combined with increasing winter recreation use warrants more specific information on wolverines and the effects of winter recreation. The results of such a study could be used to develop guidelines to minimize potential conflicts between winter visitors and wolverines.
- Measure water chemistry associated with streams and other water bodies at high risk to snowmelt pollutant runoff. Evaluate the impacts of changes in water chemistry or pollutants on riparian biological systems at high risk from snowmelt pollution. Investigate potential downstream accumulations of products from internal combustion engines and associated fuels or lubricants.
- Continue the study of the formation and geometry of moguls (Alger et al. 2000). Investigate the formation of moguls to determine the best means to groom trails to minimize roughness. Investigate in connection with weather parameters such as snow temperature, free water content, and new snow.
- Investigate the visitor's ability to experience park values such as opportunities to view wildlife and scenery, clean air, natural quiet, and solitude. Investigate the intrinsic value of these resources as well as their value to park visitors, non-park visitors, and those persons who hope to visit the parks someday.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

In response to scoping, several comments included suggestions for alternatives or alternative actions. Many of these suggestions may be found in the alternatives

considered in detail; others were eliminated from study. During the alternative formulation process, cooperating agencies and agency personnel participated in workshops to develop ideas for alternatives. Many of the ideas were incorporated into the alternatives analyzed in detail. Appendix A provides a detailed description of this process and the ideas generated, including the rationale for eliminating ideas. The alternative ideas and rationale for their elimination are presented below.

- ***Alternate years for skiing and snowmobiling.*** Effective management of concessions, businesses, and park facilities depends on a degree of consistency in use and types of use from year to year. This alternative does not appear to be logistically feasible for managers or supportive of the needs and plans of the business community.
- ***Establish a monorail.*** Although the benefits of this alternative might eventually prove to be substantial, implementation costs would be enormous. Because a hyper-car system would be a year-round improvement and not strictly a winter use item, this action would be best addressed in a general management plan. Establishing a monorail is economically unfeasible at present.
- ***Open additional areas of the parks to disperse and accommodate use.*** Most areas of the parks outside road corridors are in recommended or potential wilderness. They are, therefore, unavailable for allocation to the suggested motorized uses. For example, use of mechanical equipment to groom ski trails in recommended wilderness is inappropriate.
- ***Open more gateways to the parks***. See previous suggestion. Current locations for access to the parks are the only possible locations considering areas of recommended wilderness. In addition, a large part of the perimeter around both parks abuts congressionally designated wilderness on national forests.
- ***Increase/decrease access to areas of the parks by opening/closing trails*****.** See previous two suggestions.
- ***Eliminate oversnow motorized use in the parks.*** Oversnow motorized use is considered within the range of recreational opportunities to be provided. This alternative is essentially the same as The Natural Regulation Alternative recommended by The Fund for Animals. Total elimination of oversnow motorized use without analysis would not be within the scope of the purpose and need for action. Alternative G approaches this issue by eliminating snowmobiles in favor of access by snowcoach mass transit. However, snowmobile use is allowed (on designated routes only) under NPS regulations (36 CFR 2.18). A determination must be made that snowmobile use is consistent with the parks' natural, cultural, scenic, and aesthetic values, safety considerations and management objectives, and will not disturb wildlife or damage park resources. Within the range of alternatives in this FEIS there are a variety of features that close various portions of the parks to various types of winter uses. Comparisons of effects can be made between alternatives in which road segments or areas are closed, opened, or managed differently. The comparison can facilitate the determination of impacts on park resources or wildlife where sufficient data is available, resulting in closure as part of the selected alternative. Two alternatives, B and E, are constructed around adaptive management themes. These alternatives dictate implementation of focused monitoring programs to determine explicitly whether such impacts occur. Further, upon such determination through monitoring results, closures are prescribed in accordance with the regulation cited above.

- ***Plow the road from West Yellowstone to Old Faithful and establish a snowmachine route along the road.*** Due to the high volume of winter visitor use, establishing a bimodal transportation route on the roadways from West Yellowstone to Madison to Old Faithful would pose significant safety risks to park visitors and employees. This action would create the same safety concerns that have been identified on the CDST.
- ***Open existing facilities in the park interior to dispersed use – for example Canyon, Grant Village, or Lake*****.** A reference to other plans and environmental analysis in Chapter 1

includes commercial services plans for both parks. Since these plans are already in process, the decision was made not to include any detailed analysis of commercial facilities in the Winter Use Plans/EIS.

ALTERNATIVES SUGGESTED DURING THE PUBLIC COMMENT PERIOD

Approximately 46,500 comment letters were received during the public comment period for the DEIS. Of that number 93%, or about 43,100 documents, expressed support for one of five alternatives:

- The Natural Regulation Alternative submitted by The Fund for Animals et al.
- The Citizens' Solution submitted by the Greater Yellowstone Coalition et al.
- The Jackson Hole Alliance Proposal
- The State of Montana's alternative
- Revised Alternative E, submitted by the cooperating counties, the State of Wyoming and the Blue Ribbon Coalition.

Of the letters that indicated support for an alternative, 44% supported Revised Alternative E; 45% supported The Citizens' Solution, and 4% supported The Natural Regulation Alternative. As a whole, The Natural Regulation Alternative was determined to be outside the scope of analysis including its provision for a monorail system in YNP (see *Alternatives Considered but Dismissed from Detailed Study–Eliminate Oversnow Motorized Use in the Parks* above).

The alternative features suggested in Revised Alternative E and The Citizens' Solution are a compilation of various alternative features already included in the range of alternatives considered (see Chapter I, *Decision to be Made*). Other features in these suggested alternatives are mitigation and implementation strategies. Where appropriate, these strategies have been incorporated into the range of alternatives evaluated in this FEIS, and are available for selection by the decision maker in the Record of Decision.

Public comment letters on the DEIS have either been reproduced in their entirety or summarized and may be located along with the responses to them in Volume III, *Public Involvement*. For convenience, summaries of Revised Alternative E and The Citizens' Solution are provided in Table 9 and Table 10, showing where a particular action has been described and analyzed in the range of alternatives.

Table 9. Summary of The Citizens' Solution.

General Features of The Citizens' Solution	Winter Use Plans Alternatives							
	A	B	C	D	E	F	G	Notes
Phase out all snowmobile use in the 3 parks over the next 3 years							X*	*Alternative G specifies a 2-year implementation schedule
Eliminate the CDST in GTNP					X	X	X	

Provide only mass transit snowcoach access on current oversnow roads in Yellowstone							X	
Close Yellowstone's East Entrance				X			X*	*No snowcoaches through East Entrance currently
Expand research on winter related impacts to park values		X			X		X	
Establish winter visitor carrying capacity	X	X	X	X	X	X	X	

X = Suggested feature is included in the range of alternatives presented in the DEIS and FEIS.
M = Suggested feature is included as mitigation in the range of alternatives presented in the FEIS.

Table 10. Summary of Revised Alternative E.

General Features of Revised Alternative E	Winter Use Plans Alternatives							
	A	B	C	D	E	F	G	Notes
Utilize *only* EPA standards to regulate emissions	X		X					
Commitment to the development of acceptable measures consistent with criteria in 36 CFR 2.18		X		X				
Establish FACA† Committee *to advise on management of wildlife, air quality, and other resources** as well as implementation of mobile emission AND sound standards		X*			X*			*Advisory committee for emissions/sound standards only
Require the sale of bio-based fuels; require all commercial operators to use these fuels. Promote pre-paid passes *at all entrances**	X*	X	X	X M*		X		*Passes are currently available in West Yellowstone
Move West Entrance, implement 10 to 20 MPH speed limit; model hourly maximum emissions at all entrances				M*				*Suggested by State of Montana
Relocate CDST to year round path		X						
Improve grooming on Grassy Lake Road								Grooming standard is not a significant issue
Keep snowplane & snowmobile use on Jackson Lake	X		X					
Eliminate snowmobiles on interior Teton Park Road		X		X	X	X	X	
Eliminate snowmobiles on Moose-Wilson Road			X	X	X	X	X	
Continue existing winter facilities; add warming huts	X	X	X	X			X	
Nighttime closure from 10 P.M. to 6 A.M.		X		X			X	
Aggressive information program using video technology		X	X	X			X	
Open existing facilities to winter use (e.g. Colter, Canyon*)			X	X			X	*Defer to NPS Commercial Services Plan
In YNP, restrict nonmotorized uses in wildlife winter range to travel on designated trails only		X		X	X	X*	X	*Total area closure in YNP
In GTNP, restrict nonmotorized uses in key wildlife winter range	X	X	X	X	X	X M*	X*	*Adds bighorn sheep closures
Establish interim winter visitor carrying capacity *based on 7 year average* *of winter visitor use		M		M				*Carrying capacity study in all alternatives
Continue scientific studies and monitoring related to park resources *with independent 3rd party review by National Academy of Sciences* (NAS)*		X			X			*Review by NAS not stipulated in any alternative

X = Suggested feature is included in the range of alternatives presented in the DEIS and FEIS.
M = Suggested feature is included as mitigation in the range of alternatives presented in the FEIS.
†FACA = Federal Advisory Committee Act

SUMMARY OF ALTERNATIVES AND EFFECTS

As required in the CEQ regulations, this chapter presents the alternatives and their environmental impacts in a comparative form. The following two tables list the issues and provide a clear basis of choice for the decision maker. Table 11 is a summary of alternative features and Table 12 is a summary of effects for all alternatives.

Table 11. Summary of Alternatives

ALTERNATIVE A NO ACTION	ALTERNATIVE B PREFERRED ALTERNATIVE	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE F	ALTERNATIVE G
Visitor Use & Access						
Yellowstone · Maintain current 180 miles of groomed oversnow motorized road · Maintain current 37 miles of groomed nonmotorized · Maintain 76 miles of plowed road (include Hwy 191 to Cooke City) · Existing winter season from mid December to mid March **GT/JDRMP** · 100 miles plowed road · 33.9 miles groomed motorized trail · 35.6 ungroomed motorized trail or area · 26.4 ungroomed non- motorized trail or area	**All Units** · Increase interpretive opportunities **Yellowstone** · Establish 6 miles of new oversnow motorized trails · Establish 10 miles of new nonmotorized trails · Allow all-wheeled public shuttle vehicle access by plowing the road from West Yellowstone, MT to Old Faithful · Lengthen season by two weeks from the West Entrance · Increase size and number of warming huts and other day-use facilities · Continue scientific studies in re: impacts of winter visitor use and park resources; close selected areas or road segments if no other possible mitigation method **GT/JDRMP** · Establish 6.5 miles of new nonmotorized trail · Continue current & add destination facilities · Provide interpretive ski tours · 5-year phase-out of snowmobiles on Jackson Lake	**Yellowstone** · Establish winter campsites (e.g. Old Faithful area) · Establish 10 miles of new oversnow motorized trails · Establish 20 miles of new nonmotorized trails · Allow all-wheeled private and public shuttle vehicle access from West Yellowstone, MT to Old Faithful · Lengthen season by two weeks in December from West Yellowstone to Old Faithful and two weeks in March from the South Entrance to West Thumb · Plow the road from Mammoth to Norris to Madison mid-Feb to mid-Mar to allow late-season access · Snowcoach only from Norris to Canyon to Fishing Bridge mid February to mid March · Increase size and number of warming huts and other day-use facilities **GT/JDRMP** · Establish 30.4 miles of new oversnow motorized trail · Establish 6 miles of new nonmotorized trail · Allow all-wheeled access by plowing the Moose-Wilson and Antelope Flats Roads · Allow both snowmobiles and snowplanes on Jackson Lake · Continue current & add destination facilities	**All Units** · Increase interpretive opportunities **Yellowstone** · Separate use by establishing 15 miles of new oversnow motorized trails in the W and SW areas, and 6 miles of new nonmotorized trails in the N and NW areas **GT/JDRMP** · Establish 18 miles of new oversnow motorized route by opening road north of Colter Bay to snowmobiles · Continue current & add destination facilities · Increased and enhanced visitor programs facilities and interpretive opportunities	**All Units** · Continue scientific studies in re: impacts of winter visitor use and park resources; close selected areas or road segments if no other possible mitigation method **Yellowstone** · Restrict backcountry skiing to use of designated trails or routes only in important winter range **GT/JDRMP** · Establish 8.6 miles of new nonmotorized trail · CDST eliminated through GTNP · Oversnow motorized uses are eliminated except for Grassy Lake Trail and groomed motorized route north of Flagg Ranch	**Yellowstone** · Close sections of road from the West Entrance to Madison Junction and Madison Junction South to Old Faithful and the road segments from Mammoth south to Norris Junction and from Norris Junction south to Madison Junction · Restrict skiing to use on front-country designated trails. Backcountry use would be prohibited · Winter use season from mid-December to early March **GT/JDRMP** · Same as Alternative E	**All Units** · Increase interpretive opportunities · Snowcoach only travel **Yellowstone** · Groom 11 miles of nonmotorized trail **GT/JDRMP** · Continue current & add destination facilities · Establish 4 miles of new nonmotorized trail · Open the road from Colter Bay to the South Entrance to snowcoaches · Open the Grassy Lake Road from Flagg Ranch to the west boundary for snowcoach travel
Human Health & Safety						
All Units · Over-snow speed limit 45 mph except for the Moran to Flagg Ranch segment, which is 35 mph.	**All Units** · Prohibit late-night oversnow travel 11 P.M. to 5 A.M. · Implement information and enforcement program **GT/JDRMP** · Separate auto use from snowmachine use by moving CDST to new pathway between Moran and Flagg Ranch · Separate motor and nonmotor uses on interior park road; allow nonmotorized use only from Taggert Lake Trailhead to Signal Mountain · Prohibit snowmachine use on CDST 8 P.M. to 5 A.M. to allow for groomers	**GT/JDRMP** · Move the CDST to a widened highway shoulder between Colter Bay and Flagg Ranch	**All Units** · Prohibit late-night oversnow travel · Implement information and enforcement program **Yellowstone** · Close East Entrance road · Groom from West Yellowstone to Madison to Old Faithful more frequently **GT/JDRMP** · Move the CDST to unplowed road from Colter Bay to Flagg, and to widened highway shoulder from Colter to Moran · Nonmotor use only on interior park road	**All Units** · Reduce nighttime oversnow speed limit to 35mph **GT/JDRMP** · Separate motorized and nonmotorized opportunities	**All Units** · Prohibit night oversnow travel, sunset to sunrise **GT/JDRMP** · Same as Alternative E	**All Units** · Prohibit late-night oversnow travel
Local Communities & Adjacent Lands						
All Units · The 1999 Interagency Winter Visitor Use Assessment shows relationships and cooperative programs for winter use in the GYA · NPS visitor contacts are provided at visitor centers in West Yellowstone and Jackson Hole.	**All Units** · Implement information program in cooperation with local communities · Establish advisory committee to phase and implement emission standards	**All Units** · Implement information program in cooperation with local communities	**All Units** · Implement information program in cooperation with local communities	**All Units** · Establish advisory committee	**All Units** · Implement information program in cooperation with local communities	**All Units** · Implement information program in cooperation with local communities
Natural Resources						
All Units · Enforce current sound standards, 78dB(A) · Bio-lubes and fuels used by NPS	**All Units** · Establish advisory committee · Require new technologies · Phase in more stringent standards for oversnow vehicle emissions · All oversnow vehicle sound emissions must be at or less than 70 dB(A) · Monitor natural resources at current levels of administration, and use regulatory measures when necessary to prevent identified disturbances resulting from winter recreation use **Yellowstone** · Continue scientific studies in re: impacts of winter visitor use and park resources; close selected areas if no other possible mitigation method · Restrict nonmotorized use to designated important winter range **GT/JDRMP** · Phase in motorized use by snowplanes only on Jackson Lake	**All Units** · Enforce current sound standards, 78dB(A) · Manage wildlife same as in Alternative A · Phase in alternative fuel/lube sales to public **Yellowstone** · Provide quiet nonmotorized environment by restricting Norris to Canyon to Fishing Bridge road to snowcoaches mid-Feb to mid-Mar	**All Units** · Oversnow vehicle sound emissions must be at or less than 60 dB(A) · Phase in alternative fuel/lube sales · Phase in more stringent standards for oversnow vehicle emissions **Yellowstone** · Restrict nonmotorized use to designated trails in important winter range, except in the Tower and Mammoth areas **GT/JDRMP** · Allow motorized use by snowplanes only on Jackson Lake (no snowmobiles on Jackson Lake)	**All Units** · Establish advisory committee to recommend emission standards for oversnow vehicles · Monitor natural resources at current levels of administration, and use regulatory measures when necessary to prevent identified disturbances resulting from winter recreation use **Yellowstone** · Restrict nonmotorized use in important winter range **GT/JDRMP** · CDST would be accessed via shuttle from east boundary to Flagg Ranch · Eliminate motorized use on Jackson Lake	**All Units** · Require new technologies for reducing snowmobile emissions as they are developed by industry **Yellowstone** · Close road from West Yellowstone to Madison to Old Faithful from Nov 1 to Apr 30 · Allow nonmotorized uses only on groomed trails in frontcountry · Shorten the season by two weeks in March **GT/JDRMP** · Same as Alternative E	**All Units** · Sound emissions must be at or less than 75dB(A) trending to 70dB(A) · Restrict oversnow motorized travel to snowcoaches which meet the best environmental standards available · Continue scientific studies in re: impacts of winter visitor use and park resources; close selected areas if no other possible mitigation method · Restrict nonmotorized use to designated important winter range **GT/JDRMP** · Discontinue all motorized use on Jackson Lake · Close important bighorn sheep winter habitat to backcountry use

Table 12. Summary of Effects*

***Summary Statements Above Are Abbreviated And Taken Out Of Context To Provide A Quick Comparison By Element.**
The Reader Is Encouraged To Review The Supporting Analysis In Chapter IV.

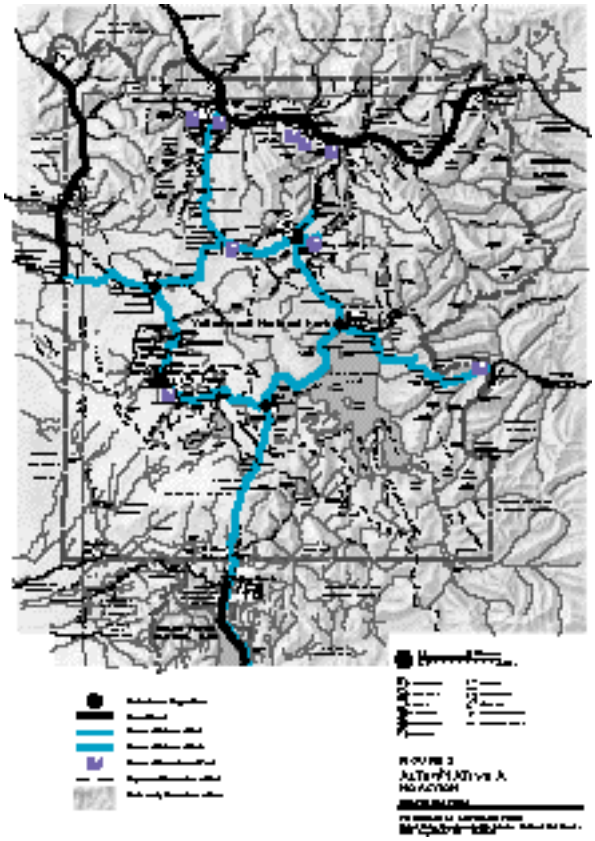
ALTERNATIVE A No Action	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE F	ALTERNATIVE G Preferred Alternative
Socioeconomic						
· Social: continued values and beliefs conflicts · No policy related impacts on economics would result under alternative A. · Continued high cost of winter visitor access.		· Negligible to minor effects on local & state economies. · Major negative effect gateway communities (West Yellowstone). · Moderate negative effects on total nonmarket visitor benefits (through reduced visitation). · Minor to moderate benefit to low-income visitors.	· Negligible to minor effects on local & state economies. · Major negative effect on gateway communities (West Yellowstone). · Moderate negative effect on total nonmarket visitor benefits (through reduced visitation). · Minor to moderate benefit to low-income visitors.	· Negligible to minor effect on local and state economies. · Minor negative effect on total nonmarket visitor benefits (through reduced visitation).	· No short-term effects compared to current condition.	· Negligible to minor effect on local and state economies. · Larger, major adverse effect on the economies of gateway communities (W. Yellowstone and Gardiner). · Minor negative effect on total nonmarket visitor benefits (through reduced visitation).
-term effects						
a red to current condition.Negligible to minor effect on local and state economies. Larger, major adverse effect on the economies of gateway communities (W. Yellowstone and Gardiner). · Minor negative effect on total nonmarket visitor benefits (through reduced visitation).Minor effect on local and state economiesor cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.		· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.	· With appropriate mitigation, no adverse effects on archeological or historic resources, or cultural landscapes.
Air Quality and Public Health						
· Continued minor and adverse effects from emissions exposure parkwide. · Continued moderate and adverse local visitor benefits (through reduced effects at major staging areas. · Continued adverse impacts on employees who work at entrances, destination and staging areas. · Vehicular emissions would continue to cause localized and perceptible visibility impairment near vicinity of the West Entrance, Old Faithful and Flagg Ranch. · Emissions along heavily used roadways would result in localized visibility impairment.	· Major beneficial effects would occur at the W. Entrance, Old Faithful and Flagg Ranch due to reduced PM_{10} and CO. · Moderate to minor beneficial effects dye to reduced CO and PM_{10} concentrations at other locations where snowmobiling is permitted, once strict emission requirements are implemented. · Minor beneficial effects due to reduced CO concentrations along the Flagg Ranch to Colter Bay roadway and the Teton Park Rd. · Relative to existing condition, improved visibility at West Entrance and Old Faithful. · Vehicular emissions would not cause any perceptible visibility impairment in the vicinity of W. Entrance or along park roadways.	· Major beneficial effects at the W. Entrance and along the roadway to Madison and Old Faithful. · Moderate reductions in CO at the Old Faithful staging area. · Minor reductions in CO at Flagg Ranch and along the road to Colter Bay. · Minor to moderate adverse effects (compared to alternative A) where oversnow vehicles would be permitted. · Relative to existing condition, improved visibility at West Entrance. · Vehicular emissions would not cause any perceptible visibility impairment in the vicinity of W. Entrance or along the roadways. · Perceptible visibility degradation could occur in the vicinity of Old Faithful and Flagg Ranch during periods of high use.	· Moderate and major beneficial effects at the West Entrance and along the road to Old Faithful. · Increased traffic at Flagg Ranch and on the road to Colter Bay would result in major adverse impacts to air quality if mitigating use limits were not implemented. · Moderate beneficial effects would occur where snowmobiling is permitted, once strict emission requirements were implemented. · Relative to existing condition, improved visibility at W. Entrance and Old Faithful. · Vehicular emissions would cause localized, perceptible, visibility impairment near the vicinity of W. Entrance and in the area around Old Faithful and Flagg Ranch. · Vehicular emissions along roadways would not result in perceptible visibility impairment.	· In the short term, effects would be the same as described in No Action. · In the long term, negligible to moderate beneficial improvements in air quality near the W. Entrance and other staging areas in YNP-- depending on emissions standards required by FACA committee. · Moderate and major beneficial impacts would occur in GTNP due to the prohibition of snowmobiles on the roadway from Colter Bay to Flagg Ranch and Teton Park Road. · Vehicular emissions would continue to cause localized and perceptible visibility impairment near vicinity of the W. Entrance, Old Faithful and Flagg Ranch. · Emissions along heavily used roadways would result in localized visibility impairment.	· Moderate improvements to visibility in W. Entrance vicinity. · Negligible beneficial effects at Old Faithful. · Negligible to minor adverse effects would occur at Flagg Ranch. · Moderate and major beneficial effects to air quality would occur on the road from Flagg Ranch to Colter Bay and Teton Park Road. · Vehicular emissions would not cause any perceptible visibility impairment in the vicinity of W. Entrance or along the roadways. · Perceptible visibility degradation could occur in the vicinity of Old Faithful and Flagg Ranch during periods of high use.	· Major beneficial effects in air quality at the W. Entrance and along the road to Old Faithful. · Minor beneficial effects at Old Faithful and Flagg Ranch due to reduction in CO and major beneficial effects from the reduction of $PM_{10.}$ · Major beneficial reductions in CO and PM_{10} are predicted along the roadway from Flagg Ranch to Colter Bay. · Vehicular emissions would not cause any perceptible visibility impairment in the vicinity of W. Entrance along park roadways or in the vicinity of Old Faithful and Flagg Ranch.
Public Safety						
· Continued minor adverse effects to visitor and employee safety along the road from W. Entrance to Old Faithful and the CDST. · Continued minor to moderate adverse effects on winter visitors and employees who use the E. Entrance.	· Moderate beneficial improvements due to mass transit in YNP and separation of uses in GTNP, including new CDST pathway. · Minor beneficial improvements in the parks due to the introduction of several positive safety-oriented measures in the absence of any additional safety risks.	· Moderate adverse effects in YNP due to the potential for increasing visitor conflicts and vehicle/animal collisions. · Minor improvement due to widened highway shoulder for the CDST.	· Minor beneficial improvements in the parks due to the introduction of several positive safety-oriented measures in the absence of any additional safety risks. · Minor improvement due to widened highway shoulder for the CDST and removal of wheeled vehicle traffic from Colter Bay to Flagg Ranch.	· Negligible improvements, as compared to alternative A, in all three-park units due to oversnow nighttime speed limits. · Moderate beneficial improvements in GTNP due to decrease in oversnow motorized travel and elimination of the CDST in the park.	· Major beneficial improvements, as compared to alternative A, in YNP and GTNP as a result of the nighttime closure and the overall elimination of oversnow travel on north and west side of YNP and the CDST. · Minor to moderate improvements (at existing use levels) due to backcountry closures.	· Improvements would be major and beneficial, as compared to alternative A, in the parks due to the elimination of all potential snowmobile accidents, implementation of park- wide mass transit system. And removal of wheeled vehicle traffic from Colter Bay to Flagg Ranch.
Geothermal Resources						
· Minor adverse long term impacts to geothermal features near groomed roads, around destination areas, and near winter trails in the backcountry.	· As in alternative A minor adverse impacts would occur near staging areas, roads, destination areas, and near winter trails. · Adaptive management provisions would mitigate these effects over the long term.	· Minor incremental long-term degradations to, and in some cases, permanent loss of certain features because of increased access.	· General continued adverse impacts as in A for features near existing groomed routes and facilities.	· As in alternative A minor adverse impacts would occur near staging areas, roads, destination areas, and near winter trails. · Adaptive management provisions would mitigate these effects over the long term.	· Elimination of human access to backcountry and along the north and west road segments of YNP would greatly decrease potential impacts.	· Negligible to minor improvements (over alternative A) due to mass transit and enhanced visitor awareness programs. · As in alternative A, minor adverse impacts would occur near staging areas, roads, destination areas and near winter trails. · Adaptive management provisions would mitigate these effects over the long term.
Water and Aquatic Resources						
· Deposition into snow pack would continue to occur from two-cycle engine emissions along groomed park roads in YNP and GTNP. · Continued high risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (22% of the groomed trail system and on the frozen surface of Jackson Lake).	· Protection through the monitoring and scientific studies provisions. If adverse effects occur that cannot be mitigated, the activity specifically causing the effect would be terminated. · Moderately decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high-risk segments along the Madison and Firehole Rivers). Vehicle miles traveled on high-risk segments reduced by 65%.	· Minor improvements on the effects from pollution deposited in the snow by selling ethanol-blend fuels and low-emission lubricants. · Moderately decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high risk segments along the Madison and Firehole Rivers). Vehicle miles traveled on high-risk segments reduced by 62%. Snowmobiles phased out from Jackson Lake.	· Slightly decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high risk segments along Yellowstone Lake). Vehicle miles traveled on high-risk segments reduced by 14%, no snowmobiles on Jackson Lake.	· Same as Alternative A for YNP. · In GTNP, eliminates risk of pollutants entering Jackson Lake. · Protection through the monitoring and scientific studies provisions. If adverse effects occur that cannot be mitigated, the activity specifically causing the effect would be terminated.	· Greatly decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high-risk segments along the Madison, Firehole, Gardner and Gibbon Rivers and Jackson Lake). Vehicle miles traveled on high-risk segments reduced by 74%. All motorized use eliminated from Jackson Lake.	· Greatly decreases the risk of adverse effects on water quality, wetlands, and aquatic resources where oversnow motorized use closely parallels rivers and other bodies of water (high risk segments along the Madison, Firehole, Gardner and Gibbon Rivers). Vehicle miles traveled on high-risk segments reduced by 84%. All motorized use eliminated from Jackson Lake. · Protection through the monitoring and scientific studies provisions. If adverse effects occur that cannot be mitigated, the activity specifically causing the effect would be terminated.

ALTERNATIVE A No Action	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE F	ALTERNATIVE G Preferred Alternative
Wildlife - Ungulates						
· Effects of groomed surfaces and plowed roads on animal movements - unknown to what extent any beneficial effects outweigh negative effects. · Effects related to displacement and fragmentation are minor to moderate, adverse, and short-term. · Risk of collisions with snowmobiles is negligible, adverse, and short-term. · Risk of collisions with wheeled vehicles is minor, adverse, and short-term. Effects of nonmotorized use – adverse, minor and short-term. · Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, moderate and short-term. Impacts to bighorn sheep in GTNP would be moderate to major and long-term if no mitigation is applied. · Effects from visitor use of winter support facilities on displacement would be adverse, minor, and short-term.	· Effects related to groomed roads would decrease due to the plowing of the road from West Yellowstone to Old Faithful. Plowing may increase road-kill mortalities, but implementation of mass transit would ameliorate effects. · Effects related to snowmobiles would decrease in YNP. In GTNP, separation of the CDST from the roadway may increase collisions and displacement effects. · Effects related to nonmotorized use would be negligible; additional routes would not be located in areas critical to wildlife. · Backcountry uses in certain winter ranges would be restricted or prohibited in YNP, thus effects would decrease and become negligible to minor. Impacts to bighorn sheep in GTNP would remain the same – moderate to major and long-term. · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.	· Effects on wildlife associated with oversnow and wheeled vehicles increase. Plowing of the road from Yellowstone to Old Faithful to accommodate private vehicles and the establishment of a groomed snowmobile trail from GTNP's south boundary to Moran along the eastern park boundary may negatively impact ungulates, especially on limited winter range in GTNP. The periodic diversion of the CDST near Jackson Lake could impact moose. · Effects related to nonmotorized activities remain the same as Alternative A, but may slightly increase because more opportunities are provided. Moose may be impacted near the Gros Ventre River in GTNP. · Effects related to backcountry use would remain the same as Alternative A. · More winter facilities are proposed; including campsites in YNP – thus associated effects would increase.	· Effects of groomed roads and snowmobiles would decrease in both parks. In GTNP, no opportunities for snowmobile use of ungroomed trails would exist. · Effects related to plowed roads and wheeled vehicles would remain the same in YNP and would decrease in GTNP because the road from Colter Bay to Flagg Ranch would not be plowed. · Effects of unregulated backcountry nonmotorized use in YNP on all ungulate species would be negligible to minor due to limitations on backcountry use and closure of the E. Entrance. In GTNP, effects of nonmotorized use on ungulates may increase because more use would be expected in areas where snowmobiling would now be prohibited (e.g., Antelope Flats). · Overall, this alternative decreases the effects on ungulates relative to Alternative A.	· Miles of groomed surface in GTNP greatly decreased, eliminating snowmobile use and its effects, from most of the park. Moose would benefit in GTNP by the elimination of the CDST. Effects would be much lower in magnitude than in Alternative A. Effects in YNP would be the same as Alternative A. · Effects of nonmotorized use in GTNP would decrease in the Antelope Flats area, thus benefiting ungulates near important winter range in the park. · Effects of unregulated backcountry nonmotorized use in YNP on all ungulate species would negligible to minor due to limitations on backcountry use. · Overall, the effects on ungulates are generally the same (YNP) or much less than Alternative A (GTNP). · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.	· Effects of groomed surfaces and oversnow motorized use are negligible. In YNP, closing the west side of the park protects important ungulate habitat. · Miles of groomed surface in GTNP greatly decrease, effectively eliminating snowmobile use, and its effects, from most of the park. Moose would benefit in GTNP by the elimination of the CDST. · In YNP, all nonmotorized use in the backcountry is prohibited, thus eliminating all effects associated with off-trail travel. · Overall effects would be much lower in magnitude than in Alternative A.	· The effects of groomed surfaces would be less than Alternative A in GTNP. Risk of collision from oversnow vehicles would be nearly eliminated in all parks due to the prohibition on snowmobiling and late night travel. Moose would benefit in GTNP by the elimination of the CDST. · Mass transit would greatly reduce vehicle miles traveled and allow for the use of trained drivers. Consequently there would be the ability to control where and when stops are made. This feature would potentially benefit all species. · Effects related to plowed roads would be the same as Alternative A for YNP, and decreased in GTNP due to the elimination of wheeled vehicles north of Colter Bay. · In all parks, restrictions on backcountry travel would minimize effects associated with off-trail travel. Effects on bighorn sheep in GTNP would be eliminated because important sheep habitats would be closed to winter use. · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.
Wildlife – Threatened and Endangered Species						
· Effects of groomed surfaces on lynx unknown; negligible to major depending upon lynx abundance, distribution. · Displacement effects of oversnow vehicles are adverse, negligible, and short-term. · Risk of collision with wheeled vehicles negligible to minor for grizzly bears, wolves. · Effects of nonmotorized use: adverse, negligible, short-term on bald eagles; no effect on grizzly bears; no known effect on lynx, wolves. · Effects of unregulated backcountry nonmotorized use: adverse, minor, and short-term on bald eagles; adverse, negligible, short-term on grizzly bears; no known effect on lynx and wolves. · Effects of winter support facilities: adverse, negligible, short-term on grizzly bears; adverse, minor, short-term on wolves.	· Effects would be generally as stated for ungulates.	· Impacts to lynx may increase in GTNP because some of the new groomed routes are in potential lynx habitat (e.g., Two Ocean Lake, and diversions of the CDST). · The new snowmobile route in GTNP may displace ungulates, and consequently wolves, from the southeastern part of the park. · The extension of the winter use season from the S. Entrance to West Thumb, combined with increased winter support facilities may result in more grizzly bear-human conflicts as bears emerge from hibernation.	· Closure and elimination of use on the road from Fishing Bridge to the E. Entrance in YNP would generally benefit all species actively using habitat on the entire east side of the park. · Most other effects are generally the same as Alternative A with the exception of the elimination of unregulated backcountry use in YNP, which decreases effects, and the development of warming huts at Jenny Lake which may increase effects on lynx.	· Slightly decreases the potential effects compared to Alternative A. The elimination of snowmobiling from most of the GTNP would reduce effects associated with packed trails and displacement; restrictions on backcountry travel in YNP may decrease displacement effects associated with off-trail travel. · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.	· The closure of the winter season after 1 March would minimize the potential for bear-human confrontations and conflicts that could occur after the emergence of grizzly bears in the spring. · Closure of the roads from W. Entrance and Mammoth to Old Faithful would generally benefit listed species habitats on the entire west side of YNP. · In all parks, if protected species activity is detected, park managers can close the area to human activity to mitigate disturbance. · Potential effects would be the same or less than Alternative A.	· Effects related to oversnow vehicles on groomed roads decrease, a potential benefit to all species. Most visitors would be traveling on NPS-managed snowcoaches having the ability to control where and when stops are made. · Use of snowcoaches could continue to displace lynx as routes pass through lynx habitat, but effects of snowcoaches would be less than those of snowmobiles being fewer in number, slower, and quieter. · Effects related to plowed roads may decrease impacts to wolves/lynx because wheeled vehicles eliminated from Colter to Flagg. · Earlier opening increases potential for grizzly/human conflicts in YNP. Restrictions in backcountry areas would mitigate impact. · Effects of backcountry travel decrease. · Adaptive management used to adjust activities if impacts to wildlife are found.
Wildlife –Species of Special Concern						
· Effects of groomed surfaces negligible. · Displacement effects of oversnow vehicles would be negligible to minor (swans in YNP). · Effects of plowed roads on collisions and displacement would be negligible. · Effects of nonmotorized use in the front country – negligible (wolverines, sagebrush lizard) to minor (swans). In swan habitat, use may cause minor, short-term displacement and avoidance. · Effect of winter support facilities would be negligible to minor.	· Effects would be generally as stated for ungulates.	· Effects of motorized wheeled vehicles increase in YNP and effects of snowmobiles increase in GTNP. Swans may be affected in YNP as a result of private vehicles stopping near open water habitats. · Effects of nonmotorized activities in the front and backcountry are generally the same as Alternative A. · Effects related to huts increase because the number of proposed huts increases.	· The elimination of unregulated backcountry use in YNP may decrease associated effects. · Closure of the E. Entrance in YNP eliminates the need for avalanche control and thus may benefit wolverines. This closure and elimination of use on the road to Fishing Bridge would generally benefit species actively using habitat on the entire east side of the park. · Other effects generally the same as Alternative A.	· Effects the same as in alternative A. · Adaptive management would be employed to adjust management should impacts to wildlife be demonstrated through ongoing monitoring and research.	· Closure of the roads from W. Entrance and Mammoth to Old Faithful would generally benefit habitats on the entire west side of YNP, and potential effects on trumpeter swans would be eliminated in those areas. · Effects in GTNP would be lowered due to the virtual elimination of snowmobile use. · If protected species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance. · For all parks, overall effects are the same or less than Alternative A.	· Effects related to oversnow motorized vehicles are reduced because no snowmobiles would be permitted in the parks. · Effects related to groomed surfaces would decrease in GTNP benefiting martens. · The majority of visitors would be traveling on NPS-managed snowcoaches, and there would be the ability to control where and when stops are made, benefiting all species. · Effects associated with backcountry use are reduced from those in Alternative A. Bighorn sheep closures may benefit wolverines. · Adaptive management would adjust activities should impacts to wildlife be demonstrated.
Natural Soundscapes						
· Current non-natural sounds impact the soundscape in the three park units. · Moderate to major adverse effects occur because vehicles are audible over more than 200,000 acres, and they are audible more than 50% of the time over more than 26,000 acres. Audibility for more than 50% of the time is greatest relative to the W. Entrance to Old Faithful route and from Moran to GTNP south entrance. · The average sound level is highest along these routes and on Jackson Lake.	· Elimination of oversnow vehicles on the road from W. Entrance to Old Faithful would moderately reduce soundscape impacts. · Lowering all snowmachine sound emissions from 78 dB to 70 dB would reduce the area in which vehicles are audible more than 50% of the time by 38%. When implemented this would result in moderate beneficial effects. · Sound levels 4000 feet distant from travel ways would be reduced by a third, overall.	· Elimination of oversnow vehicles on the road from W. Entrance to Old Faithful would moderately reduce soundscape impacts. · The area in which vehicles are audible more than 50% of the time would be increased by 22% resulting in moderate to major adverse impacts on the soundscape. · Sound levels 4000 feet distant from travel ways would be slightly reduced overall resulting in negligible improvements.	· Reduction in snowmobile sound emissions from 78 dB to 60 dB would moderately reduce impacts on the soundscape. · Compared to quiet background conditions, this alternative would reduce by 44% the area in which vehicles are audible more than 50% of the time. Overall this alternative would result in moderate to major beneficial effects on the natural soundscape. · Sound levels 4000 feet distant from travel ways would be moderately reduced by about half.	· Compared to quiet background conditions, this alternative would reduce the area in which vehicles are audible at all by 16%. This reduction is due to the elimination of winter motorized use on Jackson Lake. · The alternative would not change the area in which vehicles are audible more than 50% of the time. · Sound levels 4000 feet distant from travel ways would be slightly reduced overall resulting in negligible improvements.	· In the absence of mitigating use limits, this alternative would increase by 24% the area in which vehicles are audible more than 50% of the time. This is a result of the shifting of use from closed segments to open segments on the south and east side of YNP. · Sound levels 4000 feet distant from travel ways would be reduced by about a third, overall.	· Elimination of snowmobile sound emissions, and limiting snowcoach dBAs in the short term to 75, long term to 70, would moderately reduce impacts on the soundscape. · Compared to quiet background conditions, would decrease by 47% the area in which vehicles are audible more than 50% of the time. · Sound levels 4000 feet distant from travel ways would be slightly reduced overall.

ALTERNATIVE A No Action	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E	ALTERNATIVE F	ALTERNATIVE G Preferred Alternative
Visitor Access & Circulation						
· Minor adverse impacts would continue due to the high cost of current winter access to YNP's interior · Parking at some staging areas is filled to capacity during peak use times resulting in minor adverse impacts. · Some conflict between motorized and nonmotorized use occurs.	· All areas of the parks currently accessible under alternative A would remain accessible under alternative B. · Visitor capacity would remain at levels equal to the no-action alternative · Mass transit shuttle would provide a less expensive means of winter access resulting in minor to moderate beneficial effects. · Moderate long-term beneficial improvements for safe snowmobile access on the CDST. · Grand Loop not available by single means of transport.	· Although plowed roads would allow for wheeled vehicle access in YNP, the lack of available parking at Old Faithful, Madison and Old Faithful would result in moderate adverse effects due to an overall reduction in winter visitor capacities. · Minor to moderate long-term beneficial improvements for safe snowmobile access from Jackson and Dubois to GTNP/Parkway, and north into YNP. · Private vehicles would provide a less expensive means of winter access. · Grand Loop not available by single means of transport.	· Minor adverse impacts would continue due to the high cost of winter access to YNP's interior. · Minor adverse effects would occur to overall park access because of E. Entrance closure in YNP. Winter season visitors using the E. Entrance represent 3% of winter season visitation or approx. 4,100 visitors · Negligible adverse effects to park access would occur in GTNP. Moderate long-term beneficial improvements for safe snowmobile access on the CDST.	· Minor adverse impacts would continue due to the high cost of winter access to YNP's interior. · Short-term access in YNP, same as in Alternative A. Long-term effects are unknown and would depend on future management decisions related to area closures. · Access to GTNP in general would not change, although modes of travel in some areas would change. Motorized access on Jackson Lake would be eliminated.	· Minor adverse impacts would continue due to the high cost of winter access to YNP's interior. · Major long-term adverse effect to current visitor access patterns at YNP due to elimination of two winter entrances. · Effects for GTNP would be the same as alternative E. · The Grand Loop experience would be eliminated.	· Minor adverse impacts would continue due to the high cost of winter access to YNP's interior. · Negligible long-term effects to YNP because level of access is not altered, only the mode of travel. · Minor adverse long-term effects in GTNP would occur because motorized access on Jackson Lake would be eliminated.
Visitor Experience						
All three park units · Little or no operational change would occur. Visitation would be influenced by the method of transportation available to visitors. · For visitors who prefer to visit the parks via snowmobile, the visitor experience would continue to be highly satisfactory. · Encounters with park wildlife and scenery would continue to be primary attractions, consequently the overall satisfaction of current winter visitors would remain high. · Current levels of snowmobile emissions and sound levels would continue to detract from critical characteristics of the desired winter experience for many visitors resulting in direct short-term major adverse impacts on visitor experience. · The perceived unsafe behavior of others and the occurrence of visitor conflicts would continue to have direct short-term minor to moderate adverse effects on the experience of some users. · Current motorized use would continue to deter some user groups from visiting or returning to the parks.	**All three park units** · The adaptive management provisions could result in sections of the park being closed to protect resources/values. Visitor opportunities currently afforded in those areas would be eliminated, resulting in direct short-term adverse effects to desired winter visitor experience. Long-term protection of these resources would be a major beneficial effect by providing for future enjoyment. · The reduction of snowmobile emissions and sound levels would in the long term greatly enhance opportunities for solitude, clean air, and natural quiet. This would result in moderate to major beneficial improvements to the desired visitor experience. **YNP** · Major to moderate adverse effects on desired winter experience for persons who wish to access the park via the W. Entrance via oversnow transport. · Plowed road from W. Entrance to Old Faithful could create berms of snow resulting in moderate adverse effects on opportunities to view scenery. · Opportunities to view wildlife and scenery as a solitary experience would be eliminated on the W. Entrance Road for those persons who are limited to motorized travel. · Would provide an opportunity for the winter experience at Old Faithful which has not been available to park visitors who do not wish to or who cannot afford to ride a snowmobile or snowcoach. **GTNP & Parkway** · Moderate beneficial changes relating to safety by separating user groups within the park, and by improving groomed surfaces. · Moderate beneficial improvement due to increased availability of information, interpretation, and winter programs.	**YNP** · Major to moderate adverse effects on desired winter experience, affecting the current winter visitors who access the park via the W. Entrance using oversnow transport. · The creation of snow berms along plowed roadways could cause moderate adverse effects to scenery viewing opportunities. · The addition of motorized and non-motorized trails would increase opportunities for winter experiences and would result in direct moderate beneficial improvements. · Affects on opportunities for solitude, clean air, and quiet (except during the late season) would be minor to moderate and adverse, except at W. Entrance. · In the vicinity of Old Faithful opportunities for clean air would be moderate and beneficial. · Moderate to major adverse effects would occur due to the complexities of park travel. · Visitors, who are unable, cannot afford, or do not wish to ride a snowmobile or snowcoach would have access via private automobile to Old Faithful. **GTNP & Parkway** · A full range of winter activities would be available to enhance opportunities for wildlife and scenery viewing. · Minor beneficial changes in safety due to improvement of the CDST. · Minor adverse effect in locating motorized and nonmotorized uses in close proximity. · Opportunities for use on groomed surfaces would increase. · Minor to moderate beneficial effect to visitor experience due to increased availability of information and trailside facilities. · Major adverse effect to opportunities for quiet and solitude. Opportunities to appreciate clean air also adversely affected.	**All three park units** · The reduction of snowmobile emissions and sound levels would, in time, result in moderate to major beneficial improvements in opportunities for solitude, clean air and, natural quiet. · Minor beneficial effect to visitor experience due to greatly increased availability of information, interpretation, and winter programs. **YNP** · The increase in trail opportunities would provide minor to moderate beneficial effects for all user groups. **GTNP & Parkway** · Minor to negligible adverse effects to opportunities for wildlife and scenery viewing. · Major beneficial improvements relating to safety by separating user groups within the park. · Widening the groomed surfaces of the CDST and removing adjacent wheeled vehicle traffic from Colter Bay to Flagg Ranch would be a moderately beneficial effect.	**All three park units** · The adaptive management provisions could result in sections of the park being closed to protect resources/values. Visitor opportunities currently afforded in those areas would be eliminated, resulting in direct adverse effects to desired winter visitor experience. Long-term protection of these resources would be a major beneficial effect by providing for future enjoyment. **YNP** · Negligible to moderate beneficial short-term improvements in opportunities to appreciate clean air, quiet, and solitude from the implementation of the standards set by the FACA committee. **GTNP & Parkway** · Wildlife and scenery viewing would remain unchanged for nonmotorized users and automobile occupants. · There would be major beneficial improvements relating to safety by eliminating snowmachines as a source of motor vehicle accidents, except on Grassy Lake road. · There would be major adverse effects on opportunities to participate in oversnow motorized activities. · There would be major beneficial effects relative to opportunities for quiet and solitude by eliminating snowmobiles- except on the Grassy Lake road. · Moderate to major improvements in air quality would result in greater opportunities to appreciate clean air.	**YNP** · The elimination of winter opportunities on the road segments connecting the West and North Entrances with Old Faithful would result in major adverse effects on the desired winter visitor experience. · If winter use increases in other areas of the parks minor effects are expected on visitor experience in those areas. **GTNP & Parkway** · Same as alternative E except for decline in experiential values around Flagg Ranch due to possible displaced motorized oversnow use from YNP.	**All three park units** · The adaptive management provisions could result in sections of the park being closed to protect resources/values. Visitor opportunities currently afforded in those areas would be eliminated, resulting in direct adverse effects to desired winter visitor experience. Long-term protection of these resources would be a major beneficial effect by providing for future enjoyment. · Opportunities to view wildlife and scenery as a solitary experience would be eliminated for those persons who are limited to motorized travel. · There would be major beneficial changes relating to safety by eliminating the possibility of snowmobile related motor vehicle accidents. · There would be a minor to moderate beneficial effect to visitor experience due to increased availability of information, interpretation and winter programs. · Opportunities to appreciate clean air would be greatly improved. Where oversnow motorized use occurs, via snowcoach, quiet and clean air would be facilitated by improved motorized technology. · The elimination of snowmobiles would result in major adverse effects to the experiences of visitors who prefer this mode of travel. · There would be a major beneficial effect relative to opportunities for quiet and solitude, for nonmotorized visitors.

***SUMMARY STATEMENTS ABOVE ARE ABBREVIATED AND TAKEN OUT OF CONTEXT TO PROVIDE A QUICK COMPARISON BY ELEMENT.**
THE READER IS ENCOURAGED TO REVIEW THE SUPPORTING ANALYSIS IN CHAPTER IV.

Figure 2. Alternative A for YNP.



click to enlarge map

Figure 3. Alternative B for YNP.

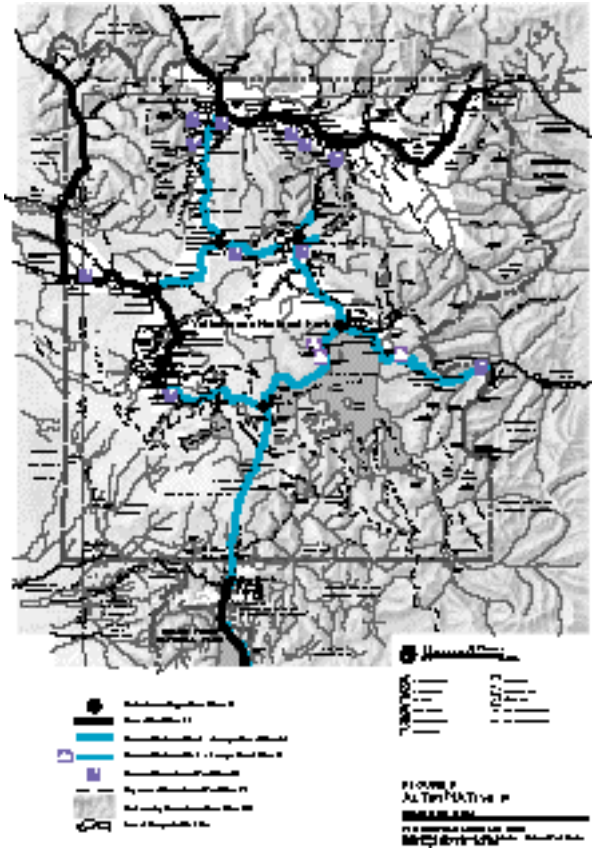


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Figure 4. Alternative C for YNP.

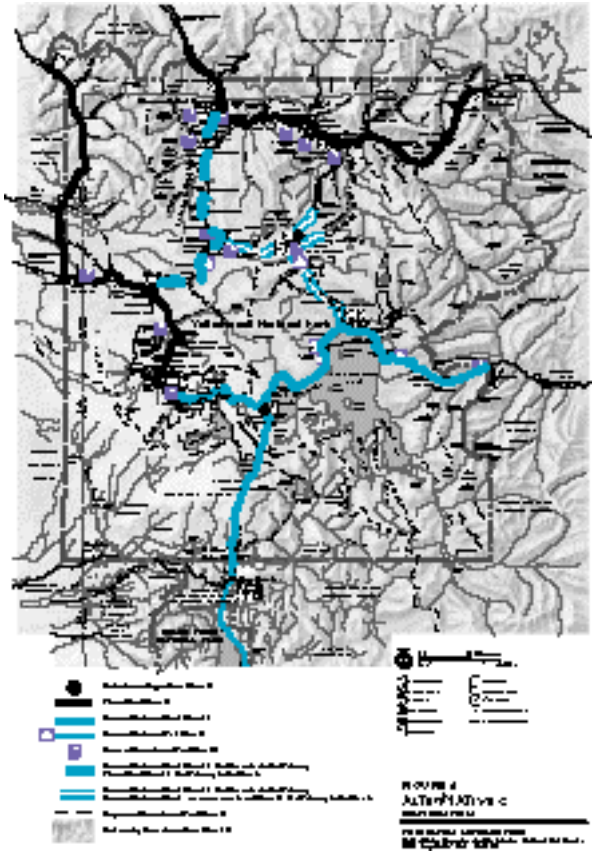

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Figure 5. Alternative D for YNP.

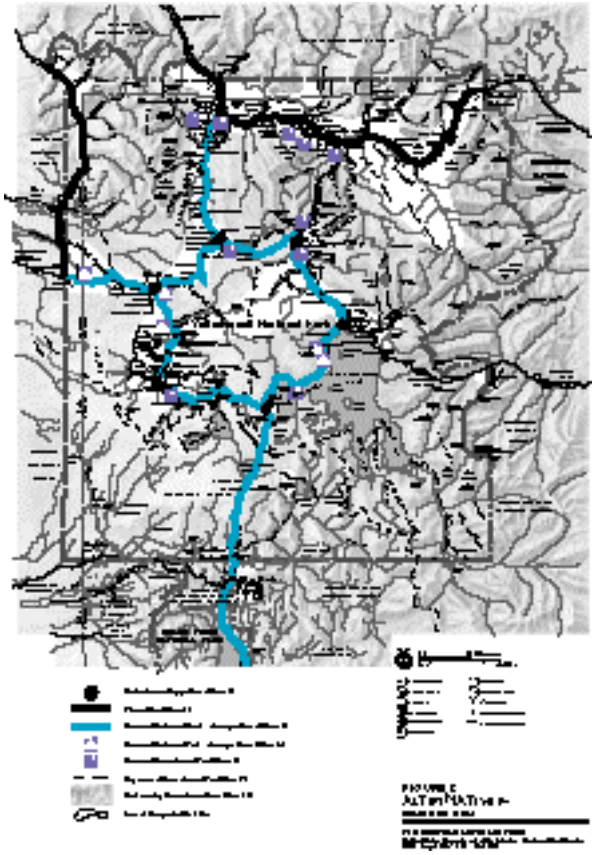

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Figure 6. Alternative E for YNP.

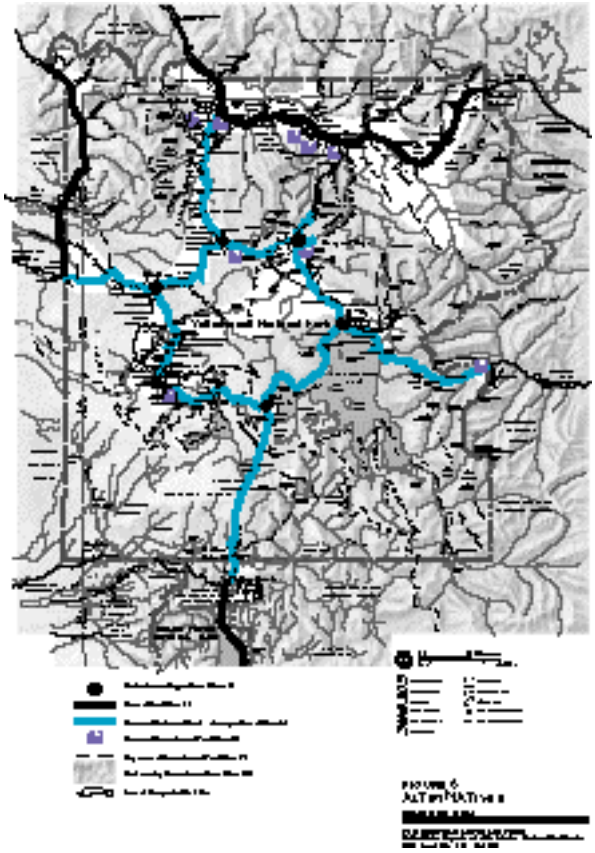

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Figure 7. Alternative F for YNP.

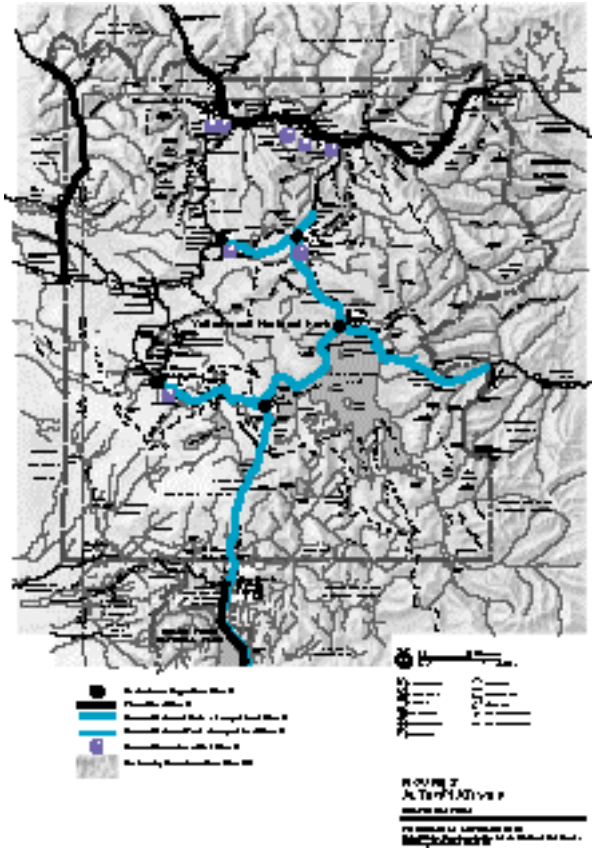

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Figure 8. Alternative G for YNP.

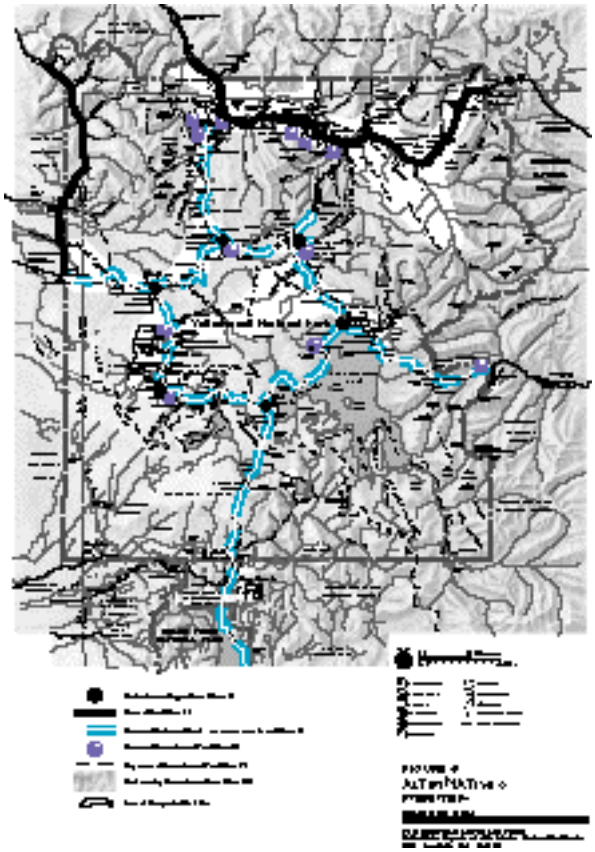

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Figure 9. Alternative A for GTNP and the Parkway.

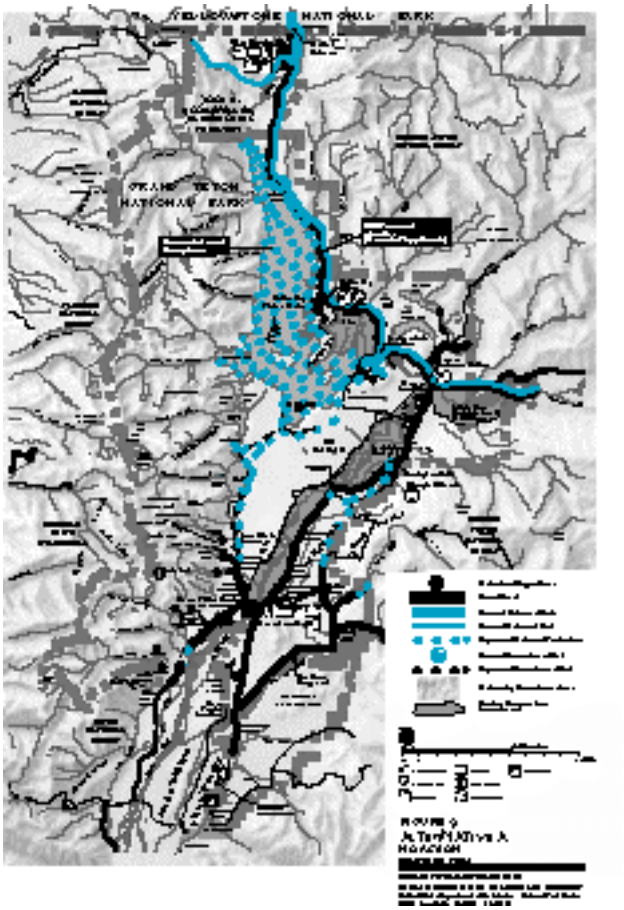

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Figure 10. Alternative B for GTNP and the Parkway.

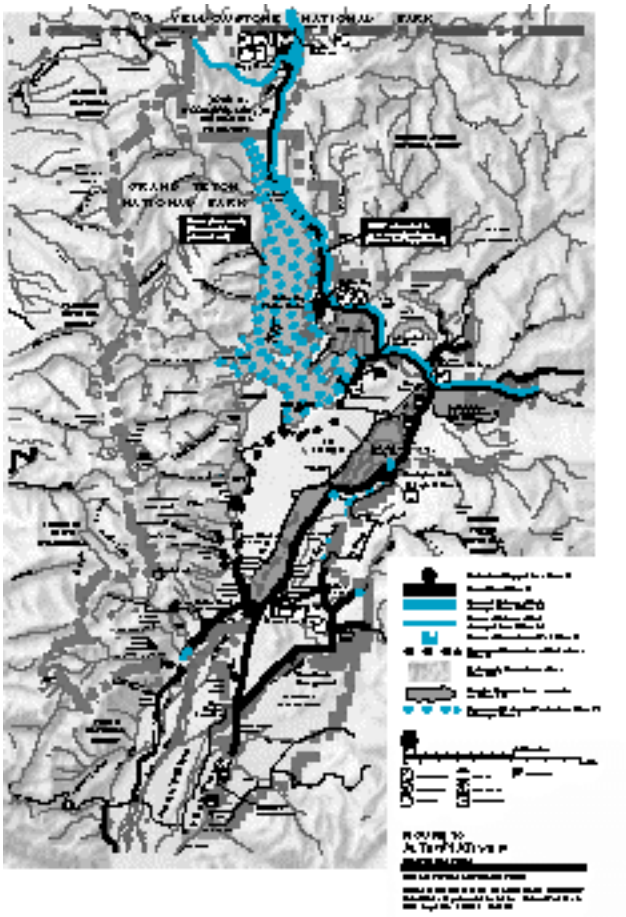

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Figure 11. Alternative C for GTNP and the Parkway.

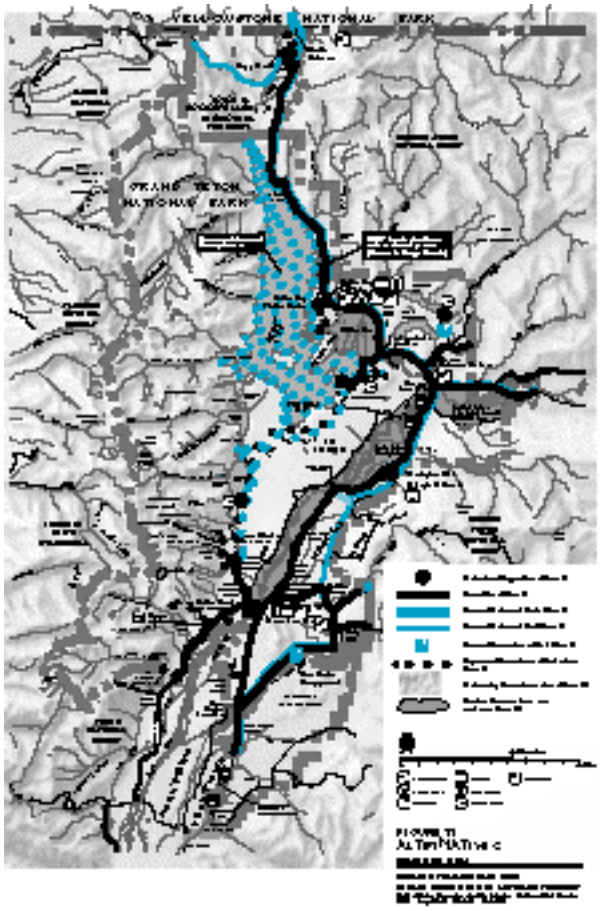

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Figure 12. Alternative D for GTNP and The Parkway.

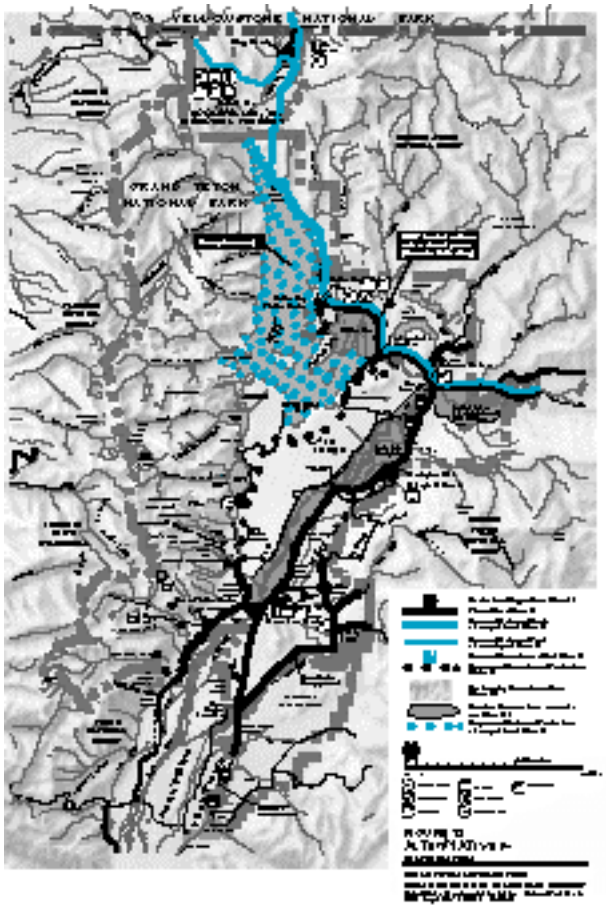

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Figure 13. Alternatives E and F for GTNP and the Parkway.

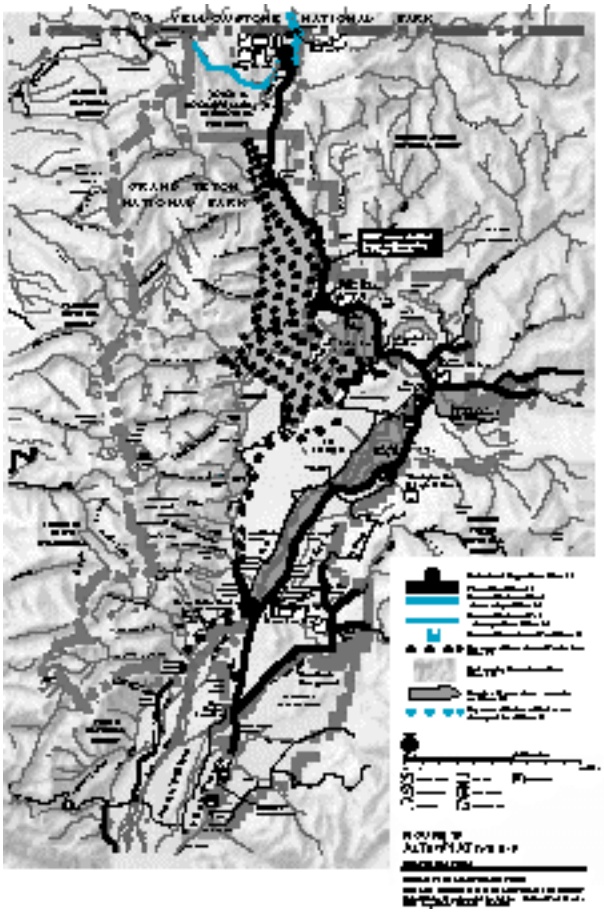

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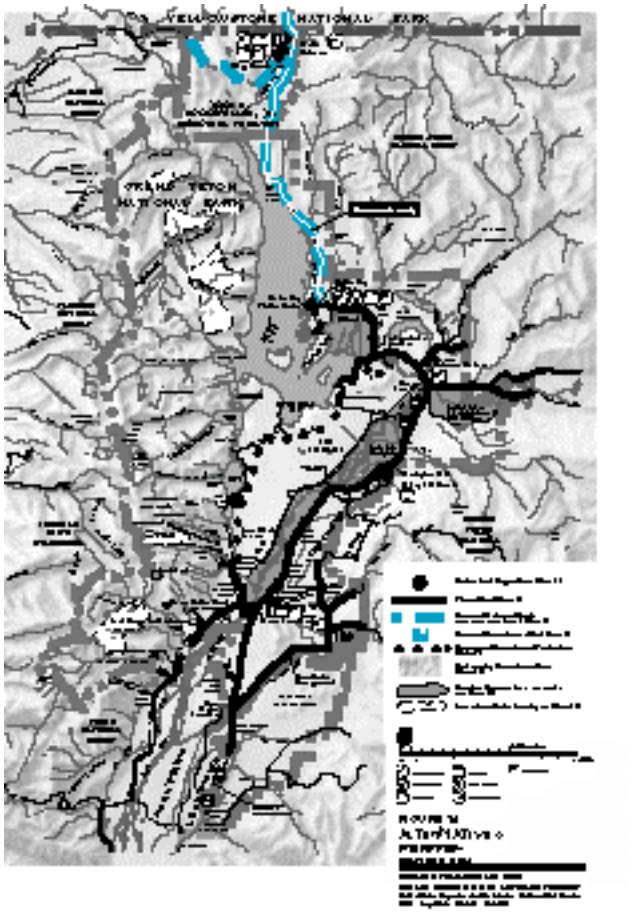
Figure 14. Alternative G for GTNP and the Parkway.



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CHAPTER III
AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the environment of the area that could be affected by the alternatives being considered. This description is intended to present only the information necessary to understand the effects of the alternatives presented in Chapter IV. As such, data and analyses are commensurate with the importance of the impacts. The importance of an impact is reflected largely by its relationship to a major issue, as documented in the purpose and need section.

The cost of current winter use management in the three park units is not expressly discussed in this chapter. Since this topic may be of interest to some readers, cost information is included in Appendix F.

MANDATORY TOPICS

Council on Environmental Quality (CEQ) regulations (40 CFR part 1500) and National Park Service (NPS) policy (NPS DO-12) require that certain topics be addressed in every Environmental Impact Statement (EIS). The following discussion addresses those topics in one of two ways: 1) it provides a rationale for dismissing the topic from further consideration; or 2) it directs the reader to the appropriate section of the document where further information on the topic is provided.

- ***Possible conflicts between the proposed action and land use plans, policies or controls for the area concerned (including local, state, or Indian tribes) (1502.16, 502.2(d), and the extent to which the NPS will reconcile the conflict.*** See *Direct, Indirect, and Cumulative Effects on Adjacent Lands*, Chapter IV.
- ***Energy requirements and conservation potential (1502.16).*** Operations for all three park units use energy to maintain park facilities and operate motor vehicles throughout the winter. All alternatives propose a level of mechanized winter recreation. The effects of, or on, those requirements do not vary substantially by alternative. For this reason, this topic is dismissed from further consideration.
- ***Natural or depletable resource requirements and conservation potential (1502.16).*** The range of alternatives and the purpose and need of this document are fully within the scope of NPS mandates and policies. No natural or depletable resources would be extracted under this plan nor will natural resource commodities be produced. Therefore, this topic is dismissed from further consideration.
- ***Urban quality, historic and cultural resources, and design of the built environment (1502.16).*** See *Cultural Resources*, Chapters III and IV, and *Consultation and Coordination*, under *State Historic Preservation Offices*, Chapter I.
- ***Socially or economically disadvantaged populations (Executive Order (EO) 12898).*** See *Socioeconomics*, Chapters III and IV.

- ***Wetlands and floodplains (1508.27).*** Floodplains are not impacted by winter use activities in the parks. See *Impact Topics Dismissed*, Chapter III. Wetlands are discussed in Chapters III and IV, under *Water Resources*.
- ***Prime and unique agricultural lands (1508.27).*** Private land in-holdings exist within the boundaries of Grand Teton National Park (GTNP). None of the actions proposed in the range of alternatives would affect such lands, access to them, or their agricultural properties. Therefore, this topic is dismissed.
- ***Endangered or threatened plants and animals and their habitats (1508.27).*** See *Federally Protected Species* and *Species of Special Concern* in the *Wildlife* section, Chapters III and IV.
- ***Important scientific, archeological, and other cultural resources including historic properties listed or eligible for the National Register of Historic Places (1508.27).*** See *Cultural Resources*, Chapters III and IV.
- ***Ecologically critical areas, wild and scenic rivers, or other unique natural resources (1508.27).*** The range of alternatives and the purpose and need are fully within the scope of NPS mandates and policies. No action proposed in the range of alternatives would affect the eligibility or designation of a wild and scenic river or wilderness area. See also *Impact Topics Dismissed*, Chapter III. Other unique, natural resources such as geothermal features are presented in Chapters III and IV.
- ***Public health and safety (1508.27).*** See *Air Quality and Public Health*, and *Public Safety*, Chapters III and IV.
- ***Sacred sites (EO 13007) and Indian trust resources (ECM95-2).*** See *Cultural Resources*, Chapters III and IV.

IMPACT TOPICS DISMISSED

Floodplains

Executive Order 11988 and NPS policy require that impacts on floodplains be considered in NPS undertakings. The intent of the order and guidelines is to provide for human safety and protect floodplain functions by preventing development in 100-year floodplains. Floodplains for all three units are well defined, although the Federal Emergency Management Agency has not published national flood insurance rate maps for these areas. There are no actions proposed in the Plans/EIS that would occur in or encroach upon floodplains, and all actions would occur during the winter months when there is little concern for flooding. With this finding, no further analysis of floodplains is necessary.

Black Bear (*Ursus americanus*)

Black bears range throughout most of North America. One primary concern associated with human development in occupied bear habitat is the availability of food attractants. Bears that become conditioned to human foods and garbage are often the target of management actions and usually are eliminated (Herrero 1985).

It has not been demonstrated that existing winter recreation activities in the parks affect black bears. Destruction of den sites or den habitat does not appear to be an issue in the Greater Yellowstone Area (GYA). Bears are not being disturbed while they are preparing or occupying den sites (Reinhart and Tyers 1999). The main concern is the potential for bear/human conflicts and displacement of bears while they are foraging during the pre-denning and post-emergence periods. The current winter recreation

season in the parks precludes most bear activity and most risks of bear/human conflicts. Therefore, black bears are not addressed further in this document.

Mid-Sized Carnivores

Mid-sized carnivores not addressed further in this analysis include the bobcat (*Felis rufus*), red fox (*Vulpes vulpes*), and coyote (*Canis latrans*). These species are not considered rare or in need of special protection in the parks. Other mid-sized carnivores, including the river otter (*Lutra canadensis*), wolverine (*Gulo gulo*), fisher (*Martes pennanti*), and American marten (*Martes americana*), are considered species of special concern in the parks, and are discussed under *Species of Special Concern.* The threatened Canada lynx (*Lynx canadensis*) is addressed under *Federally Protected Species*.

Subnivian Fauna

Subnivian fauna are small mammals that live under snow during winter, including shrews, voles, pocket gophers, and mice. They are active throughout the year, eat a variety of plant and animal foods, and generally occupy habitats on or below the ground. They are important prey species for a variety of birds and larger mammals, including the American marten (Cherry and Kratville 1999). Although no significant impacts on populations of subnivian fauna are expected to occur, the potential effect of localized reductions in these mammals because of snow compaction may affect martens. An assessment of this impact is found under *Species of Special Concern* for each alternative. In general subnivian fauna are abundant residents of the parks, and any potential loss of habitat caused by road grooming or plowing operations is compensated for by the vast amount of unroaded area found in the parks. Therefore, subnivian fauna are not directly addressed further in this EIS.

Birds

Most bird species are not addressed further in this analysis because they only occur in the parks in the summer or their habits are not considered threatened by winter recreation. This includes peregrine falcons (*Falco peregrinus*), a species of special concern that was removed from the endangered species list in 1999, but is dismissed as an impact topic. Peregrines' seasonal occurrence precludes them from being affected by winter recreation. Whooping cranes (*Grus americana*), classified as experimental, nonessential under the ESA, are also not addressed because of their seasonal occurrence. A discussion of the whooping crane's status can be found in the biological assessment (BA) published concurrently with this document. Bald eagles (*Haliaeetus leucocephalus*) are discussed under *Federally Protected Species*, and trumpeter swans (*Cygnus buccinator*) are discussed under *Species of Special Concern.*

Several species of birds that occur in the parks may be affected by human recreational activities due to increased habituation to human use areas, food, and garbage. The common raven (*Corvus corax*), gray jay (*Perisoreus canadensis*), and Clark's nutcracker (*Nucifraga columbiana*) are especially susceptible to habituation. Habituated wildlife is

a widespread, year-round issue. Increased educational opportunities, a feature of all alternatives discussed in this document, are the best way to combat this problem.

Reptiles

Reptiles that are not affected by winter use are the bull snake (*Pituophis catenifer sayi*) and the prairie rattlesnake (*Crotalis viridis viridis*). All reptiles in the park hibernate and, therefore, are not directly affected by winter use. Potential indirect effects associated with water pollution are not a concern because these snakes occur in dry, upland habitats. See *Reptiles and Amphibians* and *Aquatic Species: Reptiles, Amphibians, and Fish,* Chapter III for a discussion of the other reptiles found in the parks.

Vegetation, including Plant Species of Special Concern and Threatened Plants

Damage to vegetation from off-trail winter recreation activities has been documented in a number of studies, including:

- Physical damage to exposed branches and leaders of willows (*Salix* spp.), sagebrush (*Artemisia* spp.), and conifer species (Stangl 1999).
- Decline of grasses and herbaceous plants from snowmobile trails (Wanek 1971).
- Tissue dehydration and microorganism reduction caused by temperature changes associated with snow compaction (Wanek 1971).
- Soil erosion where compaction by snowmobiles delayed melting during the growing season (Wanek 1971).

Most documented impacts from snowmobiles occur away from established roads and trails. In the parks, oversnow motorized activities are limited to roads and along road margins where motorized use is allowed throughout the year. Because little to no vegetation exists on these routes, oversnow motorized use would have negligible direct impact on vegetation (Stangl 1999). Similarly, the effects of snow plowing on vegetation in the parks (including trees) are considered negligible. Two species of plants considered to be of special concern are discussed below.

Ross' bentgrass (*Agrostis rossiae*) and Yellowstone sand verbena (*Abronia ammophila*) are unique to Yellowstone National Park (YNP), and are restricted to very specialized habitats within the park. These species are of special management concern because of their rarity and localized occurrences. Ross' bentgrass is found primarily on marl around hot springs and geysers near Old Faithful. Despain (1990) theorized that bison or elk may transport the seeds of Ross' bentgrass between thermal areas. Because of its highly localized habitat, this species is probably the vascular plant most vulnerable to extinction in Wyoming (Clark et al. 1989). Yellowstone sand verbena, a sand obligate, is found along sandy shorelines of Yellowstone Lake; extensive searches have failed to find it elsewhere in the park. Little is known of its life history. Winter use is not expected to affect either species (Whipple, pers. com., 2000).

The threatened Ute Ladies'-tresses orchid (*Spiranthes diluvialis*) is the only plant listed under the ESA that may potentially occur in the parks. However, this orchid has never

been reported within the parks. Known populations occur in Idaho, Montana, and Wyoming at elevations lower than the Yellowstone plateau. Therefore, this species is not addressed.

Exotic Species — Plants

About 200 nonnative plant species are known to occur in the parks (Whipple, pers. com., 2000). Both parks maintain aggressive exotic weed control programs using an Integrated Weed Management approach that relies on prevention, early detection and control, and various control strategies including mechanical, cultural, and chemical. While winter recreation does not occur during the plant growing season, exotic weed propagation may occur through ground disturbance associated with winter-use facility construction and snowmachines that may act as vectors for weed dispersal. If not inspected and cleaned before entering the park, snowmachines can be a source of weed propagation along park roads and in park developed areas, though not nearly as significant as vehicles entering the parks during other seasons. Because all motorized winter use in the parks occurs on roads or their immediate margins and because of existing aggressive control programs, no further analysis of the effects of exotic species is included in the Plans/EIS.

Exotic Species — Animals

Mountain Goat (Oreamnos americanus)

Mountain goats were historically found in the mountains of the north coast and the Rocky Mountains. Through state fish and game agency introductions, their distribution has expanded both within and outside of their historic range (Varley 1999). Consequently, although mountain goats were historically absent from the GYA, they currently inhabit most mountain ranges in the GYA.

Throughout their range, mountain goats inhabit steep, rocky terrain during all seasons of the year. Winter range habitats include areas close to cliffs, and steep, rocky, south facing slopes. Winter severity and snow depths seem to be leading causes of mortality of mountain goats, affecting availability of winter forage and causing stress, susceptibility to accidents, disease, and parasites (Varley 1999).

While nonnative mountain goats have been known to cause adverse effects to vegetation elsewhere, there are no known significant impacts to native plant communities in the parks (Varley 1999). However, it was predicted by Laundre (1990) that goats might eventually impact native bighorn sheep populations in YNP. Whitfield (1983) reported that goats might eventually pose a threat to bighorn sheep in GTNP. Although control efforts are not conducted in the parks, potential impacts to mountain goats are not assessed in this document.

Bullfrog (Rana catesbeiana)

The introduced bullfrog occurs in the Kelly Warmspring in GTNP. It is a voracious and prolific predator. Impacts to bullfrogs are not assessed, since the species is considered undesirable in the park's ecological environment.

Wilderness Values

The scope of the purpose and need for action does not allow consideration of changes in or alternatives directly affecting proposed or recommended wilderness in the three parks. Therefore, there are no actions proposed, such as trails, grooming, facility construction, or motorized use, that would impact wilderness values. During scoping and initial alternative concept formulation, a number of ideas were proposed along this line, but they were dismissed as outside the scope of analysis. See Appendix A *Coordination and Consultation* for a detailed discussion of how ideas were presented, how they fit into the EIS alternatives or analyses, and why other ideas were dismissed.

Wilderness values consist of elements that are intrinsic to wilderness, as well as elements that are experiential and relative to people's appreciation of wilderness. The analysis does not avoid the subject of wilderness values entirely. Rather, it considers impacts on factors like natural quiet, scenic quality, wildlife, and air quality. Such elements are recognized as important wilderness components, and impacts on them are considered as disclosure of indirect impacts. Because of this disclosure, and because proposed actions are overtly designed to avoid impacting proposed and recommended wilderness, this topic is dismissed from further discussion.

IMPACT TOPICS ADDRESSED

Socioeconomics

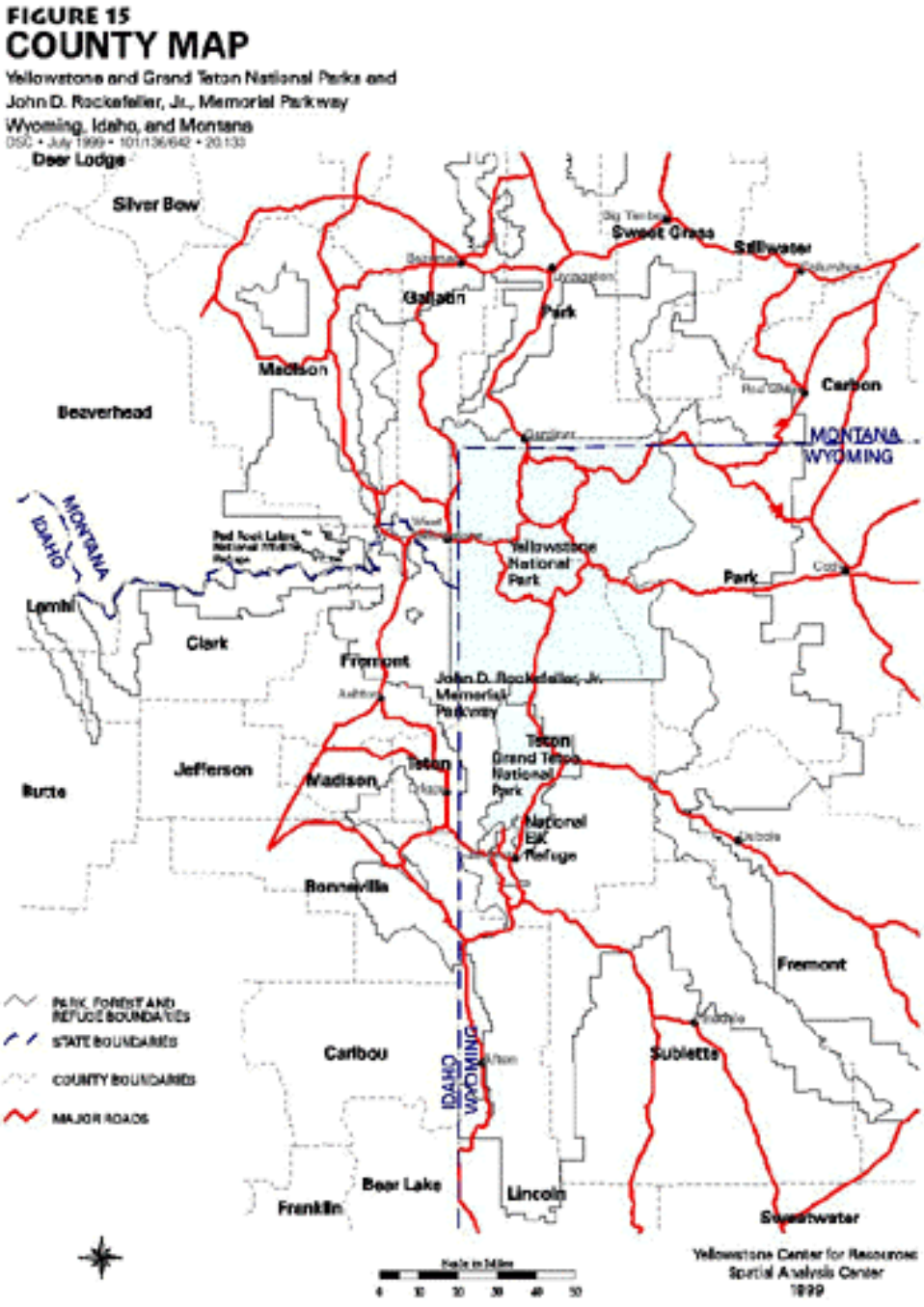
The state and county cooperating agencies provided information within their areas of special expertise: social and economic analysis. Much of this information helps define the affected environment for socioeconomics.

Regional Economy

The analysis area for the regional economy is a five-county portion of the GYA. It includes the contiguous counties in Montana, Wyoming, and Idaho surrounding YNP, GTNP, and the Parkway. The five counties are Fremont in Idaho, Gallatin and Park in Montana, and Park and Teton Counties in Wyoming (

Figure 15. County map.). This five-county area was chosen to include the parks and contiguous lands, as well as national forest lands and other nearby lands and communities that are most often visited by non-local visitors to the area. The following discussion of the economic characteristics of the affected environment of the five-county GYA presents average characteristics. While the five counties are all within the GYA, the individual counties do vary somewhat in their basic economic structure. Most counties have an economic base dominated by tourism. Characteristics such as unemployment rates and income

Figure 15. County map.



click to enlarge map

levels also vary between counties within the GYA. The five-county analysis area represents the counties and communities where most of the economic activity related to the parks occurs. Individual counties and communities within the GYA are impacted differently by this park-related economic activity. Small communities adjacent to the park such as West Yellowstone, Gardiner, or Cooke City are highly dependent on park visitor spending, while larger communities (such as Bozeman, Montana) derive a much smaller share of their economic activity from park visitor spending. The following is a discussion of the socioeconomic characteristics of the affected environment and the estimates of impacts of alternative management actions on the five-county area. Because the counties and communities have different economic settings, the impacts of alternative management actions may differ for the five counties.

Public lands provide the basis for much of the economic activity (recreation, mining, forestry, and agriculture) that occurs in the five counties. The area's overall economy has been changing for more than 20 years. The economy has shifted from a dependence on commodity extraction to a more diversified economy based on recreation, tourism, and service industries. For example, between 1969 and 1989, more than 96% of all new jobs in the larger 17-county GYA area came from sectors other than timber, mining, and agriculture (Rasker, et al. 1992).

Income

The diversification of the economy in the GYA and growth in the total number of jobs has helped keep unemployment in the five counties relatively low, an average of 3.8% in 1997. Restructuring the region's economy from a reliance on extractive industries, which are declining, to a more diversified blend of the other sectors, which are expanding, provides a more stable employment base for the region.

Table 13 shows employment by economic sector in the five counties. Most jobs pertaining to the recreation and tourism industry are found in the retail trade and services sectors of a county's economy. These sectors are much broader than recreation and tourism, and include activities such as healthcare. These two sectors account for about 42% of the earnings in the 5-county area.

Retail trade relating to recreation includes lodging accommodations, restaurants, souvenir shops, vehicle rental firms, sporting goods stores, and recreational equipment rental firms. These businesses and their employees are dependent upon the visiting public. Recreation-related services include guides, outfitters, tour organizers, and others who service the demands of the visiting public. Many other businesses are indirectly supported by the recreation-related economy, including grocery stores, auto repair shops, and construction companies. Because of the world-renowned recreational resources available to the public within the GYA, growth in these sectors is expected to continue.

Employment

Recreation and tourism are key to the economic viability of the area. Total employment for the five-county area is shown in Table 13, and the percent allocation of income by major industry is shown in Table 14. Retail trade and services accounted for about 51% of the five counties' combined employment. These industry sectors, along with the government sector, have a strong tie to the region's resources and are expected to continue to be important and sustaining segments of the GYA economy.

Table 13. Industry breakdown of employment (Number of individuals employed for the five-county GYA in 1996).

Industry	Five-County GYA Area Employment	Percent of Total County Employment
Total farm	3,417	3.62%
Total non-farm	90,947	96.38%
Private	75,814	80.34%
Miscellaneous, agriculture, and forestry	1,728	1.83%
Mining	1,043	1.11%
Construction	8,149	8.64%
Manufacturing	4,872	5.16%
Transport and utilities	3,235	3.43%
Wholesale	2,624	2.78%
Retail	19,371	20.53%
Insurance and real estate	6,109	6.47%
Services	28,683	30.40%
Government	15,133	16.04%

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, 1998.

Table 14. Total earnings by major industry for three-state area and for five-county GYA.

Industry	Three-State Area (MT, ID, WY)	Five-County GYA Area
Mining and construction	12.41%	13.68%
Manufacturing	12.23%	6.33%
Other†	13.84%	9.32%
Retail trade	11.14%	14.31%
Finance, insurance, and real estate	5.13%	6.31%
Services	23.26%	28.16%
Government	18.88%	19.30%
Farm	3.12%	2.02%

Source: U.S. Department of Commerce, Bureau of Economic Analysis Regional Economic Information System, 1998.
†Includes agriculture services, forestry, and fisheries; transportation and public utilities; and wholesale trade.

Recreation Sector and Park Visitors

Recreational use of the affected environment is a key component of the area's economy. In winter 1998-99 YNP and GTNP visitors from outside Montana, Wyoming, and Idaho spent an average of $1,129 during their trips. Of this amount, $608 per person was spent in the GYA (Duffield and Neher 2000). Winter visitors to the park from outside the GYA spend significantly less than out-of-state visitors, with $210 per trip being spent within the GYA. The expenditure estimate for nonresident winter visitors from the 1999 winter visitor survey, cited above, is similar to those from other studies. A 1993-95 Wyoming Snowmobile Assessment for the Wyoming Department of Commerce estimated nonresident snowmobile expenditures at $774 per person per trip (Taylor et al. 1995).

Winter visitation to YNP and through the GTNP Moran and Moose Entrances from December through March 1998-99 is estimated at 117,666 recreational visits (YNP Planning Office and GTNP Superintendent's Office). Considering re-entry on multi-day trips, this implies 88,250 recreational trips.

Recreation on national park and national forest lands within the GYA is an important component of total GYA economic activity. For example, within Fremont County, Idaho, which adjoins the parks, over 400 miles of snowmobile trails are groomed on a regular basis. These trails include links to Flagg Ranch and West Yellowstone. The county estimates there are 300,000 snowmobile user days each year with an additional 40,000 days of other winter recreation. Fremont County further estimates that 560 jobs and $5 million in payroll within the county are directly related to year-round recreation (Director of Fremont County Parks and Recreation, Tamra Cikaitoga, pers. com., 1999).

Winter recreation, and associated visitor expenditures are substantial within the five-county area. In the context of total annual recreation-related expenditures in the GYA, winter recreational expenditures are far less important than non-winter expenditures. This is because only 4% to 5% of annual recreational visitation to YNP occurs from December through March.

In the context of the total GYA economy, expenditures by winter park visitors (and the additional economic activity that spending indirectly generates or induces) are a small portion of total GYA annual economic output. The direct, indirect, and induced expenditures generated in the GYA by nonresidents visiting the parks in the winter months are estimated at about $63 million. In the context of the $5.7 billion dollar annual output of the 5-county economy, this represents only 1.1% of the total (Minnesota IMPLAN Group 1996).

The importance of winter visitation to local economic activity within the GYA varies from county to county and community to community. Communities located directly adjacent to the park derive a much larger portion of their total economic output from park visitor expenditures than the GYA economy as a whole.

The West Yellowstone tourism tax data for the past decade shows that tourism spending in the town has grown substantially. Between 1989 and 1999 total annual taxable tourist spending increased at an average annual rate of 10%. Tourist spending during the winter months of December, January, February, and March has remained at a relatively stable proportion of annual spending over the past ten years (between 25% and 28%). Over that period, winter tax receipts have grown at an annual rate of 10.9%. While the ten-year average growth rate of the winter tourism tax receipts in the town has been substantial, it should be noted that the year-to-year growth rates in that period have ranged from an increase of 25.6% to a decrease of 1.6%. Even within this relatively fast growing tourist economy there is substantial year-to-year fluctuation in sales.

A 1994 report on snowmobiling in Montana found nonresidents spent about $40 million annually in the state, and 75% of those nonresidents spent time in or near West Yellowstone (Sylvester and Nesary 1994).

A 1997 study commissioned by the NPS estimated the economic effects of the winter 1995–96 government shutdown on economies adjacent to park units (Neher, et al. 1997). YNP and West Yellowstone served as a case study. The NPS report estimated a statistical relationship between YNP West Entrance and West Yellowstone sales tax collections from January 1989 through February 1996. The study found a significant difference between estimated tourist expenditures in West Yellowstone for the winter and non-winter periods. For the winter months December through March, it was estimated that each West Entrance visit accounted for $152.67 in expenditures in the West Yellowstone economy. Non-winter visitor expenditures were estimated at $25.37 per visit. This result is consistent with the results of comparison data collected in a summer 1998 YNP visitor survey and data from the 1999 GYA visitor survey. While winter visitation to YNP and resort tax collections are correlated, declines in park visitation in the past have been offset by other recreational opportunities in the area. There are several hundred miles of groomed trails in the parks, but also about 400 miles of trails in nearby areas. Table 15 shows the annual change in West Entrance winter visits and the annual change in resort tax collections for both the winter and year-round West Yellowstone economy. Changes in park visitation are not closely correlated to changes in winter tax collection. For example, when visits declined by 13.4% in 1995-96, winter tax collections increased by 9.6%. The annual economy is not wholly driven by winter visits. Correcting for inflation in the tax data would not change the substantive conclusions.

Table 15. West Entrance YNP winter visits and West Yellowstone resort tax collections.

Year	W. Entrance Visits	Percent Change†	Resort Tax – Winter Months	Percent Change	Resort Tax – Year Round‡	Percent Change*
92-93	70,844	-	305,615	--	1,091,437	--
93-94	60,063	-8.2	304,638	-0.3	1,173,813	+7.5
94-95	66,294	+1.9	357,924	+17.5	1,450,882	+23.6
95-96	57,380	-13.4	392,158	+9.6	1,414,274	-2.5
96-97	56,069	-2.2	410,393	+4.6	1,498,577	+6.0
97-98	54,859	-2.1	436,219	+6.3	1,603,261	+7.0
98-99	59,928	+9.2	465,636	+6.7	1,714,878	+7.0

† From previous year
‡ For December through March
* For 1993 through 1999

Between the last week of January and the first week of March 1999, winter visitors to YNP and GTNP were surveyed regarding their winter trips to the GYA and winter management of the parks in the GYA. During the winter sampling period, surveys were distributed at the North, West, and East Entrances to YNP and at the Moran and Moose Entrances to GTNP. The number of surveys distributed at each entrance was based on the proportion of total winter visitation for each entrance during the 1997-98 winter season. The NPS entrance station personnel were instructed to distribute the surveys randomly to entering visitor groups. Respondents to the survey were asked what activities they participated in during their visits to the parks. Overall, 73.6% of park respondents reported snowmobiling, 10% reported riding a snowcoach, and 22.1% reported cross-country skiing as one of the activities participated in during their visit to the GYA. At some entrance stations, the percentage of visitors participating in different activities varied greatly. For instance, 90.1% of respondents sampled at the West Entrance to YNP reported snowmobiling during their trip. A substantial number of survey respondents reported participating in a combination of activities, for example snowmobiling and cross-country skiing, or riding a snowcoach and cross-country skiing.

This was one of several winter visitor surveys conducted in YNP, GTNP, or both since 1995. In addition, the states around the parks have conducted a number of winter visitor surveys. There is substantial agreement between the surveys on the demographics of winter visitors.

Minority and Low-Income Populations

Alternative winter management policies in YNP and GTNP have the potential to affect differing socioeconomic groups in different ways. Table 16 gives an overview of how the five GYA counties compare to the states of Montana, Wyoming, and Idaho in per capita income, percent of population in poverty, and unemployment rate. The table also shows statistics for the three-state American Indian population. American Indians were included in the comparison because they are the predominant minority group in the

region. As of 1996 the 5-county region had a per capita income of $22,116, somewhat higher than that of the 3-state area. The percent of the population in poverty across the five-county area and the three-state region in 1995 was 11.7% and 13.7% respectively. Unemployment in the five counties in 1996 was 3.8%, below the three-state average of 5.3%. Additionally, in communities such as Jackson, there may be considerable poverty because the cost of housing is 176% of the state average, the overall cost of living is 132% of the state average, and the average earnings per job is below the state average.

Table 16 shows that the American Indian population in the 3-state region had a much lower per capita income ($5,710) than either the 5-county GYA area or the 3-state region. It also shows a much higher percentage of population living in poverty (43.3%), and an unemployment rate (23.9%) much higher than the five counties or three states.

Table 16. Comparative statistics on economic status (1989).

	Per Capita Income†	Percent of Population in Poverty†	Percent Unemployment
Three-State Area American Indians	**$5,710**	**43.3%**	**23.9%**
Five-County GYA Area	**$22,116**	**11.7%**	**3.8%**
Three-State Region (WY, ID, MT)	**$19,988**	**13.7%**	**5.3%**

†Per capita income and poverty status statistics and American Indian unemployment rate are from the U.S. Bureau of the Census, 1990 U.S. Census Data. Percent unemployment is from the U.S. Bureau of the Census, USA Counties 1996 CD-ROM.

Park Visitors

The 1999 Winter Visitor Survey in the GYA found that 4.8% of winter visitors reported having a 1998 total household income below $15,000. The proportion reporting a household income below $40,000 was 22.1%. A 1999 summer visitor survey in YNP, found 11.1% of respondents reported a household income below $15,000 and 28.8% reported income below $40,000.

The reported median household income for winter visitors was between $60,000 and $75,000 per year. For 1998 summer visitors, this median income fell between $40,000 and $65,000. The income level of winter visitors to the GYA varied greatly depending on where the visitor lived. Overall, 25.1% of respondents living within the GYA reported incomes below $25,000. For visitors living outside the GYA but within Montana, Wyoming, or Idaho, this figure was 19.4%. Finally, for the group of winter visitors who lived outside the 3-state area, only 5.2% reported household incomes below $25,000. Based on the 1999 winter visitor survey, almost all the winter recreation visitors in the GYA are white (99.0%). Most winter visitors are male (66%). This compares to summer visitors that are 98% white and 50% male.

Social Values

The public has strongly held and divergent values and opinions on public policy issues concerning winter management of YNP and GTNP.

The winter visitor survey is just one of three NPS-sponsored surveys relating to the socioeconomic impacts of winter management changes within the GYA parks (Duffield et al. 2000). The other two surveys targeted summer visitors to YNP and the U.S. population as a whole, as well as local and regional residents (Duffield et al. 2000). A total of 1,137 completed surveys were obtained from winter GYA park visitors, and 257 from winter visitors to national forests in the GYA. The summer visitor survey collected 1,302 surveys from YNP visitors and the national phone survey resulted in 1,226 completed surveys. The phone survey sample was divided into three categories: GYA residents; 3-state or regional residents (Idaho, Montana, and Wyoming); and the national sample. Over 400 surveys were completed for each.

The three surveys asked several questions about visitor attitudes toward winter management of YNP and GTNP. One question asked visitors about their preferred policy for allowing winter access to Old Faithful. The results for the three surveys are shown in Table 17, Table 18, and Table 19. Winter visitors generally preferred the existing policy of grooming roads for snowmobile use. Many summer visitors preferred to have a plowed road with a parallel groomed route for snowmobile use. There was also support for the existing policy, as well as for allowing snowcoach, ski, and snowshoe travel, but not snowmobiles. Among the public, the local population was evenly divided between keeping the existing policy and allowing snowcoach, ski, and snowshoe access only. However, the regional and national populations preferred the snowcoach option to the existing policy. Among national respondents there also was substantial support for allowing only skiing and snowshoeing.

Table 17. Preferred policy for allowing winter access to Old Faithful: winter visitor sample.

Management Policy	Park Sample (%)	
	Residents	Nonresidents
Existing policy of grooming roads for snowmobile use	45.3%	63.4%
Plow the road and groom a parallel route for snowmobile use	12.8%	13.0%
Plow the road, but not groom a parallel route for snowmobile use	6.2%	3.0%
Do not groom or plow, but allow ski or snowshoe use only	10.4%	3.9%
Allow snowcoach, ski, and snowshoe travel only, not snowmobiles	25.3%	16.8%
Sample size	414	700

Source: Duffield et al. (2000a)

Table 18. Preferred policy for allowing access to Old Faithful by residents and nonresidents: summer visitor sample.

Management Policy	Residents	Nonresidents
Existing policy of grooming roads for snowmobile use	25.6%	23.3%
Plow the road and groom a parallel route for snowmobile use	31.0%	36.8%
Plow the road, but not groom a parallel route for snowmobile use	7.9%	7.7%
Do not groom or plow, but allow ski or snowshoe use only	6.9%	11.4%
Do allow snowcoach, ski, and snowshoe travel only, not snowmobiles	28.6%	20.8%
Sample size	203	832

Source: Duffield et al. (2000b)

Table 19. Respondent preference for alternative management options for winter access to Old Faithful: random phone sample.

Management Policy	Local	Regional	National
Existing policy of grooming the road for snowmobile and snowcoach use	40.4%	32.8%	20.0%
Plow and open the roads in the winter for automobile and bus access	5.6%	10.1%	11.6%
Do not groom or plow but allow only ski or snowshoe access	9.6%	14.0%	25.0%
Allow ski or snowshoe access, but also groom for snowcoaches	39.7%	37.3%	35.1%
Do not know	4.7%	5.8%	8.3%
Sample Size	413	408	405

Source: Duffield et al. (2000c)
Local = Resident of the 17-county GYA
Regional = Resident of the three-state area of Montana, Wyoming, and Idaho
National = U.S. resident

Survey respondents were also asked several general questions concerning winter use. Respondents were asked whether they agreed or disagreed with the following statement: "Visitors should have the opportunity for mechanized winter access into Yellowstone National Park." All respondents generally agreed with this statement (particularly winter visitors) as summarized in Table 20. However, all respondents also agreed largely with the statement "I am concerned about the possible disturbance of Yellowstone wildlife in the winter."

Table 20. Level of agreement and disagreement with statements regarding winter use management, by sample population.

Access: "Visitors should have the opportunity for mechanized winter access into YNP."			
Winter	**Resident**	**Nonresident**	
% Agree	57.2%	73.1%	
% Disagree	30.0%	15.6%	
Summer			
% Agree	51.4%	37.5%	
% Disagree	33.7%	25.9%	
Phone	**Local**	**Regional**	**National**
% Agree	63.7%	63.1%	49.0%
% Disagree	28.1%	27.5%	37.6%
Wildlife: "I am concerned about the possible disturbance of Yellowstone wildlife in the winter."			
Winter	**Resident**	**Nonresident**	
% Agree	62.8%	60.3%	
% Disagree	23.7%	21.0%	
Summer			
% Agree	67.2%	60.2%	
% Disagree	15.4%	9.4%	
Phone	**Local**	**Regional**	**National**
% Agree	62.4%	67.6%	77.4%
% Disagree	27.8%	24.4%	9.3%

Respondents were faced with the specific choice of trading access for the concern for wildlife, as expressed in the following question: "Grooming the roads into YNP from West Yellowstone and Mammoth for oversnow vehicles provides an easier winter route out of the park for bison. If roads were not groomed, more bison might remain in the park. Given this possibility, which of the following policies would you prefer?" The choices were:

- "The current policy that allows for winter access."
- "To close motorized winter access."
- "Not sure."

Summer nonresident visitors favored closing roads (1.4:1) as did regional (1.2:1) and national residents (2.1:1). Summer resident visitors were evenly divided on the issue while winter visitors favored having access (2.2:1) as did local phone respondents (1.3:1). Tables 21, 21, 22, and 23 provide a detailed overview of responses to these questions for winter and summer visitors and phone respondent populations.

Table 21. Visitors' preference for bison management policies that could curtail motorized winter access into YNP: Winter visitors.

Grooming the roads into YNP from West Yellowstone and Mammoth Hot Springs for oversnow vehicles provides an easier winter route out of the park for bison. If roads were not groomed, more bison might remain in the park.	
Policy Choices	**Park Sample**
Keep the current policy that allows winter access	52.1%
Close motorized winter access	23.4%
Not sure which policy to prefer	24.6%
Sample size	1134

Table 22. Visitors' preference for bison management policies that could curtail motorized winter access into YNP by residents and nonresidents: Summer visitors.

Policy Choices	Residents	Nonresidents
Choose current policy that allows winter access	37.4%	25.0%
Close motorized winter access	37.4%	34.6%
Not sure which policy to prefer	25.1%	40.3%
Sample size	211	1046

Table 23. Respondents' preference for alternative winter access bison management: Phone survey respondents.

Policy Choices	Local Sample	Regional Sample	National Sample
Keep existing policy of grooming for oversnow vehicles	50.0%	41.3%	29.6%
Close motorized winter access to allow for bison control	38.2%	48.2%	58.8%
Not sure	11.7%	10.5%	11.6%
Sample size	413	408	405

Table 24. Social Values: Level of agreement and disagreement with statements regarding.

Phone			Summer Visitor		Winter Visitor	
Local	Regional	National	Resident	Nonresident	Resident	Nonresident
Access: "Visitors should have the opportunity for mechanized winter access into YNP."						
2:1 agree	2:1 agree	1.3:1 agree	1.5:1 agree	1.4:1 agree	2.4:1 agree	4.7:1 agree
Wildlife: "I am concerned about the possible disturbance of Yellowstone wildlife in the winter."						
2:1 agree	3:1 agree	9:1 agree	4.4:1 agree	6.4:1 agree	2.6:1 agree	3:1 agree
Close road for bison: Grooming the roads into YNP from W. Yellowstone and Mammoth for oversnow vehicles provides an easier winter route out of the park for bison. If roads were not groomed, more bison might remain in the park. Given this possibility, which of the following policies would you prefer?						
1.3:1 open	1.2:1 close	2.1:1 close	1:1 divided	1.4:1 close	2.2:1 open	

Local = Resident of the 17-county GYA
Regional = Resident of the three-state area of Montana, Wyoming, and Idaho
National = U.S. resident

An interpretation of these responses is that, given all things equal, visitors would like mechanized access into YNP in the winter. However, visitors are also concerned about wildlife and possibly other resource impacts. When faced with a specific choice (help bison versus mechanized access), it appears that there is a willingness on the part of the public to accept major changes in access policy.

The national phone survey also collected information on participation in several winter recreational activities. These data are summarized in Table 25, Table 26, and Table 27. The basic finding is that the participation rates in snowmobiling and cross-country skiing are higher at the local and regional level than in the nation as a whole. In addition, the participation rates for both activities are quite similar, with skiing being slightly more popular. The estimates for the region are in close agreement with the findings for Montana (Sylvester and Nesary 1994).

Table 25. Reported respondent participation in winter activities.

	Local	Regional	National
Snowmobiling	26.7%	16.9%	7.7%
Cross-country skiing	29.5%	17.1%	9.3%

Local = Resident of the 17-county GYA
Regional = Resident of the three-state area of Montana, Wyoming, and Idaho
National = U.S. resident

Table 26. Frequency of participation in activity: snowmobiling.

	Local	Regional	National
Frequently	6.8%	4.6%	2.0%
Occasionally	10.7%	7.2%	2.9%
Rarely	8.9%	4.8%	2.8%
Never	73.6%	83.4%	92.3%
Sample size	413	408	405

Local = Resident of the 17-county GYA
Regional = Resident of the three-state area of Montana, Wyoming, and Idaho
National = U.S. resident

Table 27. Frequency of participation in activity: cross-country skiing.

	Local	Regional	National
Frequently	8.9%	6.2%	2.2%
Occasionally	12.1%	5.4%	3.6%
Rarely	8.5%	5.5%	3.4%
Never	70.5%	82.9%	90.8%
Sample size	413	408	405

Local = Resident of the 17-county GYA
Regional = Resident of the three-state area of Montana, Wyoming, and Idaho
National = U.S. resident

An additional telephone survey was conducted for residents of Teton County, Wyoming (Morey and Associates, Inc. 1998). Results were based on 300 interviews concerning winter participation and attitudes. The study found that 21% of households snowmobiled and 15% cross-country skied in YNP during the winter of 1997-98. In GTNP 12% of residents snowmobiled, 46% cross-country or back-country skied, and 10% snowshoed. A total of 52% of YNP users and 56% of non-users felt snowmobiles negatively impact YNP in the winter. Of these 66% felt snowmobiles are too noisy, 44% felt they affect air quality, 39% felt they disturb wildlife, and 25% felt there are too many. A total of 51% of users and 61% of nonusers felt that there should be entry limits in YNP during the winter. The survey also found that 7% of all respondents derived income from winter use in YNP or GTNP.

Desire for Wildlife Viewing

Respondents to the winter GYA visitor survey were asked several questions regarding wildlife in the GYA. When asked to list the three mammals or birds they would most like to see in the GYA, respondents listed the wolf most frequently. About 36% of respondents said that seeing or hearing wolves was one of their reasons for visiting the GYA. Of this 36%, 10% said they would not have chosen to make the trip if wolves had not been present in the GYA.

Bison were ranked fifth in the winter survey on the list of animals visitors would most like to see in the GYA. Nearly 54% of respondents said that seeing bison was one of the

reasons they made their trip to the GYA, and of this group, 12% said they would not have made the trip if bison were not present in the GYA.

Nonmarket Values

Direct Recreation Use

The wildlife and natural environments of bison in the GYA are of value to park visitors, hunters, and others who value the idea that these resources are maintained in a viable state. Part of this value is reflected in the expenditures that visitors make for lodging, food, and other travel services (see the previous sections *Recreation Sector* and *Park Visitors*, Chapter III). The main reason that visitors make the often long and expensive trip to YNP is because the benefits of the trip exceed the dollar costs.

Benefit studies are concerned with the demand side of the tourism industry. Because visitors are charged little or no fees for park visits or use of surrounding public lands for hunting, snowmobiling, or other recreation, trip values do not have market prices. The nonmarket value (values for items not exchanged in established markets) of trips for park visitors is measured by how much they would be willing to pay over and above the costs of the trip before they would choose to forego the trip entirely (Mitchell and Carson 1989). This area of research can be controversial, but most economists accept the method for estimating the value of direct recreational use. The more controversial issues are associated with estimating values where no direct on-site use is involved. The values reported below are for direct use.

Analysis of responses to the 1999 GYA winter visitor survey show that the median trip value for a winter trip to the GYA by residents of the 3-state region is $30. For those GYA visitors who live outside the 3-state region, the median trip value is $145.

Nonmarket values can also be used to estimate the willingness of visitors to pay for certain changes in their trips to the GYA. The 1999 winter visitor survey asked respondents three questions intended to gauge visitor willingness to pay for certain management changes within YNP.

Respondents to the winter survey who rented a snowmobile on their trip were asked if they would be willing to pay a higher rental fee to rent a snowmobile that was as clean and quiet running as a typical new car. The median willingness to pay to rent a clean, quiet machine was an additional $46 above the current cost of renting the machine.

Winter visitors for whom YNP was a destination on their trip were asked if they would pay an additional fee to cover the cost of plowing the road from West Yellowstone to Old Faithful. The median willingness to pay for winter car and bus access to Old Faithful was $6.

A final willingness to pay question was asked of winter visitors who reported skiing on their trip to the GYA. This group was asked their willingness to pay to support improved ski trail grooming and trailhead facilities within the park. The net willingness to pay for

an annual cross-country ski pass with improved ski trails and facilities within the park was $46.

Non-Economic Costs/Values

Some people who commented on the Draft Environmental Impact Statement (DEIS) stated that the economic analysis must include an assessment of the environmental costs associated with snowmobiling. This environmental cost assessment would include the cost of pollution and its impact on air quality, vegetation, ecology, or visitor experience. Similar statements were made about calculating the economic cost of harassment or disturbance to wildlife, and the removal of bison when they leave the park (due presumably to the existence of groomed routes).

Such issues are partially answered by the assessment of nonmarket values, that is, the willingness to pay for clean machines or viewing wildlife. Readers could view economic impacts as the cost of reducing impacts on resources. However, for many people the issue is instead related to the "intrinsic" value of the resource, not its value for being experienced by people.

The response to such comments is twofold. First, the National Environmental Policy Act (NEPA) does not require a "particularized assessment of nonenvironmental impact", or "particularized economic analysis" in looking at the effects on the quality of the human environment. Second, NEPA does not require an assessment of impacts for which no data can be acquired, or which is essentially speculative. The CEQ regulations do require evaluation of ecological, aesthetic, historic, cultural, economic, social, and health impacts. They do not require everything to be put into an economic context. It is necessary to reveal possible impacts on wildlife, and unnecessary to put a dollar value on them. The analysis needs to be sufficient for the decision to be made and no more. In this instance, the decision to be made does not rest on economic criteria. That is, the issues to be resolved lie largely in the areas of effects on natural resources and visitor experience. Purely economic effects must be disclosed, and will be considered (see *Decision to be Made*, Chapter I) as part of the decision making process.

Economic models are used in this EIS to evaluate the effects of various alternatives on economic systems. This approach is used in many economic settings, not just in NEPA analyses. The modeling of resource values (for example the value of an elk or of clean water) is possible within identified limits and assumptions, and it is a valuable tool in answering some questions. Often it is difficult to find much agreement on what the assumptions should be, because they are literally value judgment. This is the source of a primary limitation on such models: value lies in the eye of the beholder and there is no agreement within the body politic on inherent value of resources in dollar.[28]

[28] Comments were considered and are being addressed by the addition of this discussion into the FEIS. CEQ regulations were reviewed. Reference Values of the Federal Public Lands (Kenney et al. 1998).

Air Quality and Public Health

Over the past ten years, increases in the number of visitors using snowmobiles in YNP and GTNP have intensified concerns regarding air pollution and its effects on the health of park employees, visitors, and operators and riders of snowmobiles. A 2-stroke engine that provides a high power/weight ratio powers the typical snowmobile, and these engines produce relatively high emissions of carbon monoxide (CO) and unburned hydrocarbons (HC) compared to modern automobile engines. They also do not incorporate pollution control equipment. At present, there are no federal laws regulating snowmobile engine exhaust emissions.

CO is a colorless, odorless, and poisonous gas produced by the incomplete burning of carbon found in fuels. When CO enters the bloodstream, it reduces the delivery of oxygen to the body's organs and tissues. Health effects may include impairment of visual perception, manual dexterity, learning ability, and performance of complex tasks; headaches and fatigue; or respiratory failure and death.

In addition to CO emissions, snowmobiles generate particulate matter (PM) and volatile organic compounds (VOCs). VOCs include air toxics or hazardous air pollutants such as benzene and formaldehyde. PM includes dust, dirt, soot, smoke, and liquid droplets directly emitted into the air by sources such as power plants, vehicles, construction activity, fires, and natural windblown dust. Vehicle exhaust PM emissions may also contain hazardous air pollutants such as 1,3-butadiene. Health effects from PM emissions may include reduced lung function, aggravation of respiratory ailments, long-term risk of increased cancer rates, and development of respiratory problems.

Snowmobile emissions have been the source of the vehicle emission and health related complaints in YNP. For example in 1993 and 1994 YNP received over 1,200 complaint letters concerning employee and visitor health and excessive snowmobile pollution (Sacklin, pers. com., 1998).

Regulatory Overview Including Visibility

YNP and GTNP are classified as mandatory Class I areas under the Federal Clean Air Act (42 USC 7401 *et seq.*). This air quality classification is aimed at protecting parks and wilderness areas from air quality degradation. The act gives federal land managers (FLM) the responsibility for protecting air quality and related values (AQRVs). According to a publication entitled *Federal Land Managers' Air Quality Related Values (FLAG) Report*, (NPS, U.S. Forest Service (USFS), and U.S. Fish and Wildlife Service) AQRV's are the following: "A resource, as identified by the FLM for one or more federal areas that may be adversely affected by a change in air quality." The resource may include visibility or a specific scenic, cultural, physical, biological, ecological, or recreational resource identified by the FLM for a particular area. The Clean Air Act defines mandatory Class I areas as national parks over 6,000 acres, wilderness areas over 5,000 acres, and national memorial parks over 5,000 acres designated as of the date of the act. The Parkway is a Class II area and is managed as a Class I area under NPS policy.

National Ambient Air Quality Standards

The Federal Clean Air Act, as amended in 1990, requires the EPA to establish national ambient air quality standards (NAAQS) to protect public health and welfare. Standards have been set for six pollutants: particulate matter less than 10 microns (PM_{10}), carbon monoxide (CO), nitrogen oxides (NO_X), sulfur dioxide (SO_2), ozone (O_3), and lead (Pb). These pollutants are called criteria pollutants because the standards satisfy criteria specified in the act. Nonattainment areas are subject to planning and pollution control requirements that are more stringent than areas that meet standards.[29] The areas covered by the three park units are in attainment.

Table 28 lists the NAAQSs and ambient air standards adopted by Wyoming, Montana, and Idaho. The States of Montana and Wyoming have adopted more stringent standards for some pollutants.

Air Quality Monitoring

The Montana Department of Environmental Quality (DEQ) Monitoring and Data Management Bureau installed a microscale CO monitoring station on the northeast side of the West Entrance of YNP in October 1998. A particulate sampling station operated by the Montana DEQ is located outside YNP in the town of West Yellowstone. As reported in the aerometric information retrieval system (AIRS), the second highest CO 8-hour average in 1999 was 5.0 ppm, and the corresponding average in 1998 was 3.6 ppm (www.epa.gov/airsdata/). These compare to the federal and Montana CO 8-hour ambient air quality standards of 9.0 ppm. At the West Yellowstone monitor, the highest 24-hour PM_{10} measurement in 1999 was 61 $\mu g/m^3$, and the corresponding measurement in 1998 was 40 $\mu g/m^3$ (www.epa.gov/airsdata/). These compare to the 24-hour 150 $\mu g/m^3$ federal and Montana PM_{10} ambient air quality standards.

[29] A nonattainment area is a geographic area identified by the U.S. EPA and/or a state as not meeting either the NAAQS or state ambient air quality standards for a given pollutant.

Table 28. Primary ambient air quality standards.

Pollutant	Time Period	Federal	Wyoming	Montana	Idaho	Purpose
Carbon Monoxide (CO)	1-hour	35 ppm	35 ppm	23 ppm	35 ppm	To prevent high levels of carboxy-hemoglobin
	8-hour	9 ppm	9 ppm	9 ppm	9 ppm	
Respirable PM_{10} (current)	24-hour Average	150 µg/m^3 (arithmetic)	150 µg/m^3 (arithmetic)	150 µg/m^3 (arithmetic)	150 µg/m^3 (arithmetic)	To prevent chronic diseases of the respiratory tract and improve visibility
	Annual Mean	50 µg/m^3 (arithmetic)	50 µg/m^3 (arithmetic)	50 µg/m^3 (arithmetic)	50 µg/m^3 (arithmetic)	
Fine $PM_{2.5}$ (proposed)	24-hour Average	65 µg/m^3 (arithmetic)	65 µg/m^3 (arithmetic)	--	--	
	Annual Mean	15 µg/m^3 (arithmetic)	15 µg/m^3 (arithmetic)	--	--	
Nitrogen Dioxide (NO_2)	1-hour	--	--	0.30 ppm	--	To prevent breathing difficulties, reduce smog and acid rain formation, and improve visibility
	Annual Average	0.053 ppm	0.05 ppm	0.05 ppm	0.05 ppm	
Sulfur Dioxide (SO_2)	3-hour	0.5 ppm (secondary)	0.5 ppm	0.5 ppm (1-hour)	0.5 ppm (secondary)	To prevent increased respiratory damage, acid rain, and crop damage and to improve visibility
	24-hour	0.14 ppm	0.1 ppm	0.1 ppm	0.14 ppm	
	Annual Average	0.03 ppm	0.02 ppm	0.02 ppm	0.03 ppm	
Ozone (current)	1-hour	0.12 ppm	--	0.10 ppm	0.12 ppm	To prevent breathing difficulties, eye irritation, and biological effects to sensitive species
Ozone (proposed)	8-hour	0.08 ppm	0.08 ppm	--	--	
Lead (Pb)	90-day Average	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3	To prevent impaired production of hemoglobin
	Calendar Quarter	1.5 µg/m^3	1.5 µg/m^3		1.5 µg/m^3	

In 1980 YNP was added to the National Atmospheric Deposition Program (NADP) network, which monitors wet acid deposition at Tower Falls, located in the north central area of the park. YNP also participates with the EPA in operating a site as part of the Clean Air Status and Trends Network or CASTNet, formerly known as the National Dry Deposition Network. CASTNet provides atmospheric data on the dry component of total acid deposition and therefore complements the NADP network. Ground-level ozone also is monitored as part of the CASTNet. YNP also participates in a collaborative visibility monitoring program known as the Interagency Monitoring of Protected Visual Environments or IMPROVE program. The IMPROVE and CASTNet sampling equipment, located at Yellowstone Lake, measures atmospheric concentrations of aerosols, sulfates, nitrates, ammonium, sulfur dioxide, and nitric acid and includes an ozone analyzer, as well as meteorological equipment.

Air pollutants, primarily from nitrogen and sulfur, may be deposited on terrestrial and aquatic resources through rain, snow, cloudwater, dryfall, and gases, and may affect resources such as vegetation and water chemistry. To estimate deposition of air pollutants, data is collected at wet (rain and snowpack) and dry deposition-monitoring stations in or near the GYA parks. Snowpack samples from groomed road snowpacks had higher levels of ammonia (NH3+) and sulfate (SO42-) than those taken from roadways, indicating direct source deposition from snowmachines. Levels of NO3- were similar in both on- and off-road sites indicating that they can be attributed to regional sources.

Precipitation volume and chemistry have been monitored at the NADP Tower Falls site since 1980. Annual precipitation amounts are low (30 to 45 centimeters [cm] per year), and the acid-forming precursors (such as nitrate and ammonium) in rain and snow result in very low levels of sulfur and nitrogen. Similarly, the contributions of dry depositions of sulfur and nitrogen are low relative to wet deposition because there are no significant emission sources near either YNP or GTNP (Peterson 1998).

There is no wet or dry deposition monitoring station in GTNP for sulfur and nitrogen. However, GTNP is exposed to the same general air masses as YNP, which has both wet or dry deposition monitoring stations, and both parks experience prevailing winds from the southwest. There are no large point sources of nitrogen or sulfur adjacent to either park that might cause major differences in local deposition.

Air Quality Conditions

Since there is little industrial activity and a relatively low population in northwestern Wyoming, overall regional air quality in the parks is good. All park areas are located in areas that are in attainment with all federal and state ambient air quality standards noted in Table 28. The major sources of air pollutants in the area are those emitted by motor vehicles (automobiles, buses, snowcoaches, and snowmobiles) concentrated along motorized routes, and smoke from wood fires, including stoves, fireplaces, and

campfires. The predominant fuels consumed by stationary sources in the parks are propane and number two heating oil.

Most of the industrial activity in Wyoming occurs in the eastern counties near the cities of Gillette and Casper and in the southwestern counties around Rock Springs. Point sources of sulfur dioxide (SO_2), and nitrogen oxides (NO_X) are located within 150 kilometers (km) of YNP with most of the pollution coming from oil and gas processing, electric utility power plants, and industrial fossil-fuel combustion by industrial sources (Peterson 1998).

Air Quality and Personal Exposure Studies

A number of studies have been undertaken in recent years to characterize air quality and personal exposure to air pollutants in YNP and GTNP. These studies focused primarily on CO and particulate matter (PM) emissions and their impact on air quality and personal exposure. The studies used varying sampling methods, time periods, and other parameters that preclude a direct comparison to each other. With the exception of the Montana DEQ monitoring data that are reported as part of the EPA AIRS, study data are not directly comparable to the national and state ambient air quality standards that were discussed earlier. Table 29, Table 30, and Table 31summarize the findings of these studies of CO, PM, and volatile organic compound (VOC) emissions.

Table 29. Carbon monoxide emissions study results.

Time Period	Study Description	Study Results	Reference
1999	Carbon monoxide monitoring West Entrance to YNP	· 5.0 ppm second highest 8-hour average	EPA AIRS Quick Look Report
1998		· 3.6 ppm second highest 8-hour average	
Winter 1996	Carbon monoxide monitoring at YNP West Entrance, Old Faithful corridor, and Flagg Ranch	· 23.9 - 31.0 ppm West Entrance · 12.4 - 36.2 ppm road corridor · 0.1 - 110 ppm Flagg Ranch	NPS 1996b
Winter 1995	Carbon monoxide monitoring (grab sampling) near West Entrance	· 55 ppm maximum 1-hour level	NPS 1996a
Winter 1996	Carbon monoxide exposure while trailing a single snowmobile in GTNP	· 0.51 - 23.1 ppm average exposure at 25 - 125 feet at speeds of 10-40 mph	Snook and Davis 1997

Table 30. Particulate matter emissions study results.

Time Period	Study Description	Study Results	Reference
1999	PM_{10} monitoring station in West Yellowstone	· 61 μg/m^3 highest 24-hour average · 15 μg/m^3 annual arithmetic mean	EPA AIRS Quick Look Report
1998		· 40 μg/m^3 highest 24-hour average · 16 μg/m^3 annual arithmetic mean	
Winter 1995	Particulate high-volume sampling at West Entrance and in the town of West Yellowstone	· 7 – 40 μg/m^3 24 hour average range in the town of West Yellowstone	NPS 1996a
Winter 1999	$PM_{2.5}$ fixed site 8-hour monitoring at three YNP locations	· 38.6 – 78.0 μg/m^3 (62.1 μm^3 average) at West Entrance · 24 – 29.3 μg/m^3 (26.5 μm^3 average) at Madison · 16.7 – 39.5 μg/m^3 (24.7 μm^3 average) at Old Faithful	Kado et al. 1999
	PM_{10} fixed site 8-hour monitoring at two West Yellowstone and two YNP sites	· 1.5 μg/m^3 at residential area north of downtown West Yellowstone · 13.5 μg/m^3 at downtown West Yellowstone · 37 μg/m^3 at West Entrance to YNP · 25.5 μg/m^3 at Old Faithful	
	Personal exposure monitoring for PM_4 of NPS patrol rangers and employees at West Entrance for 8-hour work shift	· A snowmobile mechanic had highest exposure · An office worker had lowest exposure · Employees working the express lane had about double the exposure than those working the regular lanes	

Table 31. Volatile organic compound emissions study results.

Study Time Period	Study Description	Study Results	Reference
Winter 1999	Personal exposure of NPS employees to volatile organic compounds, including benzene, toluene, and aldehydes (oxidation products of automotive engine combustion)	· Toluene had highest concentration · West Entrance employees had highest VOC exposure, followed by snowmobile patrol rangers, followed by a snowmobile mechanic · Short-term peak exposures to benzene and toluene were considerably higher than integrated badge samples · Formaldehyde and acetaldehyde exposures were higher in the A.M. than the P.M. at the West Entrance	Kado et al. 1999

Public Safety

Much of the trail system in the GYA accesses remote areas. Skiers, as well as snowmobile operators and riders, may be subject to risks from cold, rapidly deteriorating weather, or other inherent backcountry dangers including terrestrial features and deep off-trail snow. Ease or difficulty of search and rescue efforts and transporting victims to medical facilities are also concerns. Backcountry accident victims also risk further injury during transport to the trailhead. Poor road and weather conditions, operator error, and the possibility of mechanical failure can combine to create safety concerns unique to snowmobilers. In areas of mixed uses, such as parking areas for both ski and snowmobile visitors, there are additional dangers. The risk of accidents also may be affected by signage and traffic control.

The increase in motorized and nonmotorized winter use over the past 10 years has been accompanied by an increase in reported accidents. Federal land managers believe that some motorized and nonmotorized accidents are not reported, and there may be more accurate records on motorized accidents because of the level of property damage and injury. Accidents are defined as incidents involving property damage or injuries that are reported to the agencies.

Generally, the number of snowmobile accidents in YNP has increased as snowmobile visitation has increased. Although snowmobile fatalities are relatively rare, they do occur. In the last 10 years, eight fatalities from snowmobile accidents have occurred: one in 1989, four in 1994, one in 1997, and two in 1999. In calendar year 1994, snowmobile deaths accounted for 44% of all park fatalities. Numbers may be higher, as statistics are kept only on fatalities that occur within park boundaries; they do not include victims whose injuries prove fatal following transport to an external medical facility.

In 1992-93, YNP converted the Old Faithful ambulance to an oversnow ambulance, and a 4-wheel drive Suburban was converted to an oversnow vehicle in the Canyon area. This vehicle is used to transport persons in emergencies on the east side of the park. Ambulance speed depends on the quality of the groomed road surface, varying from 7 mph to 25 mph. Weather permitting, helicopter evacuation services are available for life-threatening emergencies through the Eastern Idaho Regional Medical Center.

Park visitors are provided safety information as part of the information they receive upon entering the park. In addition the International Snowmobile Manufacturers Association's "Safe Rider Program" has been instrumental in distributing information to snowmobilers. For example in 1995 the Idaho State Snowmobile Association (ISSA) and the Idaho Department of Parks and Recreation implemented a snowmobile safety-training program. Both the ISSA and affiliated chapters have trained hundreds of snowmobilers in safe snowmobiling practices through this program.

Case Incident Reports—YNP

Rangers complete Case Incident Reports (CIRs) when they have been summoned to a specific location. The content of the CIRs during the winter season vary widely; for example, they can report visitor assists for gasoline sales and snowmobile repairs, search-and-rescue assistance to other area agencies, or the presentation of a talk to a group of people. YNP compiled a draft report on CIRs involving winter recreationists in YNP and outside the park for which park rangers' assistance was requested for the period December 1995 to March 2000 (Wondrak 1998, rev. 1999 and 2000). The report covered CIRs that related to winter recreationists participating in snowmobiling, snowcoach riding, and skiing. Other winter recreational activities such as snowboarding, sledding, ice skating, and snowshoeing are conducted in YNP during the winter, but there were no CIRs associated with these activities in the seasons covered by the report.

During the five winter seasons (1995-2000), about 319 (92%) of the CIRs involved snowmobiles (snowmobiles account for 61% of overall winter use). Fifteen CIRs involved skiers and fourteen involved snowcoach riders. The following table contains an accounting of the incidents by activity type. (Note: "Agency" assists are incidents in which NPS employees are contacted by the public safety departments from surrounding jurisdictions outside the park to provide assistance with situations such as search and rescue or incidents involving wildlife associated with the park. "Visitor assists" are events where a park visitor was provided assistance such as fuel, equipment repairs, minor first aid, or directions.) See Table 32 for case incident report details.

Table 32. Case incident reports from December-March 1995-2000.

Skiing Use				
Incident Description	**Agency Assist**	**Avalanche Death**	**Search & Rescue**	**Visitor Assist**
Total Frequency	1	2	8	4

Snowcoaches		
Incident Description	**Entering Closed Area**	**Visitor Vehicle Assistance**
Total Frequency	1	13

Snowmobile Use															
Incident Description	Abandoned	Agency Assist	Suspended License	Death	DUI	Entering Closed Area	Excessive Noise	Off-road Travel	Search & Rescue	Suspected Intrusion	Speeding	Unlicensed Driver	Unsafe Operation	Visitor Assist	Misc.
Total Frequency	3	46	3	1	8	19	3	11	4	9	8	12	7	172	13

[Note: Miscellaneous reports comprised the remaining thirteen snowmobile CIR's.]

Emergency Medical Services Reports—YNP

Winter EMS reports for YNP have been compiled for five seasons (1995-2000) and are shown in Table 33 (Wondrak 1998, rev. 1999 and 2000). Information is limited to the number of people who rangers reported assisting, and the types of activities that resulted in the incidents.

Table 33. EMS reports by activity type from December-March 1995-2000—YNP.

Activity Type	Number of People Assisted	Percentage of total
Ice skating	2	1%
Sledding (nonmotorized)	1	1%
Skiing	30	16%
Snowboarding	1	1%
Snowcoach riding	18	9%
Snowmobiling	120	63%
Snowshoeing	2	1%
Walking on boardwalks, etc.	15	8%

Source: NPS

Motor Vehicle Accidents—YNP

Winter motor vehicle accidents (MVAs) have also been compiled for YNP (Wondrak 1998, rev. 1999 and 2000). The report excludes accidents that occurred on US Highway 191. Accidents that occurred on the Grand Loop Road and on the road between Gardiner and Cooke City, Montana are included.

Vehicles

Not including the accidents that occurred on US Highway 191, there were 298 motor vehicle accidents from December through March 1995-2000. Of those 298 accidents, 201 (67%) involved snowmobiles, 82 (28%) involved private passenger vehicles, and 15 (5%) involved service vehicles such as busses, delivery vans, garbage trucks, snowplows, and snowcoaches. These numbers may be higher, as some accidents may go unreported. In FY 1998, snowmobilers comprised just 2% of the year's total visitors, but were involved in 9% of the year's MVAs.

Accident Descriptions

The most frequent types of motor vehicle accidents involving wheeled-vehicles in YNP (excluding US Highway 191) were:

- Vehicle versus vehicle—35%;
- Vehicle versus animal (bison, elk, deer, sheep, or wolf)—32%;
- Single car accidents—18%; and,
- Vehicle versus inanimate object—15%.

The most frequent types of snowmobile accidents were:

- Snowmobile versus landscape feature (tree, river, rock, or ditch)—34%;
- Snowmobile versus snowmobile—33%;
- Lost control of snowmobile, rollovers, and swerves—17%;
- Snowmobile versus snowcoach—5%; and,
- Snowmobile versus bison—4% (most snowmobile versus bison accidents occurred after dark).

Owner

About 70% of all visitors use rented snowmobiles, and 76% of the snowmobiles involved in accidents from 1995-2000 were rental snowmobiles (Borrie 1999; Wondrak 1998, rev. 1999 and 2000). The U.S. Government owned 6% of the snowmobiles involved in reported accidents, 15% were privately owned, and 2% were owned by YNP's concessioners (for employee use). This indicates that about 8% of people involved in wintertime MVAs in YNP are employees of the park or its concessioners. Similarly, about 9% of people involved in reported snowmobile accidents between 1995-2000 listed YNP as their home.

Contributing Factors

When completing MVA reports, rangers often explain why accidents occurred. When an explanation was provided, the following were cited as contributing factors to snowmobile accidents from 1995-2000:

- Just lost control, 27%. (These often resulted from a rider mistaking the throttle for the brake, and consequently accelerating inadvertently while attempting to slow.)
- Poor driving skills, 23%. (For example, improper passing, driving left of center, driving the wrong way down a one-way road.)
- Inattention, 15%.
- Poor road conditions, 12%.
- Inexperience with snowmobiles, 7%.
- Bison in road, 6%.
- Defective machine, 4%.
- Swerving to avoid collision, 3%.
- Other, 2%.
- Alcohol, 1%.

Location

Over the five winters covered in the report, most snowmobile accidents (51%) occurred on the part of the Grand Loop from the West Entrance to the Old Faithful area. The section of the Grand Loop from Old Faithful to the South Entrance accounted for the next largest percentage of snowmobile accidents with 23%. About 57% of the motor vehicle accidents involving wheeled-vehicles occurred on the road between Gardiner and Mammoth Hot Springs.

Time

About 90% of motor vehicle accidents involving snowmobiles occurred during daylight hours (8 A.M. to 5 P.M.). The remaining 10% occurred during the night and into the morning from 5 P.M. to 8 A.M. Travel during the night can be particularly dangerous when animals on the roadway are difficult to see. Most snowmobile versus bison accidents, which often result in serious injury, occurred during the night and comprise 35% of all nighttime snowmobile accidents.

Injuries

From 1995 to 2000:

- 73% of MVAs involving snowmobiles resulted in no reported injuries;
- 13% resulted in serious injuries;
- 13% resulted in minor injuries; and,
- 1% resulted in death.

Age

About 4% of snowmobile accidents from 1995 to 2000, where driver age was recorded, were caused by drivers between 10 and 15 years of age. This number is substantially lower than for the years prior to winter 1993-94 before the park began to require that snowmobilers be licensed drivers. Overall, 48% of snowmobile accidents were caused by drivers 35 and younger.

Citations—YNP

By far, the most common winter traffic violation in YNP is speeding on US 191. US 191 is a commercial route with a speed limit of 55 mph and is a major traffic corridor linking the cities of Bozeman, Big Sky, and West Yellowstone to Ashton and Idaho Falls. The highway is intended for and receives a substantially different sort of use than the Grand Loop road or even the Gardiner to Cooke City road. Information about citations issued on 191 is not included here for this reason. Data was also collected on winter season traffic citations that were issued to vehicle drivers during the past five winters. The results are discussed below by category.

Vehicles

Excluding those that occurred on US Highway 191, YNP's rangers issued 1,296 traffic citations during December through March of 1995 to 2000. Of those:

- 89% were issued to drivers of snowmobiles;
- 10% were issued to drivers of wheeled-vehicles, including pick-up trucks, cars, SUVs, vans and mini-vans; and
- 1% were issued to drivers of bicycles, snowcoaches, or unspecified vehicles.

Snowmobilers comprised 61% of YNP's winter visitation during these years, outnumbering auto passengers by slightly more than 2 to 1.

Incident Descriptions

Of the 1156 citations issued to snowmobilers:

- 34% were issued for speeding;
- 20% were issued for off-road travel;
- 20% were issued for driving without a license or allowing another to do so;
- 10% were issued for failure to maintain control and/or unsafe operation;
- 10% were issued for traffic violations; and,
- 5% were issued for entering closed areas.

All other violations comprised 1% of overall snowmobile citations.

Case Incident Reports—GTNP and the Parkway

Analysis of case incident reports (CIRs) in GTNP and the Parkway includes those reports related to winter recreationists engaged in wheeled-vehicle operation, riding snowmobiles, participating in skiing and snowboarding, and as passengers in snowcoaches and snowplanes. CIRs involving wheeled-vehicles on US Highways 191/26/89 south of Moran Junction in GTNP were excluded, as that route is a major transportation artery with substantial use unrelated to recreation within the park areas. The summary of CIRs encompasses five winter seasons for the months of December through March 1995-2000 (Table 34).

Table 34. Case incident reports from December-March 1995-2000.

Skiing Use					
Incident Description	**Agency Assist**	**Entering Closed Area**	**Injury**	**Pet in Closed Area**	**Search and Rescue**
Total Frequency	1	1	1	3	8

Snowboard Use		
Incident Description	**Agency Assist**	**Entering Closed Area**
Total Frequency	1	1

Snowcoach Use	
Incident Description	**Visitor Assist**
Total Frequency	1

Snowmobile Use										
Incident Description	Agency Assist	Damage to Property	Entering Closed Area/ Off-Road	Misc. Traffic Violations	Parking	Search and Rescue	Speeding	Suspected Intrusion	Underage Operation	Visitor Assist
Total Frequency	27	4	57	13	3	2	3	6	2	5

Snowplane Use		
Incident Description	**Entering Closed Area**	**Property Damage**
Total Frequency	1	1

Wheeled Vehicle Use													
Incident Description	Agency Assist	Entering Closed Area/Off-Road	Fail to Obey Traffic Device	Investigation	Misc. Traffic Violations	No Driver's License	Parking	Pet in Closed Area	Speeding	Unsafe Operation	Vehicle Equipment	Visitor Assist	Weapons Violation
Total Frequency	9	9	16	4	31	12	30	8	316	17	27	75	9

Source: Grand Teton CIR reports

Emergency Medical Service Reports—GTNP and the Parkway

Emergency medical service (EMS) reports were compiled for five winter seasons from December through March 1995-2000 in GTNP and the Parkway. Frequently, the EMS reports do not list the type of activity victims were engaged in at the time of the incident. The activities and data in the following table reflect incidents involving winter recreationists and are limited to incidents that were reported to rangers and required EMS assistance. The analysis excludes EMS activities related to wheeled-vehicle traffic on US Highways 191/26/89.

Table 35. EMS reports by activity type from December-March 1995-2000.

Activity Type	Number of Persons Assisted	Percentage of Total
Not reported	12	66%
Snowmobile	5	28%
Snowcoach	1	6%

Source: Grand Teton EMS reports

Motor Vehicle Accidents—GTNP and the Parkway

Winter motor vehicle accidents (MVAs) were analyzed for five years from December through March 1995-2000. MVAs involving wheeled-vehicles on US Highways 191/26/89 south of Moran Junction in GTNP were excluded from the analysis.

Vehicles

Not including the accidents that occurred on US Highways 191/26/89 south of Moran Junction in GTNP, there were 74 MVAs from December through March 1995-2000. Of those 74 MVAs, 66 (89%) involved wheeled-vehicles and 8 (11%) involved snowmobiles. The accident statistics for GTNP and the Parkway show a greater percentage of the MVAs involving wheeled-vehicles than is the case for YNP.

Accident Descriptions

The types of MVAs for wheeled-vehicles in GTNP and the Parkway were:

- Vehicle versus vehicle—40%;
- Single vehicle accidents—38%;
- Vehicle versus animal (bison, elk, or moose)—18%; and,
- Vehicle versus snowmobile—4%.

The types of snowmobile accidents were:

- Lost control of snowmobile—29%;
- Snowmobile versus landscape feature (tree or lake)—29%;
- Snowmobile versus wheeled-vehicle—29%; and,
- Snowmobile versus snowmobile—14%.

Location

Wheeled vehicle accidents occurred most frequently from Colter Bay to Moran Junction (38%) and from Flagg Ranch to Colter Bay (24%). Most snowmobile accidents (88%) occurred between the South Entrance of YNP and Flagg Ranch.

Injuries

Most snowmobile MVAs in GTNP and the Parkway resulted in no injuries (88%). Visitors have expressed concern to park staff about safety on the Continental Divide Snowmobile Trail (CDST) in GTNP because of shared snowmobile and automobile use in US Highways 191/26/89. Although no fatalities have occurred on the CDST within GTNP or the Parkway, several injuries and one fatality occurred on the CDST/US Highway 287 (near Togwotee Pass) because of automobile-snowmobile collisions.

Vehicle versus snowmobile accidents occurred mainly in the Flagg Ranch area. Causes for these accidents included traveling too fast for conditions, unsafe vehicle operation, and an accident occurred when a vehicle with a trailer attempted to swerve around a snowmobile.

Citations—GTNP and the Parkway

Statistics for citations issued to winter recreationists engaged in wheeled-vehicle touring and snowmobiling in GTNP and the Parkway were compiled for five winter seasons from December through March 1995-2000. There were no citations issued for recreationists involved in snowcoach touring.

Vehicles

Excluding those that occurred on US Highways 191/26/89, there were 257 citations issued in GTNP and the Parkway. Of those 257 citations, 190 (74%) involved wheeled-vehicles and 67 (26%) involved snowmobiles.

Incident Descriptions

Of the 67 citations issued to snowmobilers:

- 81% were issued for off-road travel or entering closed areas;
- 6% were issued for unsafe operation;
- 2% were issued for speeding;
- 2% were issued for allowing a driver to operate a snowmobile without a license;
- 5% were issued for traffic violations; and
- 6% were issued for unspecified offences.

Note: The total exceeds 100% due to rounding.

Avalanche Hazards

Yellowstone National Park

In YNP, there are risks associated with both avalanches and avalanche control. Avalanches occur in many locations throughout the park where slopes are greater than 30°. Three avalanche fatalities have occurred in YNP over the past decade: one in 1992 and two in 1997. All were backcountry skiers. One was an NPS employee and two were park volunteers. Depending on snow conditions and weather, most areas available for and used by backcountry skiers are subject to avalanches.

Avalanches are prevalent or a concern in three locations adjacent to roads, especially because ground and weather conditions are highly changeable. Winter avalanche control is currently practiced at Sylvan Pass and the Talus Slope (south of Lewis Lake). Sylvan Pass and the Talus Slope area include road segments that are groomed in the winter for snowmobile use. Washburn Hot Springs Overlook, on the Dunraven Pass road, receives avalanche control during spring plowing. This area contains designated ungroomed nonmotorized trails.

The NPS has conducted an avalanche control program for these three avalanche areas since the 1970s. The objective of avalanche control is to maintain the road in a

reasonably safe condition for visitor traffic and for spring plowing. In YNP rangers achieve this objective by either firing artillery shells or lobbing charges into the snow-covered slopes of the three areas mentioned above while the roads in question are temporarily closed to visitor traffic. Control operations at the Talus Slope and Washburn Hot Springs Overlook are relatively minor and infrequent compared to those conducted on Sylvan Pass. Sylvan Pass is the 1-mile long portion of the East Entrance Road that crosses the crest of the Absaroka Mountains. The pass is located between Top Notch Peak on the south and Hoyt and Avalanche Peaks on the north, and is situated at an elevation of 8,162 feet. It receives a great deal of snow and is extremely windy. Long, unbroken talus slopes descend from the surrounding peaks to the pass at angles of nearly 45°. Frequent severe weather often necessitates closing the road to all visitation, sometimes for extended periods until storm cycles clear and control work can begin. Experience has shown that it is unsafe and unproductive to try to open the road during a winter storm.

Risks associated with avalanche control can potentially affect both employees and visitors. To access the gun platform on Sylvan Pass, from which control is practiced, employee crews are often forced to snowmobile directly beneath the snow walls that they intend to release. In addition, the artillery and explosives used to initiate avalanches have occasionally failed to detonate upon force of impact. In these instances the proximate location of unexploded shells generally must be noted, and the shells searched for during the following summer. Unexploded shells generally land in remote areas that receive little visitation due to the lack of trails and unusually rugged nature of the terrain. A potential risk to visitors and wildlife does exist. It has been estimated that there may currently be as many as 30 unexploded shells in these areas of YNP's backcountry. When Sylvan Pass is not used during the winter, some form of avalanche control would be necessary during spring plowing.

At the Talus Slope, an avalauncher is used to lob charges onto the slope. Installed in 1999, the avalauncher allows for remote delivery of explosives, minimizing the need for hand-set charges.

Grand Teton National Park and the Parkway

Due to the combination of steep, mountainous terrain and heavy snowfall, considerable avalanche potential exists in many locations throughout GTNP. While avalanches can occur on almost any gradient of slope, the potential for dangerous avalanche conditions is highest on slopes in the 30° to 45° range (NPS 1998). Backcountry skiers and climbers sometimes initiate avalanches in GTNP.

Although GTNP does not conduct any avalanche control activities (except to reduce danger in a rescue situation), the historical number of avalanche accidents in the park is low. This may be partially due to the fact that there are no locations of high avalanche potential adjacent to roads. In the past decade, there has been one avalanche-related

fatality. This fatality occurred when an individual attempted a climb of the south side of Mount Wister in a remote area of Avalanche Canyon.

Jackson Hole Mountain Resort borders the southern boundary of GTNP, which creates an opportunity for skiers to easily enter the park through steep avalanche terrain. For this reason, the park boundary has been controlled. The Jackson Hole Ski Patrol monitors avalanche conditions, and backcountry skiers are required to enter the park through designated gateways that have a lower avalanche hazard potential. Fewer controls may be present in future years.

The USFS produces a daily update of avalanche conditions in the Teton and Gallatin Ranges. YNP and GTNP provide staff and visitors with this report to assure awareness of dangerous avalanche conditions in the area. However, the parks also advise that winter backcountry users should be aware of the possibility of avalanche hazards at all times.

Geothermal Features

YNP is known worldwide for its geysers, hot springs, travertine terraces, mud pots, and fumaroles. These are important resources that can be harmed by humans. Harm to geothermal resources also harms plants and animals that are dependent on them.

Water Resources

Water Quality

The GYA encompasses a 3,500 square mile watershed that preserves one of the most significant and near-pristine aquatic environments in the United States. Surface water features in the GYA include lakes, ponds, rivers, and ice-free habitats.

About 10% of the GTNP is covered by surface water. Much of this is in five lakes along the eastern front of the Teton Range, including Jackson, Jenny, Leigh, Two Ocean, and Emma Matilda Lakes. About 100 alpine lakes exist, most above 9,000 feet. Many streams originate in the Teton Range and in the Bridger Teton National Forest north and east of the park, and drain into Jackson Lake or the Snake River. About 75 pothole ponds of less than 0.5 acres to more than 35 acres occur in the glacial drift areas south and east of Jackson Lake.

About 5% (112,000 acres) of Yellowstone is covered by water, including more than 220 lakes and 1,000 streams. Yellowstone Lake, which lies at an elevation of 7,730 feet covers 136 square miles and is 400 feet deep, is the largest high elevation lake in North America. The headwaters of five major river systems (Fall, Gallatin, Madison, Snake, and Yellowstone) are either in or just upstream from YNP. The 670-mile Yellowstone River, the longest undammed river in the lower 48 states, plunges 308 feet at the Lower Falls in the Grand Canyon of the Yellowstone, almost twice the drop of Niagara Falls.

The Snake River originates on the western slope of the Continental Divide in northwest Wyoming’s Teton Wilderness Area and flows about 450 miles through the upper Snake

River Basin to south-central Idaho. From its headwaters, the river flows westward through a portion of YNP, south through the Parkway and enters Jackson Lake within GTNP boundaries. It flows east out of Jackson Lake and then south for about 25 miles before crossing the south boundary of the park. The Buffalo Fork of the Snake River enters GTNP from the east at Moran Junction.

Jackson Lake presently encompasses an area of 25,730 acres and is used to store water for irrigation in Idaho's Snake River Valley. The reservoir was first built in 1906 by installing a dam at the outlet of the natural lake to create a usable capacity of 300,000 acre-feet. Usable capacity has been increased to 847,000 acre-feet through subsequent dam replacements (NPS 1998).

Waters that remain ice-free because of river current or runoff from thermal features provide important winter habitat for waterfowl, bald eagles, and water-dwelling mammals. Similarly, YNP's surface and groundwater resources support a world-class trout fishery, and aquatic plant and animal communities.

The Snake River above and below Jackson Lake remains ice free, providing waterfowl and year-round bald eagle habitat. Jackson Lake typically freezes over in mid-December.

Surface waters within GTNP are of exceptionally high quality and are designated as Class I (the highest of four water quality classifications) by the State of Wyoming Department of Environmental Quality (NPS 1998). Water quality characteristics of Jackson Lake are typical of snowmelt-fed, high elevation reservoirs and are of relatively high quality year-round. Water temperature, nutrient loading, and turbidity remain low while dissolved oxygen averages are high. The Snake River downstream of the dam exhibits the same high quality water observed in Jackson Lake (NPS 1998).

Similarly, water quality within YNP is considered excellent and surface waters are designated Class I by the state. Water quality and quantity information is available for the Yellowstone, Madison, Snake, Gibbon, Firehole, Lamar, and Gardner Rivers. As part of fisheries investigations, the U.S. Fish and Wildlife Service collected chemical and biological data on over 600 streams and 100 lakes in YNP, and has sampled aquatic invertebrates on YNP's five major lakes and 10 major rivers. YNP maintenance staff monitors surface and ground water via 64 test wells near water and wastewater treatment systems, underground storage tanks, and former landfills.

Natural processes and human activities have the potential to affect water quality in and outside the parks. In YNP, about 16% of the park's watershed is located outside park boundaries. Although large areas are protected by wilderness designation, 5% remains unprotected. External threats include leaching from tailings due to past mining activities upstream of YNP. Within YNP, threats include involuntary discharge of untreated wastewater, leaking underground storage tanks, sporadic hazardous materials spills (primarily petroleum products), pollution from recreational boating, and backcountry toilets near lakeshores and streams, leaching from abandoned dumps, and pollution from

pesticide use. Natural influences include hydrothermal discharge, wildlife, fire, and storm runoff.

Many of the lakes and streams in GYA are very weakly buffered against pH lowering that could be induced by the addition of acidic rain or snowmelt. Many human activities, roadways and visitor use areas parallel streams, rivers, and lakeshores. Winter recreational activities, especially the discharge from 2-stroke snowmobile engines can lead to indirect pollutant deposition into the top layer of snow and subsequently into the associated surface and groundwater (Adams 1974; Ferrin and Coltharp 1974). Other human activities that can impact water quality and aquatic and riparian habitats in the GYA are timber harvest, road construction, flood control, grazing, mining, and recreational development (GYCC 1999). Most such activities occur in areas that do not drain into the parks' surface water system.

A study conducted by Miller and Dustin (1997) was initiated over concern that the quality of GTNP's lakes may be declining due to increased human usage. Seventeen lakes were sampled in 1995 and six were re-sampled in 1996 to determine the trophic state of the lakes. In Jackson Lake, the waters are primarily oligotrophic (containing very few nutrients), but may be slightly mesotrophic (containing moderate amounts of nutrients) near developments using sewage lagoons such as Colter Bay. Two Ocean Lake was found to be strongly mesotrophic.

Within GTNP, Snake River tributaries below the dam transport large concentrations of suspended material during certain portions of the runoff period because of erosion of unstable streambanks and overland flow during melt. Sediment constitutes the greatest water quality concern for these streams (NPS 1998). As reported by Clark (1993) and Maret (1995), sediment loading in the upper Snake River basin is caused by activities such as road construction, off-road recreational vehicles, irrigated agriculture, land development, and levee construction, most of which occurs down-stream from the park. Levee construction on the Snake River near Jackson has contributed significantly to channel alterations and sedimentation (Maret 1995).

Wetlands

Wetlands include marshes, bogs, streams, seeps, wet meadows, thermal pools, and geysers found on high mountain slopes in valleys, and along lower elevation rivers. They are some of the most diverse and productive parts of the parks' ecosystems. Due to their designation as national parks, YNP's and GTNP's wetlands are largely unimpacted. However, where development has occurred in the parks (a total of 2% in YNP), it has historically been placed in flatter, more easily traveled areas – along rivers and in wetlands. Today, when possible, the parks are moving roads and facilities out of wetlands and restoring them to natural conditions.

YNP's wetlands have been mapped as part of the U.S. Fish and Wildlife Service's National Wetland Inventory, a congressionally mandated program to identify, classify,

and map all wetlands in the United States. The predominant wetlands totaling over 118,500 acres (about 5% of the park) are classified as palustrine, and include wet meadows, swamps, marshes, potholes, fens, bogs, and shallow ponds.

Before ground-disturbing activities such as construction, the landscape is mapped and inventoried for wetlands so that the projects can be designed to avoid or minimize adverse effects. Such detailed mapping has occurred along several road corridors and in portions of most developed areas.

Wetlands are an important part of YNP's river corridors and lake systems, and about 38% of the park's 1,200 plant species are associated with wetlands. About 11% of the park's species grow only in wetlands, and one-half of the park's rare plants are associated with wetlands. YNP wetlands are also important to wildlife. An estimated 80% of Wyoming's native animals rely on wetlands, especially areas along rivers and creeks (Consolo 1999).

The USFWS National Wetland Inventory (NWI) also covers GTNP. Mapping reveals wetland areas throughout GTNP. The most extensive wetlands are found:

- Along the Snake River floodplain below Jackson Lake Dam;
- Along the Buffalo Fork of the Snake River;
- In the area called Willow Flats just north of the dam where Pilgrim Creek drains into Jackson Lake;
- Along the Gros Ventre River; and,
- The Snake River inlet to Jackson Lake.

Wetlands in these areas are diverse, but are predominately classified as palustrine with emergent, scrub/shrub, and aquatic bed characteristics (NWI; Cowardin et al. 1979). These areas are dominated by emergent marshes, wet meadows, shrub wetland, short woody vegetation areas, and ponds with floating or submerged aquatic vegetation.

Wetlands are an important component of the Snake River aquatic and riparian zones and help create diverse wildlife habitat for prominent species of birds, such as the bald eagle, trumpeter swan, great blue heron, and osprey (NPS 1997). Willow Flats supports diverse bird and mammal populations in many riparian wetlands with willows and emergent herbaceous vegetation interspersed with floodplain forest. Between Willow Flats and Colter Bay Village on Jackson Lake are many ponds bordered by emergent wetlands such as Swan Lake and Heron and Cygnet ponds.

Aquatic Resources

The parks are home to a vast array of native animals that depend on aquatic resources for all or part of their lives – more than 400 types of aquatic insects, 12 fishes, 10 reptiles and amphibians, at least 300 birds, 100 butterflies, and 60 mammals in YNP alone.

Fish are an important component of aquatic ecosystems. They link the transfer of energy between aquatic and terrestrial environments. Over 20 species of fish, including

nonnatives, are found in the parks; game species include trout and other salmonids. See *Aquatic Species: Reptiles, Amphibians, and Fish* for a discussion of fish species of special concern in the parks. Winter recreation does not appear to have any direct impacts to fish and other aquatic resources; water pollution caused by toxic runoff from the snowpack may be a greater concern.

Within YNP, aquatic invertebrates are abundant in both species and in total number, in part because of the wide variety of habitats, including thermally influenced wetlands. Invertebrate productivity in the Snake River in GTNP is slightly above average compared to other western rivers. About 170 species have been collected and identified. Species diversity is much lower on the Snake River between Jackson Lake Dam and Pacific Creek than in areas downstream (NPS 1997).

Reptiles and amphibians occur in aquatic, thermal, or upland habitats. See *Impact Topics Dismissed, Reptiles and Amphibians,* and *Aquatic Species: Reptiles, Amphibians, and Fish,* in this chapter for discussions of these species.

Wildlife

Introduction

Winter for wildlife in the GYA is a challenging time for survival. High snow depths, cold temperatures, and lack of high quality forage can lead to synergistic and nutritional stress, and, consequently, intense competition and higher rates of mortality. Human activities in the winter may compound these factors. The following sections describe the species that winter recreation is most likely to affect. Several topics are discussed, including population status or trend (if known), relevant life history data, and information on winter habitat use.

Ungulate Winter Ranges

Ungulates rely on restricted winter ranges in which food and cover may be limited. Consequently, major episodes of winter stress, low forage availability, and declining physiological conditions lead to an increase in mortality (Meagher 1998). Competition is particularly severe in winter, when thousands of large ungulates move to lower valley elevations to forage on exposed vegetation in areas of low snow depth (Clark 1999). In Jackson Hole, much of the ungulate winter range has been usurped by farming and development, resulting in reduced habitat and conflicts with landowners (Boyce 1989). Concern over the loss of elk winter range resulted in the creation of the National Elk Refuge (NER) in 1912. Similarly, bighorn sheep historically wintered on the Gros Ventre buttes and the east slopes of Rendezvous Peak (Whitfield 1983). These areas are extensively developed and no longer are used by bighorns. Moose migrate from higher elevations in and surrounding GTNP to the valley floors and canyon mouths where snow depths are lower.

As managers of the Jackson elk herd, the Jackson Hole Cooperative Elk Studies Unit believes that winter range is one of the most critical issues involving successful

management of the second largest elk herd in the world. Adequate winter range reduces the need for a feeding program (carried out by both Wyoming Game and Fish Department and the NER), with its inherent costs and habitat impacts, and reduces the risk of disease transmission, such as brucellosis.

In GTNP most elk and bison migrate to the NER feedgrounds; the remainder winter along or east of the Snake River, primarily in areas with south- or west-facing slopes, which accumulate less snow and are more prone to melting than other areas. Blacktail Butte provides important winter range for both elk and moose. Up to 200 elk have been observed there during late winter (Long, pers. com. 2000). Although the number of moose in the area has not been quantified, they are common on the open west-facing slopes throughout the winter. GTNP biologists have observed a gradual increase in skiing and snowshoeing on Blacktail Butte, and are concerned about the effects of such use on the wintering ungulates.

The Uhl Hill/Wolff Ridge area contains the densest over-wintering population of ungulates in the Park. Periodic aerial surveys have shown significant elk use of the area during the winter, with numbers ranging from 120 in 1996 to about 700 in 2000. During the last two years, increasing numbers of bison have wintered in the Uhl Hill and Wolff Ridge area. Before 1998, only 5 to 10 bison were located there during annual winter bison classification surveys. Since that time, numbers have increased to 60 to 70 bison (GTNP unpublished data).

Bison are highly social grazers, and develop traditional seasonal migration patterns (Meagher 1989). In addition to using areas within YNP, bison also use winter ranges to the west and north, and a small percentage move from the interior over Sylvan Pass and down the Shoshone River. The YNP bison population uses three different wintering areas: the Pelican Valley in the south-central portion of the park; Mary Mountain in the Hayden-Firehole valleys in the west-central portion; and the Northern Range in the Lamar Valley (Meagher et al. 1994).

In YNP, thermal areas are important components of winter range because warm ground keeps these areas relatively free of snow, enabling bison and other ungulates to feed in the otherwise snowbound interior of the park (Meagher 1970, 1971, 1976, 1978, 1985, 1998; Murie 1940; Miller 1968; Craighead et al. 1973; Ables and Ables 1987; NPS 1990). During severe winters, valleys supporting bison have either extensive thermal or warm areas, or many small thermal areas among which bison movement is possible. Most bison wintering areas in YNP contain streams that remain unfrozen because of a warm water influx. Meagher wrote, “Scattered thermal sites—particularly warm ground with less snow—apparently provide a margin for survival for bison in the harshest wintering areas of YNP” (1978). During four aerial counts of bison in Hayden and Pelican Valleys in December through March 1997-1998, bison were usually located in or near thermal areas and along the banks of thermally influenced streams (Kurz 1998).

Thermal areas with snow-free vegetation or shallow snow are very important winter habitats for elk along the Madison, Firehole, and Gibbon Rivers (NPS 1990). A quarter century ago, the Madison-Firehole elk herd in YNP was reported to have adapted to deeper snow by using snow-free thermal areas that provided improved access to forage (Craighead et al. 1973). In reporting on the herd of 800 to 1,000 elk residing in YNP's Madison-Firehole Valley, Ables and Ables (1987) wrote ". . . over-winter survival depends heavily on thermal areas that reduce snow accumulations."

Despite the more favorable habitat conditions provided by thermal areas, some animals inevitably die each winter. In YNP winterkilled ungulate carcasses are concentrated in thermal areas and both black and grizzly bears are known to use these areas upon emerging from dens in spring (Green et al. 1997; Mattson 1997).

Ungulate Energy Budgets

Ungulates function at an energy deficit during winter because snow reduces forage availability, affects an animal's ability to escape predators, and increases energy costs at a period of time when the nutritional value of winter forage is low (Beall 1974; Skovlin 1982; Mattfield 1974; Parker et al. 1984). Energy costs, expressed in calories expended per unit of time for various activities, must be balanced by energy intake from foods that provide necessary proteins, fats, and carbohydrates. Malnutrition may cause mortality directly, or increase the risk of death by disease or predation.

Deep snow greatly increases the amounts of energy expended by deer and elk for locomotion in YNP and elsewhere (Parker et al. 1984; Telfer 1978). DelGuidice et al. found severe energy deprivation of elk in YNP to be associated with increased elk density, deep snow cover, or both (1991). Craighead et al. reported that the Madison-Firehole elk herd had adapted to deeper snow in YNP by using snow-free thermal areas that provided improved access to forage (1973). Elk feeding in thermal areas and snow-free areas near warm springs fed an average of about 11 hours per day. In comparison Coughenour estimated that elk in snow (up to 60 cm deep) may require 16 hours of feeding per day to meet their energy requirements (1994).

Aune (1981) described bison movements as appearing to be less restricted by snow than elk movements. Bison primarily used a network of well-established trails and travel routes, including riparian areas. Bison do use groomed and plowed roads, but use is considered minor compared to off-road travel (Bjornlie 2000; Kurz et al. 2000; see Chapter IV, alternative A). All these strategies help reduce energy expenditures to some degree, and consequently, enhance Bison over-winter survival.

Bison (Bison bison)

Bison are native to the GYA, and were observed by early travelers before and after the creation of YNP in 1872. In the 1870s and 1880s bison were nearly driven to extinction by market hunting. In 1880, after nearly a decade of market hunting and poaching in the park, the superintendent reported three herds totaling about 600 animals (Schullery and

Whittlesey 1992). By 1902, the number of bison in the park had been reduced to 23 animals. Fearing extinction, park managers began a program to restore bison populations in YNP. This program included the introduction of bison from captive herds to the park. From the 1920s to the late 1960s, the bison in the park were subject to herd reductions and other manipulation to achieve range management goals. In 1967, herd size for YNP was 397 animals and a policy of natural regulation was established that allows bison and other ungulates to reach population levels dictated by environmental conditions. The bison population peaked at about 4,200 animals in summer 1994 (Meagher et al. 1994; Meagher 1998), and was estimated at 2,200 animals in spring 1999.

As a consequence of significant increases in bison numbers and their corresponding movements from YNP into Montana, periodic removals were resumed in 1990. The risk of transmission of brucellosis—a contagious bacterial disease—from bison to cattle and the economic cost associated with this risk prompted the development of bison management plans. These interim management plans resulted in the shooting or capture and slaughter of an average of 176 bison per year between 1990 and 1996. The interim plan in place during the severe winter of 1996-1997 resulted in the shooting or capture and slaughter of 1,084 bison (NPS 1998).

In May 1998 a draft EIS/Plan for the Interagency Plan for the State of Montana and YNP was published for public comment (NPS 1998). The draft EIS/Plan analyzed impacts of seven alternatives for the interagency, long-term management of YNP area bison to maintain a wild and free-ranging bison population, and address the risk of brucellosis transmission to protect the economic viability of the livestock industry in Montana (NPS 1998). More than 67,500 letters were received on the draft Bison Management EIS/Plan. The comments will be used by the NPS, the co-leading agencies (the U.S. Forest Service and the State of Montana), and the cooperating agency (the U.S. Animal and Plant Health Inspection Service) to revise the draft EIS (NPS 1998). A Final Environmental Impact Statement/Plan for bison management will be released in summer 2000.

Long-term data suggest that the YNP bison population has steadily increased from the herd control days of the late 1960s. According to Dr. Mary Meagher, bison researcher in YNP, the population reached carrying capacity early in the winter of 1981-82 at about 2,400 animals. Consequently, bison began expanding their range, using the snow-packed groomed roads to facilitate dispersal into new areas. Major movements occurred from the Pelican Valley into Hayden Valley, resulting in an increase of animals in Hayden Valley, and subsequently an increase in movements westward to the Firehole Valley (Meagher 1993; Meagher et al. 1994; Meagher 1998). As a consequence of this range expansion, the population roughly doubled between 1982 and 1994. As a result, according to Dr. Meagher, bison habitats in YNP are of decreased quality, and can no longer support the same numbers of bison as before 1981. Consequently, Meagher contends that the population will be driven downward as bison leave the park, partially using groomed roads, where they are consequently removed by management actions to control the transmission of brucellosis.

Cheville et al. (1998) presents an alternative interpretation of the population data. They conclude that the population growth rate and range expansion did not increase as a consequence of the groomed road system. Rather, range expansion is an artifact of a population that does not regulate naturally. They concluded that even in the absence of groomed roads, it would be unlikely that natural mortality would eliminate the egress of bison from the park. Other researchers dispute Meagher's claim of range expansions into the Firehole, Madison, and Hayden Valleys, stating that these areas were traditionally used by bison since at least the early 1970s (Craighead et al. 1973; Aune 1981). Aune asserts that the actual range expansions observed since the winter recreation program include increased movements out of the northern area (where no groomed routes exist) and into Cougar Meadows and West Yellowstone, which began in the late 1970s before the road grooming program (1981). Recent work by Bjornlie (2000) and Kurz et al. (2000) also conflicts with the results of Meagher's research, indicating that at present, bison do not use groomed roads for major shifts in distribution (see Chapter IV, alternative A).

Management removals (to prevent the transmission of brucellosis to cattle) and severe winter conditions are the main causes of bison mortality. Bison die during major episodes of winter stress, low forage availability, and declining physiological conditions (NPS 1998). Their carcasses are scavenged by many species, including mammals, birds, and insects, and thus play an important role in the ecology of the parks (NPS 1998). In particular, bison carcasses provide protein for threatened species including grizzly bears, bald eagles, and gray wolves (Swenson et al. 1986; Green et al. 1997; Smith et al 1998).

In GTNP the Jackson bison herd grew from 16 founders in 1969 to 500 animals by 1999. Because 95% of the herd winters on the NER and the remainder occur in areas that are either closed or otherwise restricted to the public, impacts to bison from winter recreation in GTNP are not of great concern. However, during the past several years increasing numbers of bison wintered in the Uhl Hill and Wolff Ridge area. Continued unregulated nonmotorized use could affect them. Research is ongoing as to the effects of brucellosis on this exposed herd, including the extent to which the disease influences population productivity (Cain et al. 2000).

Elk (Cervus elaphus)

Elk once roamed throughout most of North America. By the early 1890s, elk populations were decimated by commercial harvest, competition with livestock, and habitat change (Clark 1999). All remaining large herds were in the GYA. Elk are the most abundant ungulate species in the YNP area with an estimated 50,000 to 60,000 elk in eight to ten separate herds (USFWS 1994). The northern YNP elk herd, the largest in the YNP area, summers in the north, east, and central portions of the park and surrounding mountains and winters in the northeast, north, and west areas of the park and adjacent lands. Three herds are found west and northwest of YNP including the Madison-Firehole, Gallatin-Madison, and Gallatin Range herds. East of YNP are the Clark's Fork, North Fork-

Shoshone, and Carter Mountain herds, and south are the Jackson Hole, Targhee, and Sand Creek herds (Clark 1999).

Elevation, topography, weather, vegetation, and escape cover determine elk habitat. Summer range is extensive and reflects vegetative productivity. Winter range is more limited and is determined by lower elevation and snow depth. Elk generally forage on grasses followed in preference by browse species and conifers (Clark 1999).

Because of natural mortality, elk, like bison, play an important role in the ecological processes of the YNP area. Elk are either preyed upon or their carcasses scavenged by many wildlife species. Carcasses provide an important source of protein for threatened species including grizzly bears, bald eagles, and gray wolves (Swenson et al. 1986; Green et al. 1997; Smith et al. 1998).

The elk in GTNP are considered part of the Jackson elk herd. In addition to the park, the summer range of the Jackson herd includes the Teton Wilderness, the southern part of YNP, and the Gros Ventre Range. Most winter range occurs in the Buffalo Fork Valley, Gros Ventre Range, and NER. In addition four feedgrounds provide supplemental winter forage, three of which are found in the Gros Ventre River drainage and one on the NER. About 80% to 90% of the herd is associated with these feeding areas during the winter (NPS 1995).

Many of the elk that summer in the Teton Wilderness and southern YNP migrate through the Parkway and GTNP in the spring and fall. About 200 to 400 remain in the park throughout the winter along the Snake River floodplain and along the east side foothills (NPS 1980). Few elk winter in the Parkway because of deep and persistent snow.

To manage the size of the Jackson elk herd, elk hunting is allowed in specific areas of GTNP east of the Snake River and throughout the entire Parkway. Elk hunting limits the number of Grand Teton elk on the NER during winter and reserves winter range for herd segments that summer outside the park. Hunting also helps achieve the herd objective set by the Wyoming Game and Fish Department of 11,000 animals.

Moose (Alces alces)

In YNP moose occur at low densities. Although no population estimates exist for moose, recent studies indicate a population decline in areas where recent landscape-level fires have affected old-growth lodgepole pine winter range. Potential changes in deciduous vegetation, especially willows (*Salix* spp.) in riparian areas may also affect moose winter foraging and population levels (Tyers and Irby 1995). Future population trends are uncertain and may vary due to habitat conditions, exposure to predation, and human influences (Tyers 1999).

In GTNP moose were rare or absent before about 1912, but were numerous by 1950. During the mid-1960s, 200 to 250 moose were year-round residents of the valley areas in the park and the adjacent Buffalo Valley. This segment of the Jackson moose population

increased to 700 to 900 during winter when moose migrated onto winter range from other areas inside and outside the park. The parkwide population during summer is unknown, but most moose that summer within the park probably remain for the winter (NPS 1995).

Moose that spend the summer at high elevations move downslope to river bottoms and sagebrush flats, where they are abundant and highly visible residents of the park in the winter. Areas that provide important winter habitat include the Willow Flats/Hermitage Point area, Buffalo Valley, and the Snake and Gros Ventre River corridors. All or portions of the three areas are closed to winter use to protect wintering moose and other wildlife. The winter distribution of moose in the parks corresponds to areas where deep snow and harsh winter conditions exist.

Bighorn Sheep (Ovis canadensis)

Bighorn sheep were historically found throughout the western mountains of North America. However, populations have dramatically declined throughout their range. These declines are associated with competition with livestock, introduction of disease, hunting, and loss of habitat during settlement of the West. In YNP the bighorn sheep population ranges from 240 to 325, and winter ranges are located in the northern part of the park (Legg 1998).

In GTNP bighorn sheep are found in isolated bands at high elevations along the western park boundary and among the major peaks. Known as the Teton herd, it is comprised of two sub-populations: one in the north, west of Jackson Lake; and one in the south, west of Phelps Lake. The entire herd is a marginally viable, remnant population that is geographically isolated from other herds and persists in a harsh environment. There may be limited interchange between the two sub-populations. A separate, small population occurs on the Bridger-Teton National Forest in the Gros Ventre River drainage (NPS 1995).

Some herds of bighorn sheep use different ranges in winter and summer. Winter range is more limited than summer range and typically occurs at lower elevations. Sheep use traditionally formed migration patterns. Any alteration to these routes or habitats could be detrimental for a population of bighorn sheep (Legg 1998). To protect bighorn sheep from human disturbance, several areas currently are closed to public entry: McMinn Bench in YNP and Kelly Hill and Static Peak in GTNP.

Reptiles and Amphibians

The valley garter snake (*Thamnophis sirtalis fitchi*) and the wandering garter snake (*Thamnophis elegans vagrans*) are semi-aquatic. Consequently, water pollution caused by toxins in the snowpack may be of concern. Direct impacts are not expected to occur because these species hibernate for the winter use period. See *Aquatic Species: Reptiles, Amphibians, and Fish* and *Impact Topics Dismissed* for discussions of the other reptiles that inhabit the parks.

The Columbia spotted frog (*Rana luteiventris*), boreal chorus frog (*Pseudacris maculata*), blotched tiger salamander (*Ambystoma tigrinum melanostictum*), and introduced bullfrog occur in the parks. Amphibians hibernate and, therefore, are not directly affected by winter use. Water pollution caused by toxins in the snowpack may be a greater concern. *See Aquatic Species: Reptiles, Amphibians, and Fish* for a discussion of amphibian species of special concern, and *Impact Topics Dismissed* for a discussion of the bullfrog.

Federally Protected Species

The ESA requires an examination of impacts on all federally threatened or endangered species. Four species protected under the ESA are present in the parks in the winter. Threatened species include the Canada lynx (*Lynx canadensis*), bald eagle (*Haliaeetus leucocephalus*), and grizzly bear (*Ursus arctos horribilis*); the gray wolf (*Canis lupus*) is considered experimental, nonessential. Species classified as experimental, nonessential are considered not necessary for the continued existence of the species and critical habitat is not designated. This classification allows management actions that may involve lethal control or relocation. Section 7 of the ESA requires the preparation of a biological assessment (BA) that analyzes the impacts of the proposed action on listed species. A BA has been prepared, and portions of it are reproduced in this section.

Grizzly Bear (Ursus arctos horribilis)

In the contiguous United States, grizzly bears were extirpated from about 98% of their historical range between 1850 and 1950 through human-caused mortality (USFWS 1993). In 1975, they were listed as threatened under the ESA and recovery zones and goals were subsequently established (USFWS 1993). Since then, annual population estimates for the Yellowstone population have increased largely due to lower numbers of human-caused adult female mortality.

The life history of the grizzly bear is well documented (McNamee 1984). This discussion is limited to grizzly activities that coincide with winter use: the time surrounding and including denning. In the middle to late fall, grizzlies feed on the seeds of whitebark pine (*Pinus albicaulis)*, and they scavenge on ungulates that died during the rut or gut piles associated with the hunting season (Mattson and Jonkel 1990; Mattson et al. 1991). The availability of these foods and weather conditions influence the initiation of denning (Craighead 1979). During years of ample food, mild temperatures, and low snow cover, grizzlies tend to den later in the season. Based on 14 years of den entry data for grizzly bears in the GYA, about 90% of all grizzlies are denned by the end of November (Haroldson et al. in prep.). In one study grizzly bears were documented to frequent the immediate area of their dens from 8 to 22 days before denning (Judd et al. 1986). Dens were often located at sites with whitebark pine and subalpine fir at an average elevation of 8,100 feet (range: 6,500 to 10,000 feet), and were found on north slopes ranging from 30° to 60° slope range (Judd et al. 1986).

Bears emerge from their dens when temperatures rise and food availability increases (e.g., winter-killed ungulates or spring vegetation). Consequently, when spring arrives early and melting snow exposes green vegetation and carcasses, bears may emerge from dens earlier in the season (Craighead 1979). First to emerge are adult males between mid-February and late March, followed by subadults and solitary females in late March or early April; lastly females with new cubs emerge between early and mid-April (Haroldson et al. in prep). From March through May, ungulate carrion (primarily elk and bison) is the most important grizzly food (Mattson et al. 1991). Bears also feed on emerging vegetation on lower elevations, wind swept slopes, and in thermal areas. Grizzlies may also consume over-wintered whitebark pine seeds if seed production was abundant the previous fall (Mattson et al. 1992).

Grizzly bears are found throughout YNP. In GTNP and the Parkway, grizzly bears have increased from relatively uncommon to common in the last 10 years, in conjunction with a steady trend toward increasing bear density in the southern GYA. Home ranges of 27 radio-collared bears from 1975 to 1998 have included parts of GTNP and the Parkway. Grizzly bears are now common in the Gros Ventre Mountains on the southeastern border of GTNP, and southeast to the upper Green River basin. In the Teton Range, they are regularly sighted north of Moran Canyon and the Badger Creek drainage, where visitor use of the backcountry occurs at relatively low levels. On the Jackson Hole valley floor, they are common north of the Triangle X Ranch, and have been observed in the Snake River drainage on several occasions. Grizzly bears also occur in the Two Ocean Lake area and throughout the Parkway.

Gray Wolf (Canis lupus)

The subspecies of the northern Rocky Mountain wolf (*Canis lupus irremotus*) was initially listed as an endangered species in 1973 (38 FR 14678). Due to taxonomic concerns, the entire species was listed as endangered in the contiguous United States outside of Minnesota, where it was listed as threatened in 1978 (43 FR 9607). In 1990 Congress directed the appointment of a Wolf Management Committee to develop a plan for wolf restoration in YNP and central Idaho. The following year, Congress directed the United States Fish and Wildlife Service (USFWS) to prepare an EIS to consider the reintroduction of wolves into these areas (USFWS 1994b). The final EIS was completed in May 1994, and the final rules for the reintroduction were published in November 1994 (59 FR 60252). Wolves reintroduced into YNP and central Idaho are classified nonessential, experimental according to section 10(j) of the ESA of 1973, as amended (16 U.S.C. 1531). In national parks and wildlife refuges, nonessential, experimental populations are treated as threatened species, and all provisions of Section 7 of the ESA apply (50 CFR 17.83(b)). All wolves occurring in the State of Wyoming are classified as nonessential, experimental (59 FR 60256).

Wolf packs occur throughout the central GYA, including areas north and east of the parks. In 1998, wolf pack territory sizes averaged 359 square miles (range: 135 to 955

square miles) (Smith et al. 1998). There are currently 11 packs with 8 breeding pairs in the GYA (Smith, pers. com. 2000). Wolf winter range is located in areas with high prey concentrations. As a consequence, ungulate winter range is closely associated with wolf activity. Depending upon prey abundance, wolves may occupy a variety of habitats including grasslands, sagebrush steppes, coniferous and mixed forests, and alpine areas.

Wolves dispersing from YNP began to occur in GTNP in 1997. The Teton Pack (formerly the "Teton Duo") and the Gros Ventre Pack (formerly the "Jackson Trio") ranged widely throughout the park during the winter of 1998-99. Both packs and the Soda Butte Pack used the Pacific Creek drainage as a corridor between YNP and GTNP. The Teton Pack moved much less than the other two packs, remaining primarily in the northeast part of the park, where they denned in the spring of 1999 producing pups. On June 21, 1999, the male was found dead on Highway 26/287, having been hit by a vehicle. During the winter of 1999-2000, the female and her five pups alternated among the northeast corner of the park and the Gros Ventre River Basin (primarily outside of the park). The Gros Ventre Pack denned in the Gros Ventre River drainage outside GTNP producing two pups. During the winters of 1998-99 and 1999-2000, the pack principally hunted in the NER, the Upper Gros Ventre River basin outside of the park, and the area around the small community of Kelly (within the park). The Soda Butte Pack has not been located within the park since May of 1999. Uncollared black wolves have been reported in the Moran area since 1997.

Bald Eagle (Haliacetus leucocephalus)

The bald eagle was listed as an endangered species in Wyoming in March 1967 under the Endangered Species Preservation Act of 1966 (32 FR 4001), and listed in 1978 under the ESA of 1973 (43 FR 6233). The Pacific States Bald Eagle Recovery Team was formed as a result of the 1978 listing and a recovery plan was completed in 1986 (FWS 1986). The parks lie within the Greater Yellowstone Recovery Area (Zone 18 in the Recovery Plan). As a result of the implementation of recovery plans, populations of bald eagles began to increase by the mid-1980s. Consequently, the status of the bald eagle was changed from endangered to threatened in Wyoming in July 1995. Recovery goals were subsequently met, and in July 1999 the USFWS announced a proposal to remove the bald eagle from the endangered species list. No final action on the proposal to delist has occurred to date. The bald eagle is a "species of special concern" in the parks, and is also afforded protection under the Migratory Bird Treaty Act (MBTA) 16 U.S. Code 703 of 1918, and the Bald Eagle Protection Act 16 U.S. Code 668 of 1940.

Before its listing as an endangered species in 1967, about 30 to 35 occupied nesting territories of bald eagles were known in the GYA (Greater Yellowstone Ecosystem Bald Eagle Working Team 1983). Between 1970 and 1995 the bald eagle population in the GYA increased exponentially (Stangl 1999), reaching over 100 known occupied territories (Greater Yellowstone Bald Eagle Working Group 1996). In 1998 118 breeding territories were known, of which 105 were occupied. Population growth has

been attributed to a significant reduction in the level of environmental contaminants such as DDT, and the protection of nesting habitat (Stangl 1999).

GTNP contains 10 known nesting territories and pairs; however, not all pairs nest in the park each year. Known territories are located along the shorelines of the Snake River and Jackson Lake. No bald eagles are known to nest within the Parkway, although the upper Snake River is used extensively for foraging year-round (Alt 1980). Bald eagles that nest along the Snake River in GTNP may remain on their nest territories throughout the year, occasionally leaving for short periods during the non-breeding season to exploit abundant or ephemeral food sources elsewhere. Lake-nesting birds may remain on territory for most of the time that Jackson Lake is free of ice. Other winter foraging areas in GTNP include the Buffalo Fork River and Cottonwood Creek.

In YNP, 26 bald eagle nests produced 14 young in 1999. Most of these nests were located on the shoreline of Yellowstone Lake. After the lake freezes, eagles may move north to feed on winterkilled ungulates on the Northern Range, or to take advantage of gut piles associated with the fall and winter hunt outside the park. Other eagles occur in thermally influenced areas, or near rivers that remain ice-free such as the Yellowstone and Firehole (NPS 1997).

Some resident adult eagles remain in the parks as winter approaches, and others migrate short distances depending on food availability. During the winter, large numbers of migratory eagles join resident eagles, with up to a 45% influx reported in some years (Stangl 1999). In general, bald eagle winter habitat is associated with areas of open water where fish or waterfowl congregate (Swensen et al. 1986), or ungulate winter range where eagles scavenge on carcasses of large winterkilled mammals.

Bald eagle management in the parks includes conducting annual nest surveys, monitoring territory occupancy and productivity, and banding nestlings. YNP also conducts annual mid-winter bald eagle surveys to count eagles and map their distribution. In addition each year beginning February 15, GTNP enforces a 0.5-mile buffer zone around active bald eagle nests along the Snake River to provide protection from human disturbance.

Nest building or repair intensifies around this time followed by a 35-day incubation period from February through March (Swensen et al. 1986; Harmata and Oakleaf 1992; Stangl 1994). The majority of nesting territories are located along major rivers or lakes within 5 km of their inlets or outlets, or along thermally influenced streams or lakes (Alt 1980). Nests and roosts commonly occur in mature and old growth trees in multi-layered stands of Douglas-fir (*Pseudotsuga menziesii*), black cottonwood (*Populus trichocarpa*), and spruce (*Picea* spp.). Nearby food, suitable perches, and security from human activities are important habitat components for both nest and roost sites.

Canada Lynx (Lynx canadensis)

The USFWS proposed to list the Canada lynx as a threatened species under the ESA in July 1998 (63 FR 36993). In doing so USFWS concluded that the lynx population in the United States is threatened by human alteration of forests, low numbers as a result of past exploitation, expansion of the range of competitors (particularly bobcats and coyotes), and elevated levels of human access into lynx habitat (63 FR 36994). In July 1999 the USFWS extended the normal 12-month rule-making process an additional six months to allow for the consideration of new scientific information and additional public comments (64 FR 36836). A final ruling, issued in March 2000, declared the lynx a threatened species.

In Wyoming, lynx occur primarily in spruce-fir and lodgepole pine forests at slopes of 8° to 12°, at elevations between 7,995 and 9,636 feet (USFS 1999). Aspen (*Populus tremuloide*s) stands and forest edges, as well as open grass meadows and edges with forests, may also support high numbers of lynx. On a landscape scale, lynx habitat includes a mosaic of early seral stages that support snowshoe hare (*Lepus americanus*) populations, their primary prey, and late seral stages of dense old growth forest that provide ideal denning and security habitat. Connectivity between lynx populations is critical. Dispersal corridors should be several miles wide with only narrow gaps. Large tracts of continuous coniferous forest are the most desirable for lynx travel and dispersal (Tanimoto 1998).

Although reliable information concerning the abundance and distribution of lynx is lacking, Consolo and Meagher documented 50 sighting and track reports of lynx in YNP from 1893 to 1995 (1999). Most sightings and records of tracks occurred after 1930. From 1995 to present, five sightings of lynx were reported in YNP, three on the Northern Range and two in the park interior (Gunther 1999). However, many of these sightings were not verified and consequently their credibility is questionable. In particular lynx are easily confused with bobcats by inexperienced observers. In the 1990s numerous researchers conducted studies to document the presence of rare carnivores in YNP; none detected lynx (Harter et al. 1993; Gehman et al. 1994; Gehman and Robinson 1998; Murphy 1998).

Little information on lynx abundance and distribution is available for GTNP and the Parkway. GTNP files include only 12 unverified reports (GTNP files). A transect survey of 169 km at nine locales in northern GTNP and vicinity in 1998 found no sign of lynx (Wyoming Game and Fish Department, Plata, pers. com. 2000).

Lynx are solitary carnivores generally occurring at low densities in boreal forest habitats. Within most of their range, lynx densities and population dynamics are strongly tied to the distribution and abundance of snowshoe hare. However, this relationship may be muted or absent in more southern populations (Halfpenny et al. 1982). Females may not reproduce during food shortages, and food availability directly correlates with the survival of young lynx with few kittens surviving when food is scarce (Koehler 1990).

Kittens are born in May or June after a 60- to 74-day gestation period, and typically remain with their mothers until about 10 months of age.

Species of Special Concern

NPS policy requires examination of the impacts on park species of special concern, defined as those species for which data are sufficient to document that the species is in decline, or species that because of their unique or highly localized habitat requirements warrant special management. Most species of special concern are not winter residents of the parks, and thus are unaffected by winter use. Therefore, the following accounts describe only those park-designated species of special concern that occur in the parks year-round and for which winter use may be detrimental.

Wolverine (Gulo gulo), Fisher (Martes pennanti), American Marten (Martes americana), and River Otter (Lutra canadensis)

Wolverines and fishers are considered rare in the YNP area and both are classified as species of special concern in Wyoming, Montana, and Idaho, and sensitive in Regions 1, 2, and 4 of the U.S. Forest Service. American martens, more common in the YNP area, are classified as sensitive in Region 2 of the USFS. They are also classified as an "indicator species" of old growth forests by the USFS (Trochta 1999). River otters are common and classified as a species of special concern by Wyoming, Montana, and Idaho.

Wolverines occur in low-density populations and are one of the least studied carnivores in North America. To date only five comprehensive studies have described wolverine ecology in North America (Hornocker and Hash 1981; Gardner 1985; Magoun 1985; Banci 1987; and Copeland 1996). Historical reductions in the distribution of wolverines correlate with the encroachment of human civilization and suggest the species is especially sensitive to environmental perturbations and to local extinction (Banci 1994).

The most southerly productive population of wolverines in North America may occur in Grand Teton National Park. Ongoing research (Copeland 1999) is tracking the movements of radio-collared wolverines along the western border of the park and on the adjacent Targhee National Forest. In YNP there are enough sightings and reports to suggest that the park also supports a wolverine population. From 1887 through 1998, 93 unconfirmed and 51 confirmed reports and sightings of wolverine have been documented in YNP (Gunther 1999).

Wolverines are associated with remote, boreal habitats that correlate with the absence of humans (Copeland 1999). Adequate year-round food supplies (especially ungulate carrion) may be more important than particular types of topography or plant associations (Banci 1994). Rocky outcrops or trees may be used for escape and cover.

Female wolverines in Idaho appeared to initiate denning in late February (Copeland 1996). Dens were located in subalpine cirque basins above 8,000 feet and were surrounded by trees. Natal dens in Montana were most commonly associated with snow-covered tree roots, log jams, or rocks and boulders (Hash 1987). In Idaho wolverines

abandoned natal dens as early as March 10, moving kits through a series of maternal dens until weaning (Copeland 1996). Human disturbance may be the cause of den abandonment (Copeland 1996; Myberget 1968; Pullianian 1968), although Magoun (1985) stated that snow melt may be a factor as female wolverines in arctic Alaska did not appear disturbed by human activity.

Sightings and reports of fisher are extremely scarce in the parks. Only 4 confirmed and 11 unconfirmed reports were documented in YNP between 1887 and 1998 (Gunther 1999). In GTNP 13 unverified reports were received between 1984 and 1997 (GTNP files).

Fishers are associated with dense, closed canopy forests. They avoid meadows, clear-cuts, and areas of deep snow. They travel on packed snow trails. Brush piles, root wads, snags, and hollow logs provide cover. Breeding occurs from early March to late April, and the young are born in the cavities of large diameter trees (Trochta 1999). Fishers are opportunistic feeders, preying on snowshoe hares, porcupines, rodents, and carrion (Gunther et al. 1997).

American martens occur in all three parks, although the 1988 fires in YNP destroyed a large proportion of marten habitat (Clark et al. 1989). Preferred habitat includes old-growth spruce-fir and lodgepole forests with a well-established understory and woody debris. They also use meadows, rocky areas, and forest edges (Clark et al. 1989). Young are born in mid-March to late April in dens and disperse in late summer or early fall (Clark et al. 1989; Trochta 1999).

Inhabiting a variety of aquatic habitats, river otters occur in many of the lakes and streams in the parks (Clark et al. 1989). Unpolluted aquatic systems and intact riparian areas are essential to river otters' continued existence. Young are born in March or April, in the dens of other species (e.g., beaver) or in natural shelters close to water. Slow-swimming fish species are the otter's main prey. They also consume small mammals, amphibians, aquatic insects, reptiles, and birds (Clark et al. 1989).

Trumpeter Swan (Cygnus buccinator)

The trumpeter swan is a species of concern in Idaho and Montana, and a Priority 1 species in Wyoming. In 1989 the Idaho Chapter of the Wildlife Society unsuccessfully petitioned the USFWS to list the trumpeter swan in the GYA (the Rocky Mountain Population) as threatened under the ESA. Concern over the dramatic decline of this population led to the establishment of the Greater Yellowstone Trumpeter Swan Working Group in 1997 (Olliff 1999).

Trumpeter swans inhabiting the parks are a part of the Rocky Mountain Population (RMP). The RMP is comprised of 2 separate breeding flocks: the more sedentary U.S. segment which includes swans occupying parts of southeast Idaho, southwest Montana, and northwest Wyoming (referred to as the Tri-state Area), and the migratory Canadian

segment (Subcommittee on Rocky Mountain Trumpeter Swans 1992). Swans in the Tri-state Area face competition for winter forage from the nonresident Canadian flocks, contributing to high over-winter mortality, especially for juvenile birds (Subcommittee on Rocky Mountain Trumpeter Swans 1992). Swans return to breeding territories between February and May and hatch young around late June (Olliff 1999).

Winter habitat consists of ice-free areas throughout the parks. In YNP, thermal areas contribute to the maintenance of open water, but its availability may become scarce during extremely cold weather (NPS 1990). Portions of the Madison, Firehole, and Yellowstone Rivers (among other sites) provide wintering habitat for swans in YNP (McEneaney, pers. com. 2000). In GTNP the Snake River is a critical wintering habitat for swans, especially when other wintering sites around the valley have frozen over (Reid, pers. com. 2000). Portions of the Snake River corridor are closed to public use during the winter to protect winter habitat for species such as the trumpeter swan. In addition where appropriate and posted, public access is restricted within 250 yards of nesting sites from February 1 to September 15.

Aquatic Species: Reptiles, Amphibians, and Fish

Two reptile species are of special concern in the parks. The northern sagebrush lizard (*Sceloporus graciosus graciosus*) is found at elevations up to 8,300 feet, and is commonly associated with thermal areas (NPS 1998). Sagebrush lizard habitat may be disturbed if development occurs in rocky areas along the fringes of thermal areas. The rubber boa (*Charina bottae*) is a semi-aquatic snake. Consequently, water pollution caused by toxins in the snowpack may be of concern. Direct impacts to either of these species are not expected to occur because they hibernate for the duration of the winter use period. See *Impact Topics Dismissed* and *Reptiles and Amphibians* for discussions of other reptiles in the parks.

Amphibian species of special concern in the parks are the boreal toad (*Bufo boreas boreas*) and the northern leopard frog (*Rana pipiens*). The boreal toad is known to have declined in abundance in the parks, and the northern leopard frog, historically documented to breed in the parks, is now rarely seen (Koch and Peterson 1995). Both of these species inhabit a wide range of aquatic habitats, including ponds, lakes, and wetlands. Because these species hibernate, they are not directly affected by winter use. Water pollution caused by toxins that accumulate in the snowpack may be a concern more than possible direct impacts. See *Reptiles and Amphibians* in this chapter for a discussion of the other amphibians in the parks.

Fish species of special concern in the parks include the arctic grayling (*Thymus arcticus*); the leatherside chub (*Gila copei*); the westslope cutthroat trout (*Oncorhynchus clarki lewisi*); the Snake River cutthroat (*Oncorhynchus clarki*); and the Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*).

The arctic grayling inhabits lakes in YNP (Clark et al. 1989). It prefers cold, clear water with abundant vegetation, and spawning occurs from April to mid-June. Young grayling feed on zooplankton, switching to invertebrates as they mature. Threats to the arctic grayling include competition from exotic fish and habitat alteration.

The morphologically distinct Snake River cutthroat trout is only found in the Jackson Hole area of the Snake River. Spawning occurs in tributaries where success is highly dependent on local conditions. Threats to the Snake River cutthroat trout populations include barriers to migration, turbidity, lack of cover, livestock pollution, water and flood control development, irrigation, and fishing pressure (NPS 1997).

Considered by the Wyoming Game and Fish Department to be a distinct subspecies from the Snake River cutthroat, the Yellowstone cutthroat trout inhabits Yellowstone Lake and its tributaries, and may occur into the alpine zone. They are adapted to cold temperatures but have been found in geothermally influenced waters (Clark et al. 1989). Spawning occurs in streams, in the latter part of April through early August. Depending upon their age, these trout consume plankton or invertebrates. In YNP, the Yellowstone cutthroat is threatened by the nonnative lake trout (*Salvelinus namaycush*), and whirling disease caused by a parasite that attacks the cartilage of young fish. In a petition to list the Yellowstone cutthroat under the ESA, the petitioners included the Snake River cutthroat as a form of the Yellowstone subspecies.

Occurring in YNP, the westslope cutthroat trout inhabits mountain streams and mainstem river systems (Clark et al. 1989). Adult westslope cutthroats prefer large pools and other low velocity areas. They are migratory, traveling up tributaries to spawn from April to July depending upon elevation and spring runoff. All westslope trout in YNP show some degree of hybridization with other cutthroat trout species and rainbow trout. Hybridization can lead to the loss of locally adapted populations (Clark et al. 1989). Other threats to the westslope cutthroat include predation and competition from nonnative fish, and fishing pressure. The USFWS recently determined this species did not warrant listing under the ESA (65 Fed. Reg. 20120, April 14, 2000).

The leatherside chub exists in the Snake River near the mouth of the Buffalo Fork River (NPS 1980; Maret 1995; NPS 1998). Although native to other parts of the state, the leatherside chub may have been introduced to the Snake River during the last sixty years.

See *Aquatic Resources*, in this chapter for a brief discussion of other fish species.

Natural Soundscapes

An important part of the park service's mission is to preserve or restore the natural soundscapes associated with units of the national park system. The natural soundscapes (also referred to as natural quiet and the natural ambient sound level) are the unimpaired sounds of nature, and are among the intrinsic elements of the environment that are associated both with the purpose of a park and its natural ecological functioning. They are inherent components of "the scenery and the natural and historic objects and the

wildlife" protected by the NPS Organic Act. Natural sounds and tranquility are major resources of many national parks and are valued by visitors. Increasingly, even parks that appear as they did in historical context do not sound like they once did. Natural sounds are being masked or obscured by a wide variety of human activities. NPS policy is to facilitate, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate noise sources. Every visitor who so desires should have the opportunity to enjoy natural soundscapes and to hear the sounds of nature without impairment.

Appendix C contains regulatory references and excerpts of park service definitions and policies regarding sound and natural quiet in national parks.

Sound Levels, Sound Level Changes, and Audibility

The volume of a sound is measured by its sound pressure level in units of decibels (dB). A given sound can consist of a single tone, such as a bird chirp, or a wide range of sound frequencies, such as the wind through the trees. Some sound sources can have sounds in many frequencies, but are particularly loud in certain frequency ranges, such as snowmobiles with their characteristic sound centered around the frequency of 200 hertz (Hz).

Human ears do not hear all frequencies equally well: low frequencies and very high frequencies are attenuated by human hearing. Human ears are particularly sensitive to the relatively high frequency range of 1,000 Hz to 4,000 Hz. When the sound is measured, electronic filters in the measurement equipment are typically used to simulate the human ear's response. The most commonly used set of filters is referred to as the A-weighting network. Sound pressure levels that are measured through an A-weighting network are called A-weighted sound levels and are also measured in dB, commonly written as dBA. It is important to note that many animals respond to sounds much differently than humans, so that A-weighted sound levels may not correlate well to sounds that affect or do not affect animals.

Some A-weighted sound levels from typical urbanized or indoor activities or events are given in Table 36. However, park environments can be much quieter than even the quietest urban levels (NPS 1995). Also listed in the table is the relative loudness that an average person would rate the sound sources using quiet urban daytime as a reference level. For the average human, an increase in the measured sound level of 10 dB is subjectively perceived as being twice as loud; a 10 dB decrease is perceived as half as loud, assuming that there is no change in the frequency content of the sound, such as the presence of tones or unique sounds.

Assuming no change in the frequency content, the sound level change at which the average human will indicate that the sound is slightly louder or quieter is about 3 dB. However, the ear is remarkable in its ability to discern very small changes in the sound

environment when new sources are introduced that affect levels in individual frequency ranges, even when the overall A-weighted sound level does not change.

The ability of a human, free from external distractions, to hear a specific sound in a particular setting is called audibility. Audibility is a function of the frequency-specific differences in sound pressure levels between a sound source and the background or ambient sound environment. While overall A-weighted sound levels give an indication of relative magnitude of sounds, the A-weighted sound level measure combines into a single number a large amount of information about the amount of a sound source's energy in all frequencies. As a result, A-weighted sound levels are not good measures for evaluating audibility.

Table 36. Quantitative and qualitative descriptions of typically occurring sounds.

Sound Level, dBA	Type of Sound	Relative Loudness (Human Judgment) of Different Sound Levels	Subjective Impression of Sound
110	Nightclub dance floor	128 times as loud	Uncomfortably loud
100	Fire engine siren at 100 feet		
90	Motorcycle at 25 feet	32 times as loud	Very loud
85	D8 Cat dozer at 50 feet		
80	Diesel truck, 40 mph at 50 feet	16 times as loud	Loud
60-70	Average car, 40 mph at 50 feet		
70	Vacuum cleaner at 3 feet	8 times as loud	
65	Conversation at 3 feet		
60	Background music	4 times as loud	
55	Air conditioning unit at 15 feet		
50	Quiet residential	Twice as loud	
45	Bird calls		Quiet
40	Lower limit urban daytime ambient	Reference loudness	
30	Background sound – suburbs at night	_ as loud	
20	Quiet whisper	_ as loud	Barely audible
0	Threshold of hearing		

To illustrate this point, the A-weighted sound level of a piccolo may be much less than that of the entire orchestra playing at a concert, but the audience can clearly hear the piccolo because its sound energy is concentrated in a part of the frequency spectra different from that of most of the orchestra. Similarly, in the natural environment, the sound of a distant coyote or a distant snowmobile can be heard and identified by a listener even though the overall A-weighted sound level may or may not increase during either type of event.

Sound levels also vary with time, and that variability helps both to define soundscapes and determine impacts. Average conditions are often represented by the *median* A-

weighted sound level, or the sound level exceeded 50% of the time, also called the L_{50}. Background sound levels, in the presence of intrusions from other sources, are often described by the A-weighted sound level exceeded 90% of the time (the L_{90}). Finally, a commonly used measure for assessing impacts on humans from time-varying noise is the A-weighted equivalent sound level (the L_{eq}), more properly called the "average sound level." L_{eq} is a computed or measured constant level for a given time period that contains as much sound energy over that time as the actual varying sound level. The averaging gives more weight to loud events than to quiet events of equal duration. A one-hour period is commonly used for motor vehicle noise.

Natural and Human-Generated Winter Sound Sources

The existing winter sound environment in each park is a combination of natural and human-generated sounds. Some significant natural sound sources that are present in other seasons are not present during winter months in either GTNP or YNP. These sounds include the rustling of leaves of deciduous trees, birds, insects and animals, and waterfall and stream sounds. In the winter months, water flow in streams and rivers is lower than during the spring and summer, and ice covering the streams reduces emitted sound levels. Generally, winter background natural sounds are limited to wind, wind-rustled coniferous trees, muffled streams, waterfalls, and animals. Because of the differences in natural sources, background sound levels in wilderness or national park areas have been measured as lower during the winter than during the other seasons (Gdula 1998; Foch 1999).

Human-generated intrusions include snowmobiles and snowcoaches that travel along designated groomed and ungroomed routes in both YNP and GTNP, as well as wingless snowplanes that are used mostly by ice fishers on Jackson Lake in GTNP. Human-generated intrusions also include wheeled-vehicles on plowed roads in GTNP and the Parkway, such as passenger vehicles that are often pulling snowmobile trailers, and occasional plow and supply trucks. A limited number of diesel buses also travel to Flagg Ranch for snowcoach tours into YNP. Other man-made intrusions are the more localized sounds of cross-country skiing, winter camping, lodging and human voices. In addition aircraft overflights also occur over both parks. These consist of high altitude commercial overflights, regular traffic at GTNP associated with Jackson Hole Airport, occasional NPS flights for research or other park purposes, and occasional private or charter flights.

Areas of primary concern for this analysis are those in which mechanized noise from wheeled or oversnow vehicles on plowed, groomed or ungroomed motorized trails and routes affects the natural soundscape within the parks. For purposes of this noise analysis, the existing noise environment is described in terms of the proximity to these trails and routes.

In areas adjacent to motorized trails, routes and plowed roads, human-generated activity is high, human encounters with wheeled or oversnow vehicles are the norm, and the natural soundscape is often obscured by sound from these snowmachines. However,

even in these areas at times when human-generated sound is not present, the natural sound environment may be very quiet. These areas include areas along snowmobile routes or campgrounds where snowmobile access is allowed, such as park entrances and Flagg Ranch.

For areas somewhat removed from the motorized trails, routes, and plowed roads, human-generated sound is generally present at lower levels and for less time. With reduced human-generated sound compared to the areas adjacent to the motorized trails, routes, and plowed roads, the natural soundscape is not as impacted and visitors have increased opportunities to experience natural soundscapes.

In distant areas that are substantially removed from the influence of plowed roads or motorized oversnow trails and routes, human-generated sound is rare. Natural soundscapes remain unimpaired most or all the time in such distant backcountry areas. Sounds from wheeled or oversnow vehicles are only occasionally audible within the background sound in such areas, depending upon the proximity of the motorized trails and routes, local topography, and sound emission levels of these vehicles.

Existing Sound Levels and Oversnow Vehicle Audibility in YNP and GTNP

Four studies were drawn upon to describe the existing natural background and human-generated sound levels in YNP and GTNP. Three were completed between 1994 and 1996 by Bowlby & Associates, Inc. as part of a study of the Continental Divide Snowmobile Trail (CDST). They examined the sound levels of wheeled-vehicles, snowmobiles, and snowplanes in GTNP, along the Parkway road heading up to Flagg Ranch, and in the southernmost part of YNP. Some short-term samples of background sound level data also were collected (Bowlby & Associates 1994; Bowlby & Associates 1995; Bowlby & Associates 1996).

The fourth study, by Harris Miller Miller & Hanson Inc. and Bowlby & Associates, Inc., was conducted in February and March 2000 for this EIS with two purposes: 1) measuring background sound levels in YNP and GTNP; and 2) assessing the noise impact (intruding sounds) of man-made sounds, including snowmobiles, snowcoaches, snowplanes, automobiles, buses, and aircraft for the alternatives in the EIS (Harris et al. 2000; Bowlby & Associates 2000). See Appendix J for more explanation of this study. Intruding sources included motorized vehicles and human activity, while the most prevalent natural sound source was wind in the trees. Natural sounds include water sounds, such as geyser eruptions and gurgling, and flowing rivers, and animal sounds such as coyote howls.

Sound level measurements were conducted at four locations in YNP and four sites in GTNP in the study. The sites were chosen to provide a mix of areas with heavy oversnow vehicle use and with little such use. While more sites or longer measurement durations might be desirable, the measurements that were made provided much useful information.

Figure 16 shows the percentage of time that oversnow vehicles were audible during the daytime audibility logging at each site. The audibility results for the monitored sites cannot be extrapolated to cover more remote parts of the parks. However, the resulting background levels that were derived from these sites and used in the impact assessment are valid for similar, remote areas.

Figures 17 through 24 present samples of the measured sound levels at each site. In these figures, the bars represent the "energy" average of the total sound for each hour at each site, often referred to as the equivalent sound level, symbolized as L_{eq} (1h). Energy averaging refers to the fact that louder moments have much more influence on the L_{eq} (1h) than quieter moments of equal duration.

The other symbols represent the highest sampled level each hour (L_{max}), and the levels that are exceeded, cumulatively, for different percentages of each hour. For example, the L_{10} is the level exceeded for a total of 10% of each hour (for example 6 minutes), regardless of the noise source. If there are no intrusions and the wind condition remains the same over the hour, all the measures will be close together, such as in Figure 18. When there are a few intrusions during an hour, all the measures except L_{max}, L_1 and perhaps L_{10} will be close to each other, such as during the daytime hours at the Pacific Creek Road site (Figure 23) and at the Grand Canyon of the Yellowstone site. If there are so many intrusions that there is little time without intrusions, the measures will be spread out for the hour, as is evident Figures 17 and 21 for the Old Faithful site and for the Flagg Ranch site.

Old Faithful (YNP)

This site is a major destination for snowmobiles and snowcoaches for day trips and overnight visits. The measurement location was located about 1,000 feet away from both the hotel and the geyser areas, where most human activity occurs. It was estimated that oversnow vehicles were audible for 95% of the daytime period at this site, with nighttime natural ambient levels at about 30 dBA. Most maximum oversnow vehicle noise levels were between 35 dBA and 45 dBA. Occasional snowmobile pass-bys on a nearby trail resulted in maximum sound levels up to 70 dBA. The total range of oversnow vehicle sound levels measured above ambient was 30 dBA to 70 dBA. Other sounds include human voices, the geyser eruptions, the gurgling of geyser areas, and wind in the trees.

Grand Canyon of the Yellowstone (YNP)

This site is a moderately- to heavily-forested area about 1 mile from Canyon Village. The measurement site was located on a low-use side trail about 0.5 miles away from the junction at Canyon Village. (The high percentage of time intrusions were audible during the audibility logging at this site, about 87%, is judged to be unrepresentative of the long-term sound environment at this site. A snow-grooming machine was present during much of the logging time, which occurred during the first two hours of the measurement period. The noise measurement time-history data clearly indicate that significant intrusions occur less than 50% of the time.) Other sounds include the river and waterfall

and wind in the trees. Natural ambient levels were generally in the range of 21 dBA to 30 dBA. Typically, oversnow vehicle maximum sound levels were between 45 dBA and 52 dBA. The total range of oversnow vehicle sound levels measured above ambient was 25 dBA to 65 dBA.

West Thumb (YNP)

This site is a moderately-forested area near a popular geyser basin at the edge of Yellowstone Lake, at the junction of frequently traveled roads. The measurement site was located about 500 feet from the nearest oversnow vehicle trails and about 100 feet from a boardwalk at the edge of the geyser area. Oversnow vehicles were audible for 57% of the daytime audibility logging period. Other sounds include the geyser eruptions, the gurgling of geyser areas, and wind in the trees. Natural ambient levels were in the range of 22 dBA to 30 dBA, with a distinct plateau at 22 dBA that may have been the noise floor of the instruments used at this site. Typical oversnow vehicle maximum levels were between 45 dBA and 55 dBA. The total range of oversnow vehicle sound levels measured above ambient was 23 dBA to 65 dBA.

Pelican Valley (YNP)

This site is an open, lightly-forested area east of Fishing Bridge on the road to the East Entrance to the Park, with light to moderate snowmobile traffic. The measurement site was located about 250 feet from the road. Very low background sound levels (that is, about 0 dBA at night) were measured in this remote area; yet oversnow vehicles were audible for 44% of the audibility logging period with maximum oversnow vehicle levels as high as 66 dBA. Typically oversnow vehicle maximum sound levels were between 57 dBA and 65 dBA. At night very low oversnow vehicle levels were measured resulting in a total range of oversnow vehicle sound levels measured above ambient from 5 dBA to 66 dBA. Other sounds include wind in the trees.

Flagg Ranch (North End of the Parkway)

This site is a moderately- to heavily-forested foreground area that is the staging area for snowmobile and snowcoach trips into YNP by tour groups and private parties. Overnight lodging is available. Small groups of snowmobilers also travel into Flagg Ranch along the Grassy Lake Road snowmobile trail and the CDST. The latter enter GTNP near Moran and parallel the paved road from Moran to Flagg Ranch. Oversnow vehicles were audible for 63% of the daytime audibility logging period. Other sounds included cars, trucks, and buses carrying visitors, staff and supplies to Flagg Ranch, human voices, wind in the trees, and water noise along the parts of the Flagg Ranch area closest to the river. Natural ambient levels were 20 dBA to 30 dBA and maximum oversnow vehicle levels were 47 dBA to 58 dBA.

Colter Bay (GTNP)

On the shore of Jackson Lake near the marina, this fairly sheltered site is heavily-forested in all directions except to the west where the terrain is open over the frozen lake.

Snowplanes used by ice fishers are based on a beach area at Colter Bay and travel out onto the lake in the morning and back to shore in the late afternoon, with occasional travel to and from shore and around the lake during the rest of the daytime. The measurement site was shielded from this beach area by a spit of land out into the lake. Snowmobiles on the lake are also relatively common during the day. Ranger observations indicate about 20 snowplanes in use per weekday and 30 per weekend day, with an estimated 30 snowmobiles per day. Snowplanes and snowmobiles were audible for 44% of the daytime audibility logging period. Other sounds included cars and light trucks carrying operators, staff, and supplies to Colter Bay, plows in the parking lot, human voices, and wind in the trees on the shore and across the snow and ice on the lake. Natural ambient levels were 18 dBA to 30 dBA and oversnow vehicle maximum levels were 46 dBA to 65 dBA (the 80 dBA maximum level in Figure 22 may have been the sound of a snowplow).

Pacific Creek Road (GTNP)

This site is an open area along a very lightly used plowed road across from the Oxbow Bend area of the Snake River northeast of the Jackson Lake Lodge area. The CDST is over 2 miles away from the measurement site along the road from Moran to Jackson Lake. Snowmobiles on the CDST were audible for 6% of the daytime logging period, but just barely so over the natural background sounds. Other sounds included occasional cars and light trucks on the Pacific Creek Road, and wind in the trees and across the snow. Natural ambient levels were in the 17 dBA to 22 dBA, and wheeled-vehicles on Pacific Creek Road produced maximum levels generally at 40 dBA to 60 dBA. The relatively high levels (maximums above 40 dBA) for a portion of the night were due to moderate winds.

Taggart Lake Trailhead (GTNP)

This site is an open to lightly-forested area that is a staging area for cross-country skiing and snowmobiling at the end of the plowed road from Moose in GTNP. Occasional ranger snowmobiles were audible, but for only 2% of the daytime logging period. Other sounds included cars and light trucks entering and leaving the parking area, people's voices on the ski trails, and wind in the trees and across the snow.

Natural ambient levels were 19 dBA to 25 dBA, while maximum levels from cars, snowmobiles and people were at 40 dBA to 45 dBA.

Figure 16. Percentage of time snowmachines were audible during daytime audibility logging.

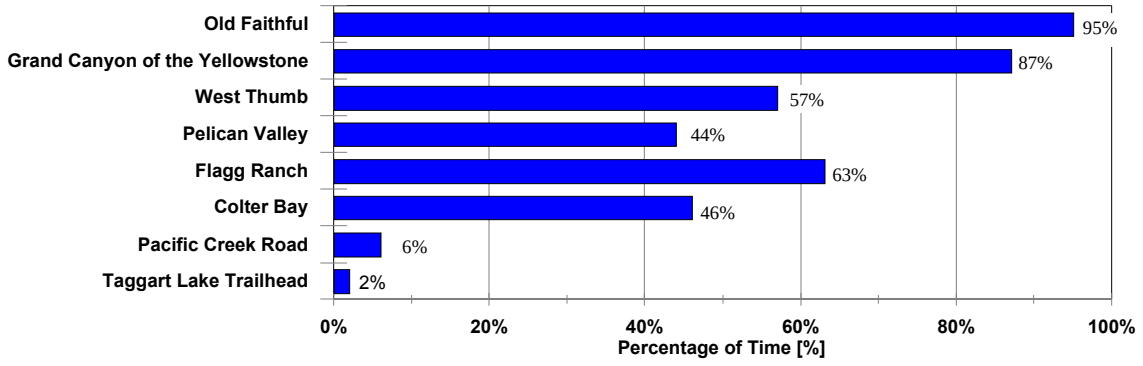


Figure 17. A-weighted sound levels by hour, Old Faithful, YNP, March 2, 2000.

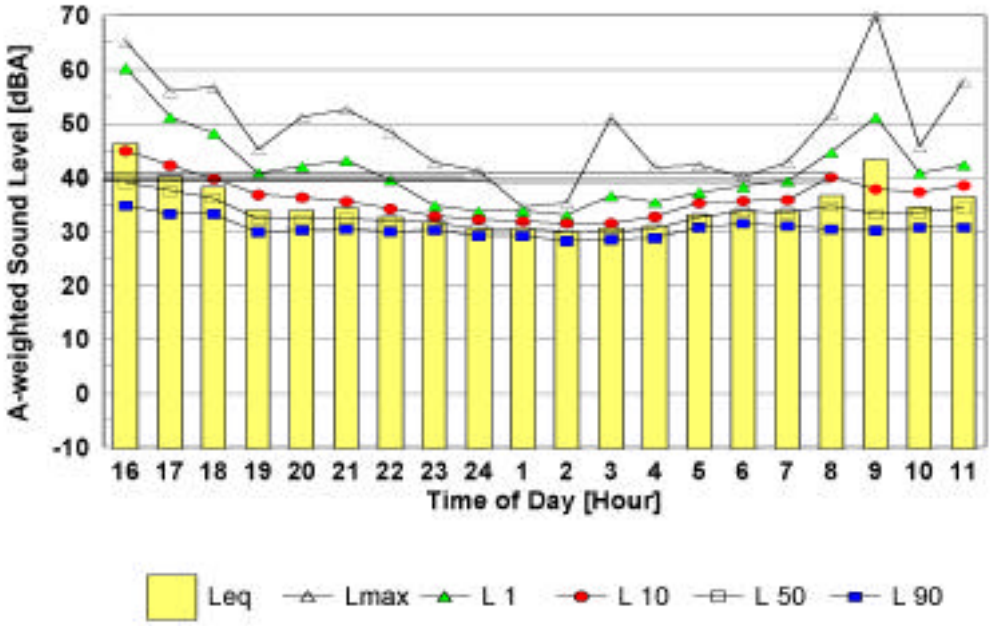


Figure 18. A-weighted sound levels by hour, West Thumb, YNP, March 1, 2000.

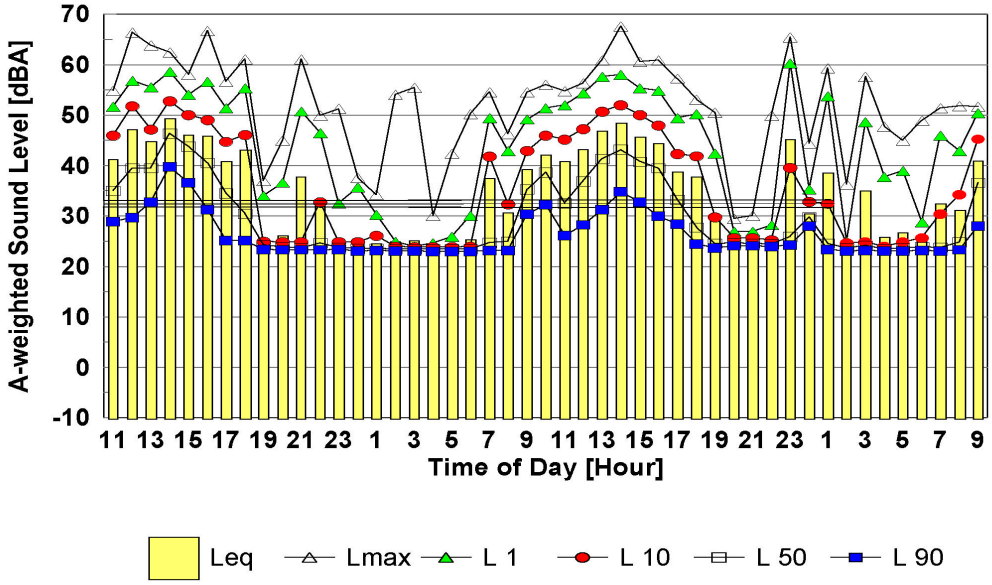


Figure 19. A-weighed sound levels by hour, Grand Canyon of the Yellowstone, February 29, 2000.

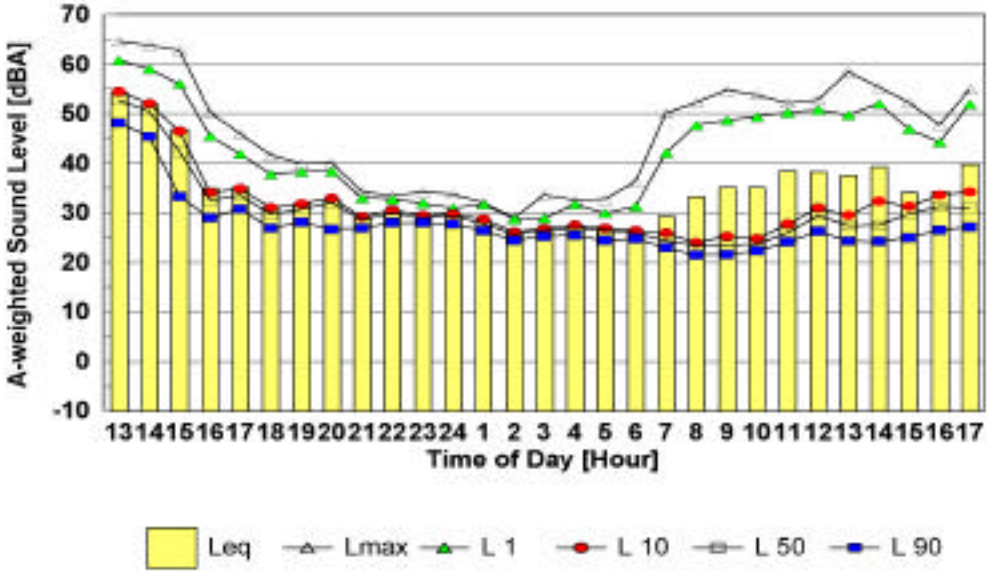


Figure 20. A-weighed sound levels by hour, Pelican Valley, YNP, February 29, 2000.

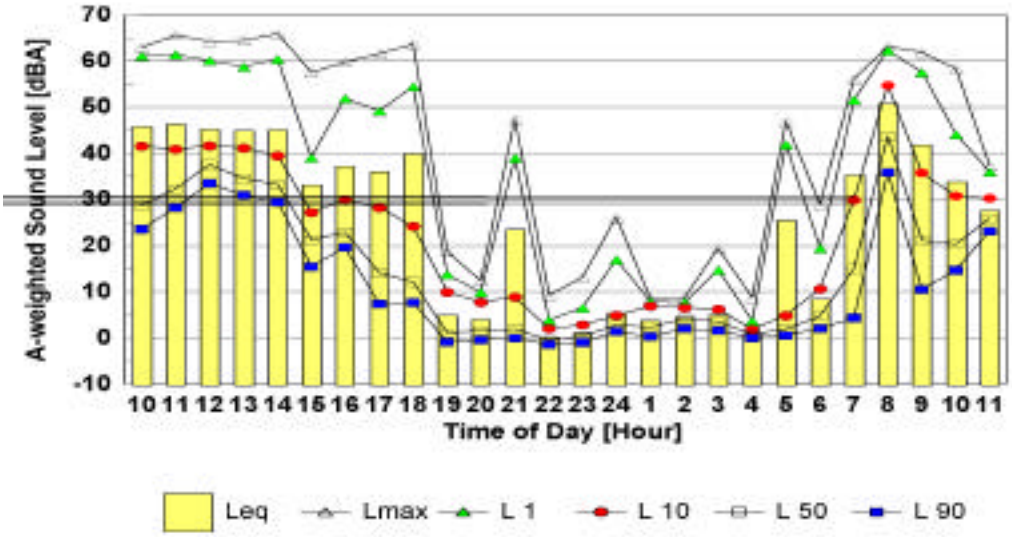


Figure 21. A-weighed sound levels by hour, Flagg Ranch, March 2, 2000.

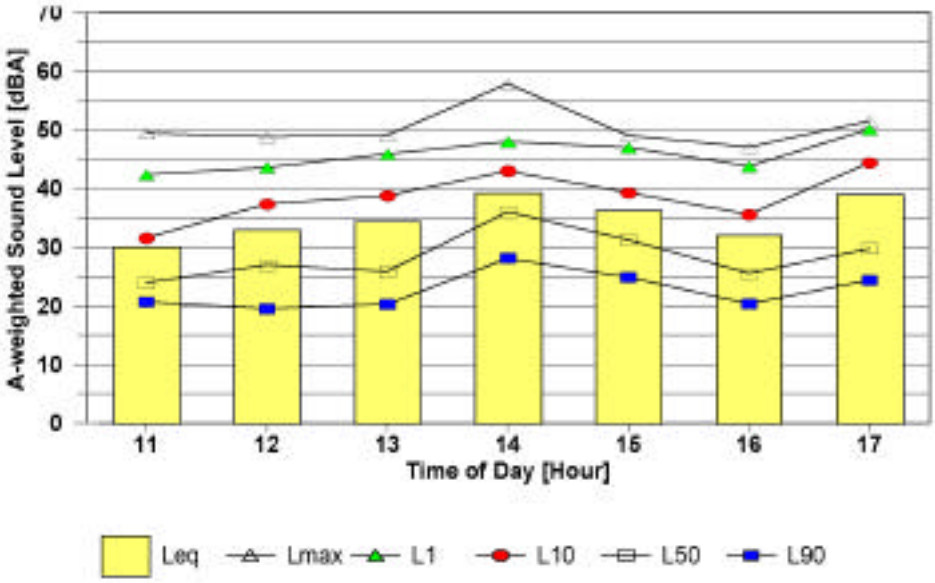


Figure 22. A-weighed sound levels by hour, Colter Bay, GTNP, March 3, 2000.

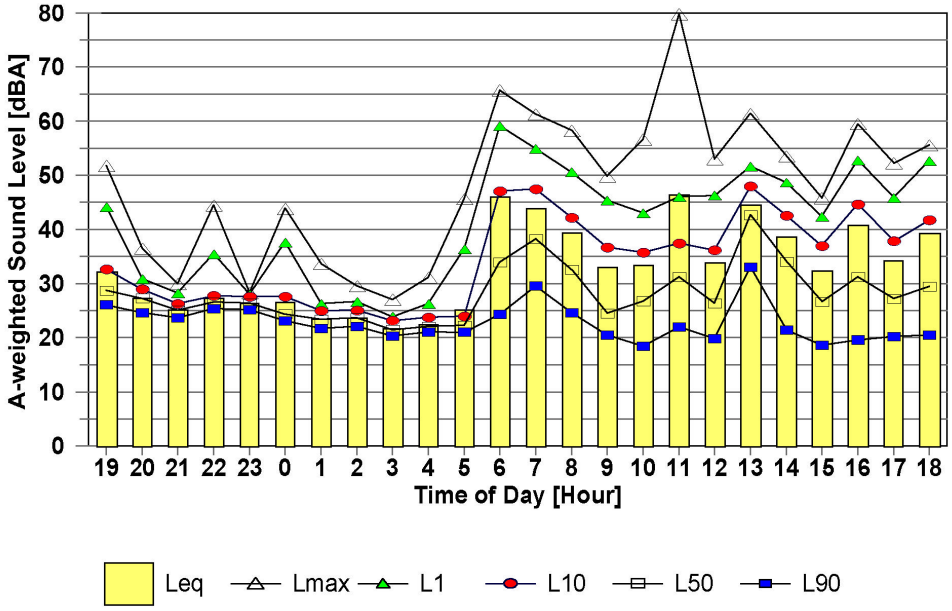


Figure 23 . A-weighed sounds levels by hour, Pacific Creek, GTNP, March 6, 2000.

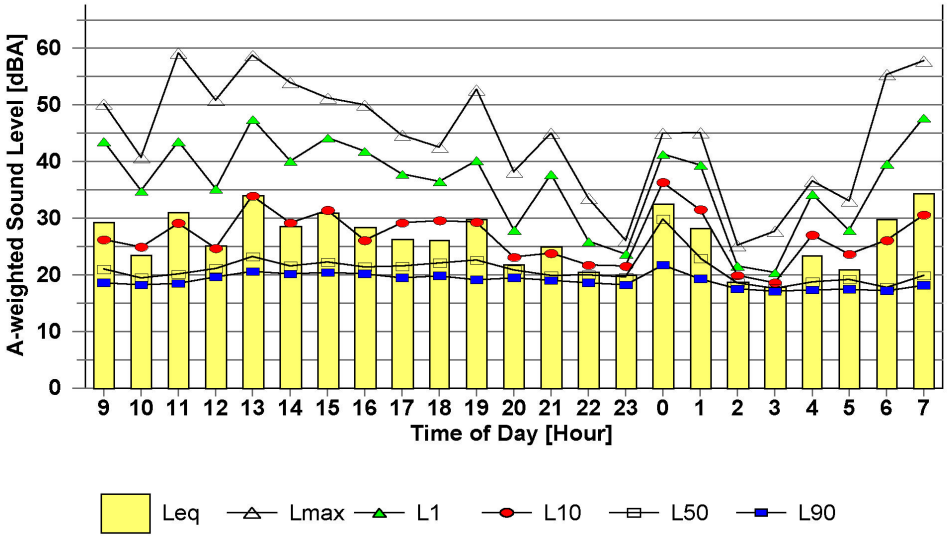
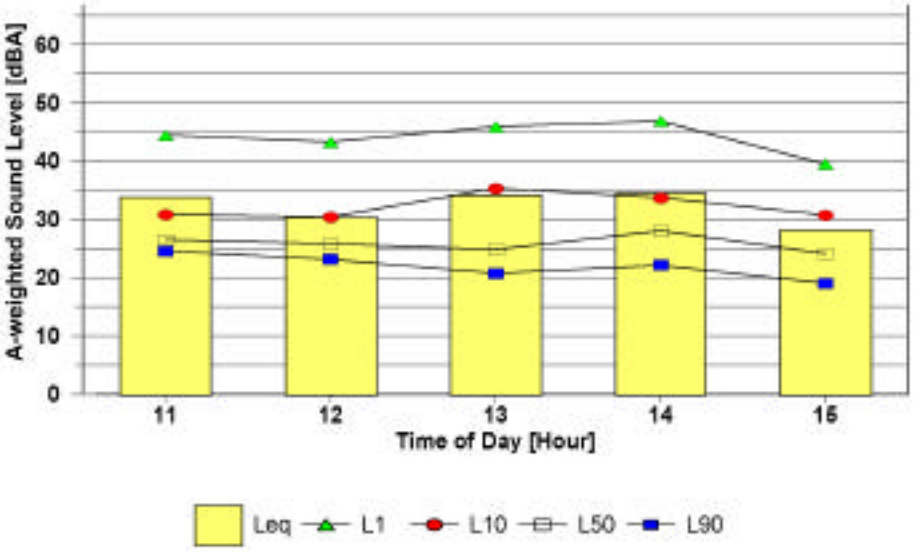


Figure 24. A-weighed sound levels by hour, Taggart Lake, GTNP, March 6, 2000.



Natural Background Sound Levels

A range in background sound levels comprises the natural soundscape, depending on wind conditions, location, and other factors during different time periods. For the purposes of this analysis, two specific background sound level conditions were identified for assessing impacts over the range of conditions: 1) the "average" condition, which includes the average effects of wind during the day; and 2) the "quiet" condition, which represents times when winds are light or calm.

While the sound level measurements were mostly made over 24-hour periods, the existing background sound levels occurring during the daytime hours were analyzed because none of the alternatives envision significant amounts of outdoor human activity at night. The daytime hours from 8:00 A.M. to 6:00 P.M. were selected and their hourly statistical sound level data were used to derive the background sound levels used in the subsequent analysis. At two of the sites, Old Faithful and West Thumb, intruding sources were heard or expected to be heard for such high percentages of the time, that the data acquired at those sites were not used to characterize the daytime background sound conditions.

As noted earlier, average conditions are often represented by the sound level exceeded 50% of the time, also called the L_{50}. However, because much of the measured sound level data included some intruding sounds for part of the time, there was concern that the measured L_{50} might not represent the true natural L_{50}. Therefore, it was determined that the A-weighted sound level exceeded 90% of the time (the L_{90}) in each hour would be a reasonable approximation of what the L_{50} would have been without intruding sounds. For nearly all measurements, the L_{90} and L_{50} values were within 2 dBA to 4 dBA, despite the inclusion of the intrusions in the measurements.

Determining the L_{90} values to use for the average and quiet background conditions was completed as follows. First, those sites and hours where intrusions were expected to occur less than about half the time were selected from all the measured hours. The selection was based on an examination of the data collected at each site and on the observations and audibility logging conducted during the site visits. The L_{90} values for those selected hours for all the sites were then grouped together to form an L_{90} data set. These measured hourly L_{90} values appeared to fall into two categories: 1) sites in mostly open or lightly forested areas, and 2) sites in moderately forested to heavily forested areas. The background sound levels in the open areas were slightly lower than those in the forested areas, the difference due to the sound of wind in the trees. The L_{90} data set was thus divided into two groups: open and forested.

The median L_{90} in each of the two L_{90} data sets was chosen to represent the average background sound level condition for each terrain type. The L_{90} value exceeded by 90% of the L_{90} values in each data set was chosen to represent the "quiet" background sound level condition for each terrain type.

Data from the Colter Bay, Flagg Ranch, and Grand Canyon of the Yellowstone sites were used to characterize all forested areas, while data from the Pelican Valley, Taggart Lake, and Pacific Creek sites were used to characterize open areas in the parks.

The average background sound level in the open areas was 20 dBA; in the forested areas it was 22 dBA. The quiet background sound level in the open areas was 15 dBA. In the forested areas, the quiet background sound level was 18 dBA. These levels were used in the audibility impact analysis in Chapter IV and are summarized below in Table 37.

Table 37. Natural background sound levels by type of site.

Type of Site	Background Sound Level, dBA	
	Average Condition	Quiet Condition
Mostly open or lightly forested	20	15
Moderately or heavily forested	22	18

Cultural Resources

Archeology

American Indians first inhabited the GYA nearly 11,000 years ago. Although more than a dozen tribes lived in the region during both prehistoric and historic times, the tribes whose traditional territory falls within the GYA include the Blackfeet, Crow, Nez Perce, Northern Arapahoe, Northern Cheyenne, Confederated Salish and Kootenai, Shoshone-Bannock, and the Shoshone-Eastern Band.

Known prehistoric resources in the GYA provide evidence of hunting, fishing, plant gathering, and the quarrying of obsidian for tool making. Prehistoric resources range from lithic scatters and debitage (a type of site or artifact characterized by the remains of any phase of stone tool production) to stratified layers with hearths and roasting pits.

Lithic scatters and debitage constitute the bulk of the evidence of prehistoric use of the region. Prehistoric resources include:

- Flaked and ground stone tools, such as projectile points, knives, scrapers, milling slabs, and handstones;
- Obsidian flakes, the refuse of stone tool making;
- Fire-cracked rocks; and,
- Darkened soil middens (refuse heaps) stained by ashes from campfires and organic remains.

Sites with identifiable features such as trails, rock shelters, stone circles, tipi rings, burials, or wickiups (simple huts) are less common. Collectively the prehistoric resources represent thousands of years of human use and document the gradual adaptation of American Indians to the region's resources.

Historic archeological sites in the GYA include remnants of American Indian cultures, as well as Euro-American, the latter including early hunters, miners, and ranchers, the U.S. military, and the parks' administration. Euro-American archeological sites include remains of transportation routes and farming, ranching, and mining operations such as buildings, pastures, cultivated fields, and irrigation ditches.

There are hundreds of known prehistoric and historic archeological sites within the boundaries of YNP and GTNP. Obsidian Cliff, a prehistoric site in YNP, is a national historic landmark. None of the other prehistoric or historic archeological sites are listed in the National Register of Historic Places, although many are considered to be eligible for listing.

Buildings and Structures

In 1872 Congress established Yellowstone National Park, the nation's first national park. The U.S. Army administered YNP from 1886 to 1916, when the NPS was founded. Many of the facilities presently in use in the park were designed and built by concessioners around the turn-of-the-century, by the army before 1916, or by the NPS during the first two decades of its administration. They embody the rustic style of park architecture popular before the 1940s. Stonework, massive timbers, and decorative woodwork are characteristic of the rustic style of park architecture, which strove to make structures more compatible with their natural settings. Examples of such rustic architecture include the Old Faithful Inn and the museum at the Norris Geyser Basin.

Five of the buildings and structures in YNP are designated national historic landmarks, and another eight are listed in the National Register of Historic Places. Table 38 contains a list of YNP historic resources.

Table 38. Historic resources of YNP — National Historic Landmarks (NHL) or listed in the National Register — of Historic Places (NHRP).

Historic Resource	Status
Fishing Bridge Museum	NHL
Lake Fish Hatchery Historic District	NRHP
Lake Hotel	NRHP
Lamar Buffalo Ranch	NRHP
Madison Bridge Museum	NHL
Norris Museum	NHL
Norris Museum/Norris Comfort Station	NRHP
Northeast Entrance Station	NHL
Obsidian Cliff Kiosk	NRHP
Old Faithful Historic District	NRHP
Old Faithful Inn	NHL
Roosevelt Lodge Historic District	NRHP
Yellowstone Main Post Office	NRHP

In addition to the above, the YNP road system, which includes the Grand Loop Road and five entrance roads, recently was nominated for inclusion in the National Register.

GTNP was established in 1929 and enlarged in 1950. In GTNP, where ranching and tourism preceded the establishment of the national park, the remaining rustic and/or historic buildings and structures are associated with pioneer ranching, dude ranching, private estates, and early administration by the Forest Service and the NPS. Though none of the park's buildings and structures are designated national historic landmarks, many are listed in the National Register of Historic Places (Table 39).

Table 39. Historic resources of GTNP listed in the National Register of Historic Places.

4 – Lazy F Dude Ranch	Jenny Lake Ranger Station Historic District
AMK Ranch	Kimmel Kabins
Aspen Ridge Ranch	Leigh Lake Ranger Patrol Cabin
Bar B C Dude Ranch	Menor's Ferry
Brinkerhoff	Moose Entrance Kiosk
Cascade Canyon Patrol Cabin	Moran Bay Patrol Cabin
Chapel of the Transfiguration	Morman Row Historic District
Cunningham Cabin	Murie Residence
Double Diamond Ranch Dining Room	Old Administrative Area Historic District
Geraldine Lucas Homestead	Rams Horn Dude Ranch Lodge
Highlands Ranch	Snake River Land Company Buffalo Dormitory
Hunter Hereford Ranch	String Lake Comfort Station
Jackson Lake Ranger Station	White Grass Dude Ranch
Jenny Lake Boat Concessions Building	White Grass Ranger Historic District
Jenny Lake CCC Camp	

Authorized in 1972, the Parkway, an 82-mile corridor that links West Thumb in YNP with the North Entrance of GTNP, commemorates John D. Rockefeller Jr.'s role in helping to establish national parks throughout the nation, including GTNP. There are no known historic buildings and structures in either the Parkway or its general vicinity that are either listed in or eligible to be listed in the National Register of Historic Places. Flagg Ranch, located on the Parkway, was determined ineligible for listing in the National Register by the NPS in consultation with the Wyoming State Historic Preservation Office.

Ethnographic Resources

Ethnographic resources consist of features of the landscape that are linked by members of a contemporary community to their traditional ways of life. As more specifically defined by the NPS, ethnographic resources are any ". . . site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (Director's Order #28: Cultural Resource Management: 181 1998). Recently an ethnographic

overview of YNP, entitled *Restoring a Presence: A Documentary Overview of Native Americans and Yellowstone National Park*, was completed. Ethnographic overviews or assessments have yet to be completed for GTNP and the Parkway.

The overview of YNP, however, demonstrates that "[e]thnographically . . . th[e] northwestern corner of present-day Wyoming is . . . especially complex and unique . . . [f]or the Yellowstone Plateau is the convergence point for three out of North America's nine aboriginal culture areas . . . ." — the Plateau, Plains, and Great Basin Indian peoples (Nabokov and Loendorf 1999). The identity of the contemporary Indians associated with these culture areas revolves around land and spirit. Although not all Indians share identical cultural traits, land is the matrix of Indian life and spirit. The essence of life is related to coming from the earth and living with the animal, plant, and other resources of the land, both material and spiritual. Tribal members today can easily identify resources and features of YNP that intimately link their culture to the region, including the Obsidian and Sheepeater Cliffs; and geographic features such as Yellowstone Lake, water courses, hot springs, and geysers. Similar examples may be present in GTNP and in the Parkway.

Throughout the planning process, NPS consulted with the eight contemporary American Indian tribes traditionally affiliated with the GYA—the Blackfeet, Crow, Nez Perce, Northern Arapahoe, Northern Cheyenne, Confederated Salish and Kootenai, Shoshone-Bannock, and the Shoshone-Eastern Band. In addition to the eight affiliated tribes, representatives of other contemporary American Indian tribes with a cultural interest in the region were invited to participate in a general tribal consultation meeting at YNP on May 20, 1999. The Winter Use Plan/EIS was among the projects discussed at this meeting. Tribes represented were the Assiniboine and Sioux, Cheyenne River Sioux, Crow Creek Sioux, Flandreau Santee Sioux, Gros Ventre and Assiniboine, Kiowa Tribe of Oklahoma, Lower Brule Sioux, Oglala Sioux, Rosebud Sioux, Sisseton-Wahpeton Sioux, Spirit Lake Sioux, Standing Rock Sioux, and the Yankton Sioux. Consultation with representatives of the affiliated tribes to ensure that their interests and concerns are adequately incorporated will continue as actions within this Plan progress.

Cultural Landscapes

According to the park service's *Cultural Resource Management Guideline* (NPS-28), a cultural landscape is:

> *" . . . a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions."*

Thus, cultural landscapes are the result of the long interaction between man and the land. They are shaped through time by historical land use and management practices and

natural disasters such as fires, floods, and earthquakes, as well as politics and property laws, levels of technology, and economic conditions. Cultural landscapes provide a living record of an area's past.

Examples of four general cultural landscape types are found in the GYA:

- Ethnographic Landscapes—Ethnographic landscapes contain natural and cultural resources that associated people consider heritage resources.
- Historic Sites—Landscapes that are significant for their association with historic events, activities, or people are considered historical sites.
- Historic Vernacular Landscapes—Landscapes that evolved through use by the people whose activities or occupancy shaped them are historic vernacular landscapes.
- Historic Designed Landscapes—Landscapes that were consciously designed or laid out according to design principles or a recognized style or tradition are historic designed landscapes.

Most of the potential cultural landscapes in the GYA have been formally inventoried or evaluated for national register eligibility. One landscape, Mormon Row, is on the NRHP as a rural historic district.

Visitor Access and Circulation

Regional Access

Yellowstone National Park

YNP is located in the northwestern corner of Wyoming, with portions extending into southwestern Montana and southeastern Idaho. The park is within Teton and Park Counties in Wyoming, Park and Gallatin Counties in Montana, and Fremont County in Idaho.

The Interstate Highway system provides access to and through the GYA. Interstate 90 passes through the northern part of the region, serving east-west travel. Interstate 15 serves north-south travel in the western part of the region. Interstates 25 and 80 border the region on the east and south, and serve as the primary access routes to the area. This network of roads is fundamentally important to nearly all resource and tourism-related activities.

Five gateway communities and park entrances serve as local access to the park:

- U.S. Highway 89 through Gardiner, Montana serves the North Entrance, 54 miles south of Livingston, Montana.
- The Northeast Entrance provides direct park access from Silver Gate, Cooke City, Red Lodge, and Billings, Montana via U.S. Highway 212.
- The East Entrance connects the park to Cody, Wyoming by U.S. Highway 16, 53 miles east of the park.
- The Parkway (U.S. Highway 89/287) provides access from the south.
- U.S. Highways 20 and 287 serve access to the West Entrance, through West Yellowstone.

Grand Teton and the Parkway

GTNP is located in west central Wyoming, immediately south of YNP and the Parkway. It is bounded on the south by the National Elk Refuge. The Parkway provides access between YNP and GTNP. The Parkway is open year-round between the northern boundary of GTNP and Flagg Ranch. Flagg Ranch is the major visitor destination in the Parkway and serves as the winter use staging area for oversnow access to YNP. Regional access to the Parkway is provided via U.S. Highway 287 from the Moran Entrance to GTNP on the east, and U.S. Highway 89 on the south from Jackson, Wyoming through GTNP. GTNP administers the Parkway.

As with YNP, the Interstate Highway system provides regional access to and through GTNP. Interstate 15 on the western edge of the region provides access to the park from Idaho Falls, Pocatello, and Boise, Idaho. On the north, Interstate 90 provides direct access through YNP and the Parkway for Butte, Bozeman, and Billings, Montana during summer months. Either Interstate 15 or 90 provides winter access to these regional cities. Interstates 90 and 25 provide regional access from the eastern cities of Sheridan, Casper, and Cheyenne, Wyoming. Interstate 80 serves as a major east-west connection for visitors entering the park from the south.

The primary gateway community for GTNP is Jackson, Wyoming, located about 3 miles south of the park boundary. Moran, Wyoming, on the east edge of the park, is a smaller gateway community with less reliance on park tourism to support the local economy. U.S. Highway 89 from the south and U.S. Highway 26/287 from the east provide local park access from these communities. Dubois, Wyoming, about 50 miles east of Moran along U.S. Highway 26/28, is a full-service community through which all travel from the east must proceed, and through which people can access YNP, GTNP, and the Parkway as an alternative to traveling through Jackson. The northern access route, U.S. Highway 89/287, is closed in the winter to wheeled-vehicles north of Flagg Ranch through YNP.

Park Roadways and Motorized Trails

Yellowstone National Park

YNP roads are maintained for many purposes including touring and sightseeing, accessing trailheads, and park management. During the winter, all park roads are closed to wheeled vehicular traffic with the exception of Highway 191, which provides access between West Yellowstone and I-90 near Bozeman, Montana, and the road from Mammoth to Tower and Tower to the Northeast Entrance (Cooke City). These two roads provide the only regional access through the park during the winter. Oversnow vehicular travel is allowed on the remaining park road segments. One segment, however, is closed to all winter travel due to avalanche danger between Washburn Overlook and Tower-Roosevelt. Where oversnow vehicular travel is allowed, the roads are groomed. Grooming begins when there is adequate snow cover, and is accomplished using a tracked vehicle equipped with a blade on the front and a packer wheel and drag at the rear. The road segments from the West Entrance to Old Faithful are groomed every night. Most other sections are groomed every other night.

Visitors reach most park features via snowmobiles, snowcoaches, and cross-country skis. Staging areas, or points of access, for oversnow routes into the park are an important component of the winter visitor experience. They typically include a parking area with appropriate signing and may have restrooms, a warming hut, and snowmobile rental facilities. Snowcoach routes offered by concessioners provide access to the park from some staging areas. The staging areas for trips into YNP are near Mammoth Hot Springs in the north, at Pahaska Teepee in the Shoshone National Forest near the East Entrance, at a parking area just north of Flagg Ranch near the South Entrance, and in West Yellowstone near the West Entrance. These staging areas become congested during peak days because of small or undefined parking and unloading areas. Many difficulties exist in serving winter visitors, including a shortage of all-weather facilities and the dangers of exposure to subzero temperatures.

Park operations and maintenance personnel groom 184.6 miles of park roads, and plow 56 miles. About 14.2 miles are closed to winter travel. The July 1994 study: *Alternative Transportation Modes Feasibility Study, Volume III, Yellowstone National Park*, defines the internal park roadway system by fourteen roadway segments. These segments are described below. The descriptions provide mileage and indicate if the segment is plowed, groomed, or closed during the winter season. About 37 miles of groomed nonmotorized trails are provided in the park. These trails are near Mammoth, Canyon, Tower, Virginia Cascades, Blacktail Plateau, East Entrance, and Old Faithful.

Segment 1: Canyon Village to Norris Junction (13.1 miles). Segment 1 is groomed for oversnow winter travel. Norris Geyser Basin at Norris Junction is the largest and thermally hottest basin in the park. Virginia Cascades, east of Norris, is available for cross-country skiing.

Segment 2: Mammoth Hot Springs to Norris Junction (22.6 miles). Segment 2 is groomed for oversnow winter travel from Mammoth Terraces to Norris (about 21 miles). This segment follows the Gardner River and Obsidian Creek drainage basins through a number of significant natural and cultural features. Mammoth Hot Springs is the site of park headquarters and offers a full range of visitor services and access to outstanding thermal features. Bison and elk can be viewed in the Norris Geyser basin. The warm waters of the Gibbon River stay open all year, attracting elk and bison during the winter. A warming hut exists at Indian Creek. The Terrace Loop Drive and the Indian Creek area are available for skiing.

Segment 3: Mammoth Hot Springs to North Entrance (4.8 miles). Segment 3 is plowed. This segment parallels the Gardner River, passes under a historic stone arch and ends at the North Entrance. The North Entrance is the second most heavily used winter use entrance, and the third most heavily used park entrance year round. Just beyond the park boundary at the confluence of the Gardner and Yellowstone Rivers is the gateway town of Gardiner, Montana. A substantial number of elk, deer, moose, pronghorn antelope, and bighorn sheep inhabit the area.

Segment 4: Mammoth Hot Springs to Tower Junction (18.5 miles). Segment 4 is plowed. This segment crosses the Gardner River, follows Lava Creek for a short distance, and then rises up and over the Blacktail Deer Plateau. It generally follows the broad course of the Yellowstone River Valley. Extensive bison and elk viewing are available along this segment. Blacktail Road is available for skiing.

Segment 5: Tower Junction to Northeast Entrance (32.7 miles). Segment 5 is plowed. This segment closely follows the course of the Lamar River and Soda Butte Creek. The towns of Silver Gate and Cooke City, Montana, just beyond the Northeast Entrance, offer a full range of visitor services. The Lamar Valley, which is 15 miles long and 3 to 5 miles wide, is one of the more remote areas of the park. It supports abundant wildlife populations, especially bison and elk.

Segment 6: Tower Junction to Canyon Village (18.2 miles). About 14.2 miles of this segment south of Tower Junction to Washburn Hot Springs Overlook are closed to winter travel. The remaining segment, about 4 miles, is groomed from Washburn Hot Springs Overlook to Canyon Village. The segment from Tower Junction, by Tower Falls, to the top of the Chittenden Road is available for skiing. Segment 6 has a diverse population of animals, including moose and deer, and a wide variety of vegetation, including species characteristic of alpine tundra.

Segment 7: Canyon Village to Fishing Bridge (15.7 miles). Segment 7 is groomed. This segment closely follows the Yellowstone River from Canyon Village through the Hayden Valley. The road ends at Fishing Bridge, with access to the Lake developed area and the East Entrance road. Except for parking associated with the thermal features, there are no developed features along segment 7. Abundant wildlife, especially bison, is easily visible from the roadway. The Sulphur Cauldron and Mud Volcano thermal areas, about 10 miles south of Canyon Village, are especially active thermal areas. There is a gasoline station and a warming hut at Canyon Village. The north and south rim drives are groomed.

Segment 8: Fishing Bridge to East Entrance (25.4 miles). Segment 8 is groomed. This segment leaves Fishing Bridge, crosses the Pelican Valley, follows the northern edge of Yellowstone Lake, crosses Sylvan Pass in the Absaroka Range, and descends along the eastern edge of the Yellowstone Plateau to the eastern park border. The trailhead is 2 miles east of the boundary at Pahaska Teepee. The road provides access to Cody, Wyoming, 53 miles to the east. A gasoline station and warming hut are available at Fishing Bridge. A ski trail is groomed parallel with the East Entrance road for several miles west of Pahaska Teepee.

Segment 9: Fishing Bridge to West Thumb (20 miles). Segment 9 is groomed. This segment traces a course along the western shore of Yellowstone Lake. A warming hut exists at West Thumb. Lodgepole pine stands are dense in this area and several tributary

streams provide excellent moose habitat. Elk and bison are often seen along the roadway, which provides excellent views and access to Yellowstone Lake.

Segment 10: West Thumb to South Entrance (22 miles). Segment 10 is groomed. This segment begins at the West Thumb Geyser Basin, a thermal area on the shore of Yellowstone Lake. At Lewis Lake, about 10 miles from West Thumb, the road follows the eastern shore, then passes Lewis Falls, parallels the Lewis River, and traverses the Lewis River canyon. A short distance before the South Entrance, the road begins to follow the Snake River drainage, exits Yellowstone, and becomes the John D. Rockefeller, Jr., Memorial Parkway. A ranger station is located at the South Entrance. Two miles south of the South Entrance is Flagg Ranch, an access point with food, gasoline, and a ranger station.

Segment 11: West Thumb to Old Faithful (17.8 miles). Segment 11 is groomed. This segment climbs to the west from West Thumb to the Craig Pass crossing of the Continental Divide at over 8,000 feet. A warming hut exists at West Thumb. Elk and bison are frequently seen wintering near the West Thumb and Old Faithful thermal areas. Kepler Cascades is visible along the southern edge of the roadway shortly before reaching Old Faithful. The Lone Star Geyser area is available for skiing.

Segment 12: Old Faithful to Madison Junction (16.6 miles). Segment 12 is groomed. This segment follows the banks of the Firehole. More than 300 geysers and 10,000 other thermal features are found along or near this road segment—more than the combined total in all other locations around the world. A gasoline station and two warming huts are available at Old Faithful. Thermal areas attract large mammals, especially in winter when elk and bison feed near the hot springs. Several ski routes are available in the Old Faithful area. The Fountain Flats road is also available for skiing.

Segment 13: Madison Junction to West Entrance (13.7 miles). Segment 13 is groomed. A warming hut exists at Madison. This segment begins at the junction of the Firehole and Gibbon Rivers and follows the Madison to the West Entrance. The first half of the road travels through Madison Canyon with National Park Mountain and Mounts Haynes and Jackson flanking the road. The second half offers access to the river via numerous informal pullouts and drives. Winter visitors are rewarded with frequent animal concentrations attracted by nearby thermal areas. The Barns road is a popular area available for skiing.

Segment 14: Madison Junction to Norris Geyser Basin (13.7 miles). Segment 14 is groomed. This segment passes through scenic mountain meadows, following the Gibbon River and passing through Gibbon Canyon en route to the river's confluence with the Madison River. A portion of the road follows the rim of the Yellowstone Caldera. The road passes cliff formations and Gibbon Falls, which tumbles over the rim of the caldera. Thermal areas attract animals. The falls and Gibbon Geyser Basin are principal visitor attractions.

Grand Teton and the Parkway.
The Parkway encompasses 24,000 acres between YNP and GTNP, and is also a roadway through GTNP. It provides access to Flagg Ranch, which serves as a principal winter use staging area. The roadway itself is about 7.5 miles through the Parkway, between the South Entrance to YNP and the northern edge of GTNP. The road is groomed between Flagg Ranch and YNP and plowed south of Flagg Ranch to GTNP. The CDST (see *Background and History*, Chapter I) parallels the road between the eastern boundary of GTNP and Flagg Ranch, and is accessed from trail systems on the adjacent Shoshone and Bridger-Teton National Forests out of Jackson and Dubois. Grassy Lake Road, beginning at Flagg Ranch and continuing west outside the Parkway boundary into Targhee National Forest is groomed in the winter for oversnow travel.

The roadway system within GTNP is comprised of regional through highways and local park roads providing access to visitor destination areas within the park. The two through highways in the park are U.S. Highways 89 and 287—both are plowed during the winter for wheeled-vehicle access. Highway 89 extends south from Moran Junction to the South Entrance of GTNP, providing access from Jackson, Wyoming. This highway also provides the only access to Jackson Hole Airport, located south of Moose Junction within the park. Between Moose Junction and Moran Junction, this roadway follows the Snake River, a sensitive resource area for wintering wildlife.

Highway 287 traverses the park from the eastern park boundary, near the Moran Entrance Station, to the Parkway. Colter Bay, about 9 miles northwest of Moran, is the only visitor destination area along the roadway segment within the park. The CDST parallels the roadway from Moran to the northern edge of the park and further north to Flagg Ranch. The CDST is a groomed snowmobile trail constructed during the winter. In many areas the CDST occupies the roadway right-of-way and constricts the roadway to one lane. Access to Signal Mountain is provided along a short portion of Teton Park Road between Signal Mountain and Jackson Lake Junction. This segment of Teton Park Road is plowed for wheeled access in the winter.

Teton Park Road traverses the eastern edge of the Teton Range between Moose Junction and Jackson Lake Junction. This roadway is plowed during the winter for a short length at both ends to provide winter use access to Taggart Lake Trailhead on the south and Signal Mountain on the north. The remaining portions of the road, including the Jenny Lake Loop and a short access route to Spalding Bay, are available for oversnow travel.

While not a transportation facility, Jackson Lake provides motorized recreational opportunities during the winter for snowmobiles and snowplanes. This is believed to be one of few locations in the country where snowplanes operate. Snowplanes are small, enclosed crafts, propelled across ice and snow by a rear-mounted propeller. The crafts are supported and steered by skis. Snowplane access to the lake is provided at Signal Mountain and Colter Bay.

Moose-Wilson Road, a narrow, lightly traveled roadway without shoulders, extends southwest from the Moose Visitor Center to the park boundary and on to the towns of Teton Village and Wilson. In the winter the roadway is plowed and open to wheeled-vehicles from both ends: from the southwest boundary to the Granite Canyon Trailhead, and from the corner near the Moose Visitor Center to the JY Ranch entrance. Oversnow motorized travel is permitted between the road segments. The roadway provides access to several private inholdings along the road.

Other, less traveled, roadway segments in the park include:

- The segment along the Gros Ventre River between the Gros Ventre Junction and Kelly;
- North from Kelly to Triangle X Ranch with two access points to Bridger Teton National Forest between Kelly and Mailbox Corner;
- Antelope Flat Road between Highway 89, north of Moose Junction, east to Mailbox Corner.
- Plowed portions of these roadway segments include:
- The section along the Gros Ventre River between Gros Ventre Junction and Kelly;
- North of Kelly to Mailbox Corner;
- The two Bridger Teton National Forest access roadway segments (a short portion of the northern access road is not plowed west of the forest);
- A short segment of Antelope Flat Road at the intersection with Highway 89.

The remaining roadway segments are open to oversnow travel with the exception of the unplowed portion of Antelope Flat Road to Mailbox Corner.

Park Facilities and Winter Destination Areas

Park facilities and winter destination areas are described below within the context of each park unit by available lodging, parking, and other winter use amenities such as the provision of warming huts, cross-country ski and snowshoe trail access, and winter use fueling facilities. It should be noted that there are a number of accommodations in the parks that are not available during winter because of infrastructure vulnerability to freezing temperatures.

Lodging

Winter lodging facilities in YNP provide a total of 256 rooms with 413 beds. Table 40 itemizes each lodging facility in the park and identifies the number of winter rooms and beds.

Table 40. Winter lodging facilities and numbers of rooms.

Facility	Bed Total	Rooms
Mammoth Hot Springs Hotel and Cabins	191	132
Old Faithful Snow Lodge and Cabins	222	124
Total	413	256

Source: TW Recreational Services, November 1992 Existing Concession Services and Facilities Report, Yellowstone National Park, 1998 (Snow Lodge information updated in 2000).

In addition to the above lodging facilities, Yellowstone Expedition operates 10 yurts plus a community yurt and mess yurt near Canyon Village. The yurt camp logged 418 user days during the winter of 1998-99. In addition, the park issued 118 backcountry camping permits during the same time period.

For GTNP and the Parkway, Flagg Ranch and Triangle X are permitted by NPS to provide overnight accommodations during the winter. Colter Bay and Jackson Lake lodge facilities are closed for winter use. However, the area is open during winter months to provide snowplane, snowmobile, and cross-country skiing and snowshoeing opportunities at Jackson Lake and in surrounding areas.

Parking

There is an area equivalent to about 960 parking spaces located at selected winter use destination areas in YNP. This includes the space needed to store snow at each area (about 50%). These capacities are used to estimate visitor access and circulation impacts of the EIS alternatives. Table 41 presents the parking capacities at relevant winter use destination areas.

Table 41. Average winter parking capacity in YNP destination areas.

Area	Capacity*
Mammoth Hot Springs	480
Tower-Roosevelt	180
Old Faithful	150
Madison Junction†	30
Norris†	120
Total Spaces Available for Winter Visitor Use (space available for wheeled-vehicle access)	960

†Existing capacity numbers are given for these sites to estimate changes in various alternatives
Source: Inventory by BRW, Inc., August 1992.
*Considering snow storage consumption, estimated by NPS, May 1999.

In GTNP and the Parkway, the primary facility for winter use parking and staging is Flagg Ranch. Cross-country skiing and other nonmotorized winter users represent a small percentage of users in the area. The pattern of use is similar to private snowmobile users in that they arrive in private vehicles, arrive at variable times of the day and stay irregular lengths of time. Public winter parking at Flagg Ranch is available in a new parking facility with more than 300 spaces for autos. Fifty 60-foot long spaces are available on the Parkway. Some parking is also provided along the straight section of the main entrance road.

About 225 winter parking spaces are available at Colter Bay considering the need for snow storage in an average year.

Other Winter Services and Facilities

Yellowstone National Park

Warming huts in YNP are located at Mammoth, Canyon Village, Indian Creek, Fishing Bridge, Madison, Old Faithful, and West Thumb. A new warming hut has been approved and is planned for Norris. The Canyon Village, Old Faithful and Madison warming huts are scheduled for replacement. Warming huts at Mammoth, Madison, and Canyon Village locations are staffed by concession personnel who operate small snack bars and maintain vending machines. NPS interpreters, who answer questions and provide information and various forms of assistance to visitors, also staff some of the huts.

Groomed nonmotorized trails are provided near Mammoth, Canyon Village, Tower-Roosevelt, Virginia Cascades, Blacktail Plateau, East Entrance, and Old Faithful. Winter use fueling facilities are available at Old Faithful, Fishing Bridge, and Canyon Village.

Snowcoach tours in YNP operate from Mammoth Hot Springs, Old Faithful, West Yellowstone and Flagg Ranch (the Parkway). Snowcoaches provide cross-country skiing tours, snowshoeing tours, and sightseeing tours.

Snowmobile rentals are available at Old Faithful and Mammoth. Thirty machines are available at Mammoth Hot Springs, and 20 to 30 are available at Old Faithful for self-guided tours. In West Yellowstone there are about 1,400 snowmobiles available for rent and seven operators are licensed by the park to provide guided snowmobile tours of YNP. Three additional operators are licensed, and operate out of Pahaska Teepee and Cody, Wyoming and Tetonia, Idaho. Snowmobile tours are restricted to 11 snowmobiles each, including guides.

Grand Teton National Park and the Parkway

Flagg Ranch is the major staging area for oversnow travel from the south to YNP. Primary winter users at Flagg Ranch are commercial snowmobile tour operators, private snowmobiles, snowcoach tour operators, Flagg Ranch snowmobile renters, and cross-country skiers. Most facilities at Colter Bay are closed during winter months, but a plowed area remains open to camping for use by people who snowplane, snowmobile, ski, and snowshoe on Jackson Lake or in the area. Dornan's, an inholding in GTNP, is open year-round and offers dining, a general store, gas, and visitor information in the winter months. Park headquarters and the Moose Visitor Center, located across the Snake River just west of Moose Junction, are open in the winter.

In 1998 there were 11 commercial snowmobile tour permits issued at Flagg Ranch. Tour leaders provide the tour group with a brief instruction and practice before leaving the area. AMFAC, a YNP permittee, offers tours and transportation from Flagg Ranch. Snowcoach operators currently load and unload tourists in front of the lodge at Flagg Ranch. Six to ten snowcoaches, each accommodating eleven people, run daily into YNP.

The concessioner at Flagg Ranch maintains 80 snowmobiles for rental to lodgers and day users. The machines are stored in an area about 1,000 square feet adjacent to the existing gas station.

Colter Bay/Jackson Lake lodge facilities are closed for winter use. However, the area is open during winter months to provide snowplane, snowmobile, and cross-country skiing/snowshoe opportunities at Jackson Lake and in surrounding areas. Other destination and support facilities are available at Moose Visitor Center, with limited services at Colter Bay. Ski tours are periodically available from Moose and Flagg Ranch. Currently there are no warming hut or trailside facilities available. Ungroomed ski and snowshoe trails are available from Taggart Lake Trailhead to Jenny Lake, along Antelope Flats Road, and near Moose, Death Canyon, Granite Canyon, Two Ocean Lake, Colter Bay, and Flagg Ranch.

Winter Visitor Use

Yellowstone National Park

Winter activity at YNP is composed primarily of visitors on snowmobiles (62%), automobiles and bus passengers (29%), snowcoach passengers (9%), and cross-country skiers (1%). The following table contains visitor counts by activity from 1992 through 2000 winter seasons. The average seasonal visitor count is 128,720 visitors.

Table 42. Winter use activities in YNP.

Winter Season	Visitors by Auto	Recreation Vehicle	Bus Passengers	Skiers†	Snowmobile Passengers	Snowcoach Passengers	Total Visitors
92/93	36,202	164	378	464	91,196	14,340	142,744
93/94	41,041	308	751	998	87,682	12,743	143,523
94/95	39,329	177	432	684	86,286	12,729	139,637
95/96	33,719	123	280	1,081	75,265	9,071	119,539
96/97	30,432	129	429	485	71,759	10,221	113,455
97/98	35,704	81	305	453	72,834	9,897	119,274
98/99	36,450	90	173	446	76,271	10,779	124,209
99/00	37,872	140	747	351	76,571	11,699	127,380
Total	290,749	1,212	3,495	4,962	637,864	91,479	1,029,761
Percent	28%	<1%	<1%	<1%	62%	9%	100%‡
Average	36,343	152	437	626	79,733	11,435	128,720

Source: NPS visitation records.
†Numbers of skiers reflect the number of visitors that actually skied through the entrance gate. It does not reflect the number of visitors that access the park via another mode of transportation and then ski in the park interior. Visitor surveys indicate about 20% of visitors ski in the park (Littlejohn 1996).
‡Total greater than 100% due to rounding.

The visitor counts for the various entrance stations were tallied to produce Table 43. This information indicates that the highest visitor traffic is at the West Entrance, followed by the North Entrance and South Entrance. The East Entrance accounted for 3% of the visitor traffic in the reported winters. Counts are not kept at the Northeast Entrance in the winter because there is no through traffic from the east.

Table 43. Winter use visitors in YNP — by entrance station.

Winter	North	West	South	East	Total
1989-90	24,949	50,730	20,322	3,581	99,582
1990-91	25,935	51,560	22,378	3,666	103,539
1991-92	35,146	55,005	23,411	4,203	117,765
1992-93	40,150	70,844	27,001	4,459	142,454
1993-94	45,290	65,603	28,124	4,506	143,523
1994-95	42,987	66,294	25,893	4,463	139,637
1995-96	37,366	57,380	20,668	4,125	119,539
1996-97	34,902	56,069	19,272	3,212	113,455
1997-98	40,497	54,859	20,486	3,432	119,274
1998-99	41,007	59,928	20,385	2,889	124,209
1999-00	42,903	58,154	22,957	3,366	127,380
Total	411,132	646,426	250,897	41,902	1,350,357
% of total	30%	48%	19%	3%	100%

Source: NPS visitation records.

North Entrance. The North Entrance is the only YNP entrance accessible to wheeled-vehicles during the winter season. Oversnow travel begins at Mammoth Terraces, 0.5 miles south of Mammoth Hot Springs. The North Entrance received 30% of the winter visitors between the 1992-93 and 1999-2000 seasons. Traffic at this point is predominately wheeled-vehicles with about 89% of visitors arriving by automobile, bus, or recreational vehicle. Traffic using the highway to Cooke City is not counted as YNP visitors. The primary attraction accessible from the North Entrance during the winter season is Mammoth Hot Springs with its associated facilities. There also are several cross-country ski trailheads located near Tower-Roosevelt. Table 44 lists visitor counts by mode of transportation by winter season for the North Entrance.

Table 44. Winter use activities in YNP — North Entrance.

Winter	Visitors by Auto[†, ‡]	Recreation Vehicle	Bus Passengers	Skiers[*]	Snowmobile Passengers	Snowcoach Passengers	Total Visitors
1992-93	36,202	164	378	5	708	2,693	40,150
1993-94	41,041	308	751	13	528	2,649	45,290
1994-95	39,329	177	432	6	625	2,418	42,987
1995-96	33,719	123	280	11	1,731	1,502	37,366
1996-97	30,432	129	429	21	2,080	1,811	34,902
1997-98	35,704	81	305	10	2,119	2,278	40,497
1998-99	36,450	90	173	17	2,196	2,081	41,007
1999-00	37,872	140	747	21	1,617	2,506	42,903
Total	290,749	1,212	3,495	104	11,604	17,938	325,102
% of total	89%	<1%	1%	<1%	4%	5%	100%[**]
Average	36,343	152	436	13	1,451	2,242	40,637

Source: NPS visitation records
[†]Statistics for automobile visitors reflect visitor use for the entire months of December and March.
[‡]Visitor surveys indicate that about 25% of all visitors who arrive by automobile also skied in the park (Littlejohn 1996).
[*]Numbers of skiers reflect the number of visitors that actually skied through the entrance gate. It does not reflect the number of skiing visitors that access the park via another mode of transportation.
[**]Total greater than 100% due to rounding.

West Entrance. The West Entrance is the single busiest entrance to YNP. This entrance received 48% of the winter visitors between the 1992-93 and the 1999-2000 seasons; 90% of the visitors used snowmobiles as their mode of travel. Of the 639,194 visitors entering YNP on snowmobiles during the winter seasons between December 1992 and March 2000, 69% (439,798) arrived at the West Entrance. Table 45 includes visitor counts for the West Entrance by winter season and mode of travel. The West Entrance is not accessible to wheeled-vehicles, so auto, bus, and recreational vehicle passenger counts are not shown.

Table 45. Winter use activities in YNP — West Entrance.

Winter	Skiers†	Snowmobile Passengers	Snowcoach Passengers	Total Visitors
1992-93	13	62,590	8,241	70,844
1993-94	6	58,731	6,866	65,603
1994-95	19	59,405	6,870	66,294
1995-96	14	52,455	4,911	57,380
1996-97	21	50,296	5,752	56,069
1997-98	18	49,776	5,065	54,859
1998-99	27	53,980	5,921	59,928
1999-00	21	52,575	5,558	58,154
Total	139	439,798	49,184	489,131
% of total	<1%	90%	10%	100%‡
Average	17	55,976	6,148	61,141

Source: NPS
†Numbers of skiers reflect the number of visitors that actually skied through the entrance gate. It does not reflect the number of skiing visitors that access the park via another mode of transportation. Visitor surveys indicate about 20% of visitors skied in the park (Littlejohn 1996).
‡Total greater than 100% due to rounding

East Entrance. The East Entrance is located on Highway 14/16, which connects to Cody Wyoming. Snowmobile riders (90%), followed by cross-country skiers (10%), primarily use the East Entrance. The East Entrance provided access to YNP for about 3% of the total park visitors during the winter seasons from December 1992 and March 2000 (Table 46). Groomed cross-country ski trails are available at the East Entrance. As with the West Entrance, there is no wheeled-vehicle access.

Table 46. Winter use activities in YNP — East Entrance.

Winter	Skiers†	Snowmobile Passengers	Snowcoach Passengers	Total Visitors
1992-93	375	4,075	9	4,459
1993-94	850	3,647	9	4,506
1994-95	539	3,917	7	4,463
1995-96	957	3,160	8	4,125
1996-97	355	2,857	0	3,212
1997-98	346	3,077	9	3,432
1998-99	263	2,620	6	2,889
1999-00	204	3,105	57	3,366
Total	3,889	26,458	105	30,452
% of total	14%	86%	<1%	100%
Average	486	3,307	13	3,869

Source: NPS
†Numbers of skiers reflect the number of visitors that actually skied through the entrance gate. It does not reflect the number of skiing visitors that access the park via another mode of transportation. Visitor surveys indicate about 20% of visitors skied in the park (Littlejohn 1996).

South Entrance. Visitors to YNP who gain access through the South Entrance must first travel through GTNP. This entrance accounted for almost 18% of the visitors for the 1992-93 through 1999-2000 winter seasons. As with the entrances other than the North Entrance, snowmobiles were the primary mode of transportation. The South Entrance had the second highest number of snowcoach passengers and snowmobiles during the reported winters (Table 47). The South Entrance is not accessible to wheeled-vehicles.

Table 47. Winter use activities in YNP — South Entrance.

Winter Season	Skiers†	Snowmobile Passengers	Snowcoach Passengers	Total Visitors
1992-93	62	23,665	3,274	27,001
1993-94	129	24,776	3,219	28,124
1994-95	120	22,339	3,434	25,893
1995-96	99	17,919	2,650	20,668
1996-97	88	16,526	2,658	19,272
1997-98	79	17,862	2,545	20,486
1998-99	139	17,475	2,771	20,385
1999-00	105	19,274	3,578	22,957
Total	821	159,836	24,129	184,786
% of total	<1%	87%	13%	100%‡
Average	103	19,979	3,016	23,118

Source: NPS visitation records
†Numbers of skiers reflect the number of visitors that actually skied through the entrance gate. It does not reflect the number of skiing visitors that access the park via another mode of transportation. Visitor surveys indicate about 20% of visitors skied in the park (Littlejohn 1996).
‡Total greater than 100% due to rounding.

The following table contains information on the locations visited by winter users (Littlejohn 1996). The percentages do not total 100 since respondents could visit more than one site. The most visited site was Old Faithful (76%), followed by Madison (62%), Canyon (48%), and Norris (48%).

Table 48. Sites Visited in February 1995.

Yellowstone National Park Sites Visited by Yellowstone National Park Survey Respondents							
Mammoth Hot Springs	**Norris**	**Madison**	**Old Faithful**	**West Thumb**	**Fishing Bridge**	**Canyon**	**Tower Junction**
43%	48%	62%	76%	41%	34%	48%	22%

Grand Teton National Park Sites Visited by Yellowstone National Park Survey Respondents						
Flagg Ranch	**Jackson Lake**	**Jenny Lake**	**Taggart Lake**	**Moose Visitor Center**	**Signal Mountain**	**Colter Bay**
22%	5%	2%	1%	5%	1%	4%

Source: NPS Yellowstone National Park Visitor Study

Grand Teton National Park and the Parkway

Unlike YNP, GTNP's main access routes are plowed during the winter season. The visitor counts for GTNP tally visitors arriving via wheeled-vehicles. GTNP experienced a higher number of winter season visitors than YNP. The average visitor count for YNP for the eight winter seasons of December 1992 through March 2000 is 128,720. GTNP received an average of 167,694 visitors for the eight winter seasons between December 1992 through March 2000 (Table 49).

Table 49. Winter recreational visits, by year, in GTNP

92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	Total
128,159	146,621	156,112	167,120	162,627	176,601	180,367	223,944	1,341,551

Source: NPS visitation records

GTNP visitor counts include visitors using the Parkway. Flagg Ranch, a commercial operation licensed to provide various visitor services to complement winter use activities, provides visitor accommodation within the Parkway. The Parkway accommodated 116,489 snowmobile visitors between December 1994 and March 2000, a season average of 19,414 for the six winters. This represents 77% of the snowmobile traffic for the area and the highest number of snowmobile visits for the GTNP.

Visitor counts for GTNP also include snowmobiles using the CDST (Table 50). This user-fee-supported facility provides a 27-mile long, 10-foot to 14-foot wide, groomed snowmobile trail immediately adjacent to Highways 26/287 and 89/191/287. An additional 3-mile segment generally follows Teton Park Road from Highway 89/191/287 to Signal Mountain. Speed limits for the CDST are the same as for the adjacent highway and range from 15 mph to 55 mph. The NPS reduces highway speed limits by 10 mph or more during the season that the CDST operates.

Table 50. Winter use activities in GTNP.

Winter Season	The Parkway Snowmobile	CDST Snowmobile	GTNP Snowmobile	GTNP Snow-plane	The Parkway Skiing	GTNP Skiing	Total Visitors
93/94				2,131	1,623	2,855	6,609
94/95	21,748	1,394	2,788	1,757	1,898	1,619	31,204
95/96	17,619	2,912	3,241	1,734	1,367	1,862	28,735
96/97	19,024	2,779	3,843	1,790	1,440	1,636	30,512
97/98	17,589	2,318	4,051	1,685	1,373	1,577	28,593
98/99	17,110	2,304	3,617	851	1,169	1,298	26,349
99/00	23,399	1,329	2,867	1,091	1,581	5,387[†]	35,654
Total	116,489	13,036	20,407	11,039	10,451	16,234	187,656
Percent	62%	7%	11%	6%	6%	9%	100%[‡]
Average	19,414	2,172	3,401	1,577	1,493	2,319	26,808

Source: NPS visitation records
[†]Reason for increase in skier numbers unknown.
[‡]Total greater than 100% due to rounding.

GTNP performed visitor counts at various locations within the park that indicate the travel patterns for park visitors. Counts were administered at the Moose Entrance, Moran Entrance, Gros Ventre Junction, US 89 westbound, the Parkway northbound, and Moose-Wilson Road Counts were tallied monthly from January 1991 to March 2000. The highest traffic levels were recorded at Gros Ventre Junction with a total of 1,941,322 vehicles during the winters between December 1992 and March 2000. The next highest counts were recorded at US 89 westbound (377,553), Moran Entrance (193,460), and Moose Entrance (117,533).

Table 51. Winter recreational visits in and adjacent to GTNP.

GTNP—Moose Entrance									
Winter Season	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	Total Visitors
Visits	16,072	17,810	15,776	13,313	13,921	13,166	13,307	14,168	117,533
GTNP—Moran Entrance									
Winter Season	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	Total Visitors
Visits	17,359	23,726	27,861	23,765	24,004	23,471	23,733	29,541	193,460
Gros Ventre Junction									
Winter Season	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	Total Visitors
Visits	183,733	201,266	206,709	226,597	256,092	282,171	275,409	309,345	1,941,322
US 89 Westbound									
Winter Season	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	Total Visitors
Visits	41,369	41,576	49,219	45,907	46,594	48,072	50,371	54,445	377,553
GTNP—The Parkway Southbound									
Winter Season	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	Total Visitors
Visits	8,474	7,829	8,911	7,995	7,363	11,200	11,895	21,787	85,454
GTNP—Moose Wilson Road									
Winter Season	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00*	Total Visitors
Visits	0	0	0	5,388	4,625	5,291	6,215	12,455	33,974

Source: NPS visitation records
*Increase in use is attributed to more accurate counting methods.

Visitor Experience

This section describes existing visitor experience relative to three topics:

- Winter visitor profile data and survey results.
- A description of peoples' values and expectations about winter use based on survey data.
- Measures of visitor experience and satisfaction.

Conclusions are drawn about the most important aspects of visitor experience relating to the winter plan alternatives and their consequences. Where relevant, specific studies are cited to support these discussions.

Winter surveys have been conducted to collect information about the people who use the parks in the winter, and what they expect relative to visitor experience. Most people surveyed were visiting the parks or surrounding areas, on a snowmobile, at a hotel, or with an interest group. The states and counties surrounding the parks have completed

several surveys that pertain to winter use. Although most of the highlighted surveys in YNP and GTNP have interviewed winter visitors, one survey of summer visitors and a recently completed telephone survey attempt to quantify opinions about winter use from regional and national audiences.

Winter Visitor Profile

Numbers of Winter Visitors

Winter visitation to YNP has increased from 99,582 in 1989-90 to 127,380 in 1999-2000. Over the last decade there has been a general, but uneven increase in winter visitation to YNP. Peak visitation occurred in 1993-94 with 143,523 visitors; 142,454 people visited in 1992-93. Visitation dropped to 119,539 in 1995-96, and increased little over the following year, possibly due to poor snow conditions, unusually warm weather, and high snowfall in the Midwest. Winter visitation to GTNP has increased more steadily over the last decade from 44,845 in 1987-88 to 223,000 in 1999-2000.

Most of these winter visitors came to view wildlife, scenery, and thermal features, and rated the presence of clean air, quiet, and solitude as very or extremely important to their visits (Littlejohn 1996). One key difference between winter and summer visitors was in-park transportation. Snowmobiles, snowcoaches, cross-country skis, snowshoes, and snowplanes offer oversnow recreational experiences that added to and detracted from winter visitors' overall enjoyment. Visitors can also enjoy the parks by driving on plowed roads. In YNP and GTNP, an average of 75% of winter visitors ride snowmobiles, 12% ride in snowcoaches, 20% use cross-country skis, 2% use snowshoes, and 22% drive automobiles (Littlejohn 1996).

Group Origins, Types, Characteristics, and Previous Visits

Most people who visited YNP from outside Wyoming came from Montana, Utah, Idaho, and Minnesota. For GTNP and the Parkway most non-Wyoming visitors came from Idaho and California (Littlejohn 1996). Visitor origins may have changed over the last decade. A 1989-90 survey found that YNP visitors were from (in order) Montana, Minnesota, Washington, Utah, and Wyoming (Bath 1994).

Snowmobilers from Wyoming, Montana, and Idaho heavily use areas within their own states for snowmobiling. For example, about 84% of snowmobile days for Wyoming residents were spent on the state trail system; 7.9% were in YNP, and 1.4% were in Grand Teton (Taylor et al 1995). Montana residents spent an estimated 12% of their snowmobile activity days on trips that started at West Yellowstone; nonresidents were estimated to have begun over 75% of their snowmobile activity days from West Yellowstone (Sylvester and Nesary 1994). The number of days snowmobiling in Montana by nonresidents increased from about 108,000 activity days in 1987-98 to 185,000 in 1993-94 (Sylvester and Nesary 1994).

More than 33% of YNP visitors were in family groups and 29% were with friends. Groups of six or more comprised 37%; 29% were in groups of two. About 38% of

GTNP and the Parkway visitors were families, and 30% were groups of friends. Snowmobilers tended to be younger than other categories of visitors (Littlejohn 1996).

YNP's average winter visitor is a highly educated, relatively wealthy, middle-aged white male. The average age of winter visitors to YNP in 1998 was 45 years old; over half were college graduates; almost 70% lived in a community of 5,000 or more; and their average household income fell between $60,000 and $80,000. Thirty percent of the respondents reported annual incomes over $100,000 (Borrie et al. 1999).

More than half of YNP visitors stayed more than one day and 55% had visited the park previously during the winter. Half of GTNP and the Parkway visitors stayed more than one day, and more than half had visited the park previously during the winter (Littlejohn 1996).

Borrie et al. (1999) found that 84% of the respondents to their winter survey stayed the night near YNP. Most respondents, over 78%, spent the night in a hotel or motel outside YNP. For the overall park sample, West Yellowstone, Jackson, Bozeman and Big Sky were the most frequently visited communities for overnight stays (Borrie et al. 1999). Twelve percent of respondents spent at least one night of their visit in a hotel inside the park. Fifty-five percent of respondents spent more than one day inside YNP and 7% spent five or more days inside the park. Of those respondents that recreated outside of YNP, 41% did so for more than two days (Borrie et al. 1999). Duffield et al. (2000a) found that of those survey respondents who entered YNP on snowmobiles, 42% had rented their machines. In contrast 70 % of respondents from the Borrie et al. (1999) survey rented their machines.

Visitor Surveys

A 1997 survey of YNP snowmobilers and snowcoach riders found a range of responses when asked about the importance of various indicators of quality recreational experience in YNP and GTNP. Thirty-two percent felt that the percentage of time in sight of other vehicles was unimportant, while 40% indicated that it was important. For 35% the sound of other vehicles was unimportant, and for about 26% it was important. About 87% of respondents indicated that the condition of groomed trails was important (Borrie et al. 1997).

A 1998-99 survey of YNP winter visitors found support for sound and emission standards on snowmachines, more information and interpretation, stricter enforcement of rules, and more trails and locations for recreation. Closing roads to oversnow vehicles, restricting groomed roads to snowcoaches, and plowing the road from West Yellowstone to Old Faithful were the least supported among respondents (Borrie et al. 1999).

A survey of motorized recreational equipment owners in Idaho found concerns that availability of recreational lands could diminish or become more difficult with limits to visitor use of areas:

> *"Recreationalists* [sic] *are concerned about their access to natural resources. They are finding that access is becoming limited and that it is more difficult for them to enjoy the resources today than it has been in the past"* (Strategy Group 1994).

An Idaho survey of cross-country skiers (resident and nonresident) found overwhelming support (85%) for the separation of skiers and snowmobilers (Parrish et al. 1996). Other desirable characteristics included having trail maps at parking areas, designated parking areas, restrooms, and warming huts. Most (52%) preferred to ski on groomed trails, and 19% preferred ungroomed trails.

An Idaho survey of snowmobilers (resident and nonresident) found that 57% disagreed that the current amount of lands open to snowmobiling is adequate, and 84% would like to see more lands opened to snowmobile use. Groomed trails, well-marked trails, and off-trail opportunities added the most to the snowmobilers' experiences. Other characteristics that added to the experience included having designated parking areas, trail maps at the parking area, restrooms, and warming huts (Parrish et al. 1996).

Wyoming snowmobilers felt that the greatest needs for improvement of snowmobiling were better trail maintenance, additional trail development, and better trail signing (Taylor et al. 1995). A Montana study found that nonresident snowmobilers, when asked to rate the importance of various snowmobile facilities, chose (in descending order) trail maps, trail markers and signs, groomed trails, road signs to trailheads, and loop trails. Resident snowmobilers, when asked the same question, were most interested in trail maps, long trails, trail markers and signs, loop trails, and outhouses at trailheads (Sylvester and Nesary 1994).

Activities

Most visitors also participated in winter recreation outside the parks, in national forests and other recreational areas. Snowmobiling and skiing were the most popular pursuits (Littlejohn 1996). National forests and other recreational areas in states immediately bordering the parks offer more opportunities for winter recreation, and receive much more use than the three NPS areas. Borrie et al. (1999) reported that over half the respondents to their survey also skied or snowmobiled in areas outside YNP.

Snowmobiling was the most popular activity for visitors entering the East and West Entrances, 93% and 89% respectively. Cross-country skiing was the most popular activity for visitors to the North Entrance of YNP and to Grand Teton National Park. Over 70% of North Entrance visitors indicated that wildlife viewing was a primary activity during their visit. Viewing geysers was popular with West Entrance visitors. Between 9 and 10% of visitors listed snowcoach tours as a primary activity.

Visitors' Values and Expectations

People care about YNP as a "place of scenic beauty, where wildlife is protected, and where everyone should visit" (Littlejohn 1996). Survey respondents cared least about YNP as an economic resource. The top three reasons people visited YNP in the winter

were to view natural scenery, have fun, and view bison. YNP visitors reported gaps between importance of several characteristics of their visit and the degree of satisfaction with the experience for that characteristic. For example, the importance of "experience the tranquility" was sixth, while the satisfaction with that characteristic was 18th. "Experience peace and quiet" was rated 14th in importance, and 25th in satisfaction. "Get away from crowds" had the largest gap: it was 17th in importance, and 40th in satisfaction. This indicates people feel that the values of tranquility, peace and quiet, and solitude are important and anticipated, but that they were often dissatisfied with the actual experience (Borrie et al. 1999).

A 1994 survey of winter visitors to the three parks (Littlejohn 1996a) asked visitors for the primary reasons for their visit (respondents could list more than one activity). Table 52 summarizes the results. A similar survey completed in 1995 by the NPS validated these results (NPS 1996b).

Table 52. Survey: Primary reasons for visitation.

Reasons for Visit	YNP	GTNP
View scenery	76%	73%
View wildlife	76%	68%
Take photographs	63%	66%
Snowmobiling	61%	30%
Cross-county skiing	29%	59%
Downhill skiing	11%	27%
Snowshoeing	1%	17%
Satisfy curiosity	-	35%

Snowmobilers who reside in Montana and nonresidents vacationing in Montana were asked to give reasons for engaging in their sport (Sylvester and Nesary 1994). Results of this poll are given in Table 53.

Table 53. Survey: Important reasons for snowmobiling.

Reason	Residents	Nonresidents
Observe scenic beauty	81.5%	87.7%
Take in natural surroundings	68.7%	84.2%
Enjoy smells and sounds of nature	57.2%	55.9%
Understand the natural world better	21.1%	30.3%
Learn more about nature	22.6%	33.8%
Get away from other people	41.5%	37.7%
For solitude and privacy	38.4%	45.1%
So my mind can move at a slower pace	19.9%	24.6%

In 1998 Teton County, Wyoming conducted a survey of county residents concerning their opinions on winter use in Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway (Teton County 1998). Respondents to this survey were asked, regardless of usage, what they liked and disliked about the parks in winter. In Yellowstone snowmobiling was the number one "like" answer (43%) among respondents, who had at some time visited Yellowstone, while beauty was the number one response for non-users. For GTNP cross-country skiing was the most popular "like" response (27%) among users and beauty was most popular among non-users (38%). Of the "dislikes" for YNP, responses were evenly distributed among users and non-users, who gave the following responses: dislike snowmobiling, snowmobiling traffic, snowmobile pollution, snowmobile noise, and crowds. For GTNP respondents did not like the cost, snowmobiles, snowmobiles off trail, and crowds. Users (51%) and non-users (61%) supported limits on snowmobiles. A smaller percentage of respondents supported limiting snowmobiles in GTNP with 47% of users and 40% of non-users supporting limits. However, regarding overall visitation, most survey respondents felt that current levels of visitation were the right amount (66% of users and 57% of non-users in YNP). In GTNP 84% of users and 75% of non-users felt that current use levels were about right.

During the 1998-1999 winter and summer seasons the NPS sponsored three surveys relating to the socioeconomic impacts of winter management changes within the three park units. The first survey targeted winter visitors within the GYA (Duffield et al. 2000a). The other two surveys targeted summer visitors to YNP (Duffield et al. 2000b) and the U.S. population as a whole, as well as local and regional residents (Duffield et al. 2000c). The results of these surveys may be found in this chapter in the section *Socioeconomics, Social Values*. Although the results are not reiterated here in their entirety, several findings from the survey are pertinent to the discussion of visitor experience and satisfaction presented below.

As one might expect, respondents to the three surveys differed somewhat demographically. Winter survey respondents, as mentioned previously, were primarily white (99%), well educated, and relatively wealthy. Sixty-six percent of winter survey

respondents were male. Summer visitors were predominately white (98%) and male and female respondents were evenly split at 50%. The national telephone respondents were also predominantly white (91%), but a higher percentage of other ethnic and racial groups were represented. Of this group of respondents 6.5% were African American; 2.8% were Asian; 1.3% were American Indian; and 6.8% were "Other". Like the summer survey, respondents to the telephone survey were evenly mixed between males and females.

Although all respondents favored oversnow access to the parks, the summer and telephone respondents were evenly divided between preferring access by snowcoach only and access by snowmobile. A larger portion of the telephone and summer respondents also expressed a preference for limiting use to skiing and snowshoe access only. Overall respondents to all the surveys indicated concern about the welfare of wildlife. When questioned whether they would favor limiting access to the parks to protect wildlife (bison in this case) regional and national telephone respondents and summer visitor respondents favored closing roads, while local telephone and winter visitors favored visitor access.

Measures of Visitor Experience and Satisfaction

Based on evaluation of the survey results, conclusions can be drawn about the most important aspects of visitor experience. Eight factors were defined as important criteria by which to gage the alternatives for winter use in terms of visitor experience:

- Opportunities to view wildlife. Winter visitors consistently rate wildlife viewing as a primary reason for visiting the parks. Respondents to the surveys conducted by Duffield et al. (2000a, 2000b and 2000c) were concerned about the possible disturbance of wildlife in the winter. There also appeared to be support from regional and national survey respondents to accept changes in access policy if there was a corresponding benefit to wildlife.
- Opportunities to view scenery. Winter visitors rate viewing scenery as the primary reason for visiting the parks.
- The safe behavior of others. Both snowmobilers and skiers rate safe behavior as important and indicate that it influences the enjoyment of their visit.
- Quality of the groomed surface. More than 80% of winter visitors rate the quality of the snow surface as very important.
- Availability of access to winter activities or experiences. Nearly all winter visitors surveyed by Borrie et al. (1999) support oversnow mechanized access, as opposed to plowed roads. Winter respondents to the 1998-99 winter survey (Duffield et al. 2000a) also favored oversnow access for snowmobiles. Respondents to the summer visitor sample (Duffield et al. 2000b) and the phone sample (Duffield et al. 2000c) were more evenly mixed between groomed roads for snowcoaches and groomed access for snowmobiles. Plowed roads also received very low support in the summer and telephone surveys.
- Availability of information. Most respondents are highly supportive of management actions that provide readily available information about winter opportunities or conditions for safe travel.
- Quiet and solitude. Most survey respondents feel that natural quiet and solitude were important to their park visit. Many were dissatisfied with their experience in this regard.

- Clean air. Clean air is important to most visitors surveyed. This is supported by past national survey results that indicate the recreating public most highly values clean air in their visits to public lands.

ADJACENT LANDS

The GYA was initially delineated and described in the Greater Yellowstone Coordinating Committee report, *An Aggregation of National Park and National Forest Management Plans* (1987). Within the context of this EIS, which refers not only to public lands in the GYA but also to states, counties and communities, the aggregation report is appropriate for describing lands adjacent to the parks, as follows.

The description of GYA land ownership in the report, which excluded the southern portions of both the Bridger Teton and Shoshone National Forests, shows a mix of federal, state, and private lands. The 31,000 square miles in the GYA are comprised of the following ownerships or jurisdictions:

- National forests (51%)
- Private ownership (24%)
- National parks (13%)
- Other federal agency jurisdictions (BLM, USFWS, and Bureau of Reclamation) (5%)
- Indian reservations (4%)
- State owned lands (3%)

For the purposes of this Final Environmental Impact Statement (FEIS), it is reasonable to include both the southern portions of the Bridger Teton and Shoshone National Forests. Significant amounts of winter recreational use occur there, and could be affected by changes in national park management. Including the southern portions of the above national forests would expand the study area and include all the above-listed ownerships or jurisdictions in about the same proportion.

Apart from the federal jurisdictions and lands involved, lands of three states (Wyoming, Montana, and Idaho) and 17 counties are considered part of the GYA study area. The geographic relationship of all entities is shown on the GYA map found in Chapter I. Discussions of the social and economic relationships among federal, state, and local governments may be found in the Socioeconomic section of this chapter. Information was provided by the Jackson Hole Chamber of Commerce to assist in preparation of the Socioeconomic section. This included lodging occupancy numbers for December 1996 through March 1999, sales and use tax breakdown from July 1996 through June 1999, winter airline load factors for 1996 through 1999, and winter airline seats available versus seats sold from 1996 through 1999. Teton County, Wyoming provided the report *Draft Summary of Socio-Economic Conditions, Teton County, Wyoming* (September 1998). Park County, Wyoming provided the May 1999 report *Economic Importance of the Winter Season to Park County, Wyoming* (Taylor 1999). A list of the information provided by the state and county cooperating agencies may be found in Appendix A.

About 95% of the perimeter of GTNP, YNP, and the Parkway abuts national forest lands. A high percentage of the national forest system along this common boundary is in congressionally designated wilderness, and inventoried or other roadless areas. (Note: Roadless areas as described in RARE II, and subject to the current USFS moratorium on new road construction.) Other lands are in wildlife preserves, such as the National Elk Refuge, or other similar designation. Near the gateway communities (Jackson, Gardiner, Cooke City, and West Yellowstone) to both YNP and GTNP, mostly private lands abut the parks. There is a significant amount of private land within the external boundaries of GTNP, mostly east and south of Moran, and along the Snake and Gros Ventre River corridors. There are isolated sections of state land near, in, or abutting the southern portion of GTNP, and abutting the northwest corner of YNP.

CHAPTER IV
ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter contains the scientific and analytical foundation for comparisons between the alternatives. The alternatives are designed to define issues sharply and provide a clear basis of choice. Alternative effects comparisons in Chapter II are based on this information.

A number of people commented that the Draft Environmental Impact Statement (DEIS) contained inaccurate, bad, or no scientific basis. Most such statements were accompanied by a statement of opposition to the DEIS preferred alternative. An Environmental Impact Statement (EIS) is not a scientific document per se (40 CFR 1500.4(i)). It is not necessary to repeat the entire volume of detail on a particular subject, and it is encouraged to cite literature or tier to other analyses to the greatest degree possible to reduce the bulk of a document (40 CFR 1500.4(i) and (j)). An EIS is intended to disclose environmental effects over a range of alternatives. It is meant to provide enough information, both qualitatively and quantitatively, to display the relative differences among the alternatives in subject areas most pertinent to the decision to be made (40 CFR 1500.4(f)). The scientific integrity of an EIS is demonstrated by disclosing methods of analysis, defining terms and assumptions, and making explicit references to sources of information used (40 CFR 1502.24). Council on Environmental Quality (CEQ) Regulations allow an EIS to proceed even if there is incomplete or unavailable information, and specifies processes by which to do this (40 CFR 1502.22).

This chapter first explains the methods and assumptions used for all resource impact topics. Then for each alternative, it discloses direct and indirect environmental effects for the range of resource impact topics, including effects on the human environment (social and economic). The final part of the chapter consists of separate summary discussions of effects for all alternatives, including:

- Cumulative impacts
- Effects on adjacent lands
- Adverse effects that cannot be avoided
- Irreversible or irretrievable commitments of resources
- The relationship between short-term uses of the environment
- Maintenance and enhancement of long-term productivity.

The estimated costs of the alternatives are not considered an impact topic. Appendix F provides relative costs of the alternatives.

CEQ regulations for the National Environmental Policy Act (NEPA) require that agencies determine the environmental issues related to a proposed action that are "deserving of study" (40 CFR §1500.4, §1501.7), and discuss them in proportion to their significance (40 CFR §1502.2 (b)). This determination, and consequent level of discussion for each impact topic, is reflected in the *Affected Environment* chapter and is a necessary prelude to analysis.

The purpose and need for the proposed action is defined in Chapter I, along with a determination of the issues to be analyzed in depth based on the scope of the purpose and need (*Major Issues*). The issues to be analyzed in depth do not always correspond neatly to individual analysis topics because of analysis complexities and resource interrelationships. What follows is a guide to major issues and corresponding relevant and related topics in the effects analysis. Since alternatives were formulated to define the issues, this linkage is critical for the reader and the decision maker to see how alternatives address the purpose and need for action.

Table 54. Major issues.

Impacts of the Proposed Action on:	Impact Topics Related to Major Issue:
Visitor Use and Access	Visitor Access and Circulation
Visitor Experience	Visitor Experience; Air Quality and Public Health; Natural Soundscape; Public Safety
Air Quality	Air Quality and Public Health; Visitor Experience
Soundscape	Natural Soundscape; Visitor Experience
Human Health and Safety	Air Quality and Public Health; Public Safety; Visitor Experience
Local Economies	Socioeconomics
Natural Resources	Natural Resources – Geothermal; Water; Wildlife; Soundscapes

ASSUMPTIONS AND METHODOLOGIES FOR EVALUATING IMPACTS

This analysis includes a description of whether effects are beneficial or adverse, and short term or long term. The magnitude of the effect also is described in terms ranging from negligible to major. Effects disclosed may be direct or indirect. The definition of the level, or magnitude, of the impact may vary between impact topics, so individual definitions are provided for each. The following definitions apply in general to the effects analysis.

Table 55. Types of effects.

Impact Category	Definition
Beneficial effect	A positive change in the condition or nature of the resource, usually with respect to a standard or objective. A change that moves a resource toward its desired condition.
Adverse effect	A negative change in the condition or nature of the resource, usually with respect to a standard or objective. A change that moves a resource away from its desired condition.
Direct effect	An effect that is caused by an action and occurs at the same time and place.
Indirect effect	An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.
Short-term effect	An effect that in a short time will no longer be detectable as a resource returns to its pre-disturbance condition. The period is generally less than 5 years.
Long-term effect	A change in a resource or its condition that does not return to pre-disturbance levels and for all practical purposes is considered permanent.

From an analysis standpoint there is a difference in types of effects relating to natural resources versus items such as public safety or public health. Applying the definitions of short-term or long-term effects to the public health is somewhat problematic. In most cases it is assumed that public health or safety risks would be affected directly by a management action, either improved or worsened. Therefore, the term or duration of effect is only as long as the management action is applied. This effect is, therefore, assumed to be short term since the action can be changed at any time to improve safety and health risks. Conversely, it is not reasonable to assume that an identified health or safety risk would be allowed to continue over the long-term.

For the rest of the analysis, including *Natural Resources*, all disclosed effects are considered short term unless otherwise stated. In most cases, the duration of the impact coincides with the duration of the action.

Socioeconomics

Introduction

The degree of impact can be quantified in some cases, such as when a model is used or data are obtainable. Often only qualitative descriptions of impact from specialists or scientific literature in similar cases are available. Table 56 defines the degree of impact when it cannot be quantified.

Table 56. Definition of impacts to socioeconomics.

Impact Category	Definition
Negligible	The impact is at the lower levels of detection.
Minor	The impact is slight, but detectable.
Moderate	The impact is readily apparent and has the potential to become major.
Major	The impact is severe, or if beneficial, has exceptional beneficial effects.

Summary of Regulations and Policies

NEPA's guiding regulations require analysis of social and economic impacts resulting from proposed major federal actions if an EIS is being prepared. In addition Executive Order 12898, dated February 11, 1994, "*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*" requires federal agencies to assess the impact of actions on minority and low-income communities. Although there are no specific regulations requiring protection of social values, impacts on them are considered an important piece of the federal planning processes.

Assumptions and Methods

Between the last week of January and the first week of March 1999 winter visitors to Yellowstone National Park (YNP) and Grand Teton National Park (GTNP) were surveyed regarding their winter trips to the Greater Yellowstone Area (GYA) and their opinions about winter management of the national parks in the GYA. Chapter III describes key results of the survey. Economic parameters related to the regional economy generally were derived from the winter user study using regional economic input-output methodologies (Minnesota IMPLAN Group 1996). Also included in Chapter III is a discussion of the results for two additional surveys: a 1999 survey of summer visitors to YNP, and a national, regional, and local random household phone survey. Economic parameters related to nonmarket values were derived from the winter user study using contingent valuation model methodologies (Braden and Kolstad 1991; Mitchell and Carson 1989).

Methodology for Estimating Changes in Winter Visitation Associated with Socioeconomic Impacts

The primary source of data used to estimate winter visitation changes under different park management policies was the 1999 winter survey of winter visitors to YNP and the GYA (Duffield et al. 2000a). The following discussion focuses first on the information needed to estimate visitation changes, and then the mechanics of estimating changes from this information.

The following information was used to estimate impacts.

Total winter visitation to YNP, and GTNP, and the Parkway. This information provided by the NPS was based on 1998-99 data for the West and East Entrances of YNP as well as the Moose and Moran Entrances of GTNP, and 1997-98 data for the North Entrance of YNP. The 1997-98 data was used because of questions regarding the 1998-99 data, and because available information indicated that visitation had been relatively stable through the North Entrance for 1997-98. The visitation data for the Moran Entrance of GTNP was derived in three steps:

1. Adjusting the total December through March 1998-99 car counter data for the portions of December and March not included in the winter season analysis;
2. Reducing the car count by an estimate of 25% non-recreational entries;

3. Multiplying the result by an estimated 2.4 people per vehicle.

The estimate of visitors at the Moose Entrance was provided by GTNP as the sum of skiers, snowmobilers, and an estimate of 60% of backcountry user-nights accessed through this entrance (Terri Roper, pers. com., 2000). An estimated 117,666 visitors entered GTNP at the Moose Entrance. Because some visitors enter the parks more than one time on their trip to the area, the trip estimate is based on the total entrance count reduced by 25% (Sacklin, pers. com., 1998). Therefore the estimated baseline visitation level is 88,250 individual trips (including multi-day trips) to the parks between mid-December and the second week of March.

Percent of visitors from outside the analysis area. There were two analysis areas in this study: the five contiguous counties surrounding the parks (Fremont, Idaho; Gallatin and Park, Montana; and Park and Teton, Wyoming), and the three-state region of Idaho, Montana, and Wyoming. The survey of winter visitors to the parks found that 85.9% of winter visitors were from outside the five-county area, and 65.5% were from outside the three-state region. A 17-county area was evaluated in the DEIS and refined to five counties at the request of cooperating agencies.

Estimated percentage change in the number of trips to the parks. The winter visitor survey addressed four possible policy changes in park winter access management (Duffield et al. 2000a). The survey questions asked visitors how they would change their anticipated visitation to the 17-county GYA in the winter months under different management policies. To arrive at an estimated percentage change in trips, the responses of individuals who said they would take either more trips or fewer trips were compared to the baseline number of anticipated trips to the GYA. Two specific adjustments were made:

1) A very small number of individuals from distant states (New Jersey, Pennsylvania, or Alaska) who stated that they took an implausibly high number of trips from home to the GYA during the 120-day winter season (25, 30, or 50 trips) were excluded from the analysis.
2) A 120-day threshold was set for the winter visitor season. If a respondent indicated that the threshold would be exceeded by additional visits to GYA, the response would be excluded. For this reason, one response was excluded from the sample.

Total spent per trip within the analysis area. The 1999 winter visitor survey asked respondents how much money they spent on their trip to the GYA. The survey also asked the respondents to divide their total trip spending and estimate how much was spent in the 17-county GYA verses the three-state region. These responses were analyzed to calculate the average trip expenditure in the 3 states and in the 17-county GYA for individuals that said they would increase their number of trips and those who said they would decrease their trips. Spending was calculated on this disaggregated level to capture any possible differences in trip spending between those who would increase or decrease visitation under a policy change.

Percent of the nights spent in the five-county analysis area. The winter visitor survey asked respondents how many nights they spent in each of 19 towns in the 17-county GYA. To estimate impacts on the smaller five-county area it was assumed that spending would closely follow overnight stays. It was found that 85% of the overnight stays detailed by winter survey respondents were spent in the five-county area.

Sampling Methodology and Adjustments to Sample Data

The sampling design for the winter user survey was based on the distribution of winter use among five park entrances (YNP North, East, and West, and GTNP Moose and Moran) during winter 1997-98. The sampling rate at the East Entrance was intentionally doubled to yield more complete surveys from this lightly used entrance.

In the course of conducting consistency checks on the final winter survey database, it was discovered that the sample allocation among the GTNP entrances was weighted too heavily toward the Moose Entrance. The 1997-98 winter visitation statistics used for this entrance included a substantial number of non-recreational visits. Since visitors through the Moose Entrance are predominantly cross-country skiers, this sampling bias resulted in an overrepresentation of skiers relative to snowmobilers in the sample. To correct for this, the responses of GTNP skiers and snowmobilers were weighted in the final analysis to reflect the true proportion of these groups in the winter visitor mix to GTNP.

Estimation of Visitation Impacts

The estimates of changes in direct visitor spending were calculated using the following steps for each of the two analysis areas (five-county and three-state), and for each of the four management changes:

1) Total winter visitation (88,250) was multiplied by the percent of visitors coming from outside the GYA three-state region.
2) The resulting visitation from outside the impact area was multiplied by the estimated percentage change to the number of trips as calculated from the responses to the YNP winter visitor survey. This estimated percentage change in visitation took into consideration the responses of those who said they would decrease their visitation under an alternative as well as the responses of those who said they would either increase visitation or not change their visitations to the area.
3) The respective reduction and increase in trips were multiplied by the mean trip expenditure to the impact area for those who said they would decrease or increase trips, respectively.
4) The resulting estimated increase and decrease in trip expenditures were summed to arrive at an estimated change in visitor expenditures.
5) The change in trip expenditures was input into an IMPLAN regional economic model of the impact area to estimate the indirect and induced expenditure impacts resulting from the estimated direct expenditure impacts.
6) Direct, indirect, and induced expenditure impacts were summed to arrive at total estimated expenditure impacts for each management option and impact area.
7) Total estimated expenditure impacts were compared against the total impact area economic baseline to arrive at an estimated percentage change in economic activity (output or employment) for the area.

In addition to the survey data described in the Chapter III, the cooperating counties and states supplied a substantial number of local economic reports and associated data. These reports were reviewed and, where appropriate, incorporated into the following analysis. Appendix A contains a list of the documents supplied by the cooperators and reviewed in preparation of this document.

The five-county GYA and three-state region were used for the socioeconomic impacts analysis of alternative management actions. The primary economic impact associated with the winter management alternatives concerns actions that are likely to change winter park visitation levels. Estimated expenditure impacts on an area from reduced tourism depend on 1) the percentage of visitors to a park, for example, that come from outside the impact analysis area, and 2) the amount of their total trip expenditures that are spent within the impact analysis area. The percentage of visitors from outside the analysis area decreases as the size of the analysis area increases, while the percentage of their total trip expenditures spent within the analysis area increases as the analysis area increases. The five-county analysis area was chosen to represent the counties and communities where most of the economic activity related to YNP and GTNP occurs. This change from the DEIS, which evaluated a 17-county area, was made at the cooperating agencies' request.

The estimated impacts associated with the alternatives are presented as impacts on the specific analysis areas (five counties or three states). It is important to recognize, however, that these analysis areas are not economically homogeneous, and any impacts associated with alternative management actions would not be distributed evenly across the analysis areas (see also *Socioeconomics of the Regional Economy,* Chapter III). The counties and communities closest to the parks (specifically communities such as West Yellowstone and Gardiner, which are heavily tourism dependent) would be much more heavily impacted than more distant, larger, and more economically diverse communities within the five-county area such as Bozeman or Jackson.

The following analysis of socioeconomic impacts to the five counties presents *net* impacts to the five-county area. No specific estimates are made of shifts in visitation and associated visitor spending within the GYA. It is likely that under alternative B for example, there would be a shift in snowmobile related winter visitation from the West Entrance of YNP to other areas such as the South and North Entrances. Consequently, part of the lost tourism spending within the West Yellowstone economy would be gained by Teton County, Wyoming and Gardiner and Cooke City, Montana.

Estimated impacts related to social effects and attitudes relied on standard methods in the social sciences, including survey research and various standard statistical techniques.

Air Quality and Public Health

Visitors and park staff report haze, odors, and health-related issues from emissions in areas where snowmobiles congregate (GYCC 1999). The EPA currently does not regulate snowmobile emissions although it has recently indicated that regulations on

snowmobiles will be proposed by September 2000 (EPA 1999). Such proposed rules and regulations often require years before they can be implemented. Studies in YNP, GTNP, and in laboratories analyzing the emissions of snowmobiles and the impacts of the emissions on the environment and human health have shown that most wheeled-vehicles are less polluting than 2-stroke engines (Snook and Davis 1997). The use of bio-based fuels and biosynthetic lubricants, proper engine set up (such as tuning the snowmobile engine for the elevation), and other 2-stroke engine technologies have shown to have moderate reductions in emissions (White and Carrol 1998).

Increased recreational visitor use contributes to concerns about the impacts on air quality from increased use of 2-stroke engines. Weather conditions, higher elevations, and large numbers of visitors using snowmobiles contribute to concentrated pollution at YNP (GYCC 1999). Destination areas such as Old Faithful, and road segments with greater traffic such as the road from the West Entrance to Old Faithful often experience problems with air quality. Visible adverse impacts (haze and odor) to air quality are short term, depending upon the location and environmental factors such as wind. Studies are underway to understand the long-term impacts of high polluting emissions on environment and human health. The results of these studies are summarized in Chapter III.

Modeling Methodology

To assess the relative impacts of the proposed winter use alternatives on ambient air quality in the GYA, short-term air quality analyses were performed by means of atmospheric dispersion modeling for carbon monoxide (CO) and particulate matter (PM_{10}). Table 57 summarizes six locations that were selected for the analyses based on visitor activities and vehicle mix as specified in alternatives A through G. The air quality study includes the inherent uncertainties of the model and the temporal and spatial biases due to limited meteorological and emission data. The modeling input and output data are presented in a separate report (EAEST 2000).

Table 57. Selected locations for modeling application.

Location	Type
West Yellowstone Entrance	Tollbooths
Old Faithful Staging Area	Staging area
Flagg Ranch Staging Area	Staging area
Mammoth to Northeast Entrance	Plowed highway
West Entrance to Madison	Groomed motorized route
Flagg Ranch to Colter Bay	Groomed motorized trail/plowed road

For the West Entrance to YNP and the roadway links, the EPA model CAL3QHC (EPA 1995a) was used to predict the maximum hourly average concentrations of CO and $PM_{10.}$ In addition persistence factors were applied to the results to estimate maximum 24-hour average PM_{10} concentrations and maximum 8-hour average CO concentrations. For the

staging areas, the EPA model ISCST3 (EPA 1995b) was used to predict the maximum hourly and 8-hour average CO concentrations and maximum hourly and 24-hour average PM_{10} concentrations. The predicted maximum concentrations of CO and PM_{10} attributed to traffic conditions of the alternatives were then compared to those of the existing traffic conditions (no action alternative) to determine the amount and direction of changes in CO and PM_{10} concentrations. The contribution of each vehicle type to the generation of CO and PM_{10} was also assessed.

The visibility assessment was conducted following the procedures outlined in the *Workbook for Plume Visual Impact Screening and Analysis* (EPA 1992). These procedures are designed to analyze the visibility impacts of plumes from industrial stacks. The winter use visibility analysis requires the assessment of line and area source emissions. The analysis techniques were adapted to meet this requirement using virtual point source methods.

West Yellowstone Entrance

Two tollbooths or kiosks are present at the West Entrance to YNP where snowmobiles and snowcoaches idle when entering the park to pay fees and obtain information. This creates stop-and-go, delay, and queuing traffic conditions. In addition an express lane exists at a third tollbooth in which traffic is designed to be freer flowing. To model the air quality impact of these traffic conditions, the EPA air quality model CAL3QHC was used. CAL3QHC predicts concentrations of inert pollutants from both moving and idling motor vehicles at roadway intersections. It includes the line source dispersion model CALINE3 (Benson 1979) and a traffic algorithm for estimating vehicular queue lengths at signalized intersections. Even though the West Entrance is not a signalized intersection, it presents the characteristics of one (e.g., delay approach, idle, and acceleration). The CAL3QHC model requires meteorological, site geometry, traffic, and emission parameters and data as critical inputs. Only the morning case was considered since it represents the most limiting traffic scenario occurring on a daily basis (DEQ 2000). A referential system with origin at the second or middle tollbooth was used to allocate the end points of the links and the receptor locations. Nine links representing the approach, queue, and departure links of each of the three lanes were defined. The end point coordinates of the links extend up to 1,000 feet for each link. Ten receptors were located outside the mixing zone, 200 feet apart along the northern and southern side of the entrance.

Using data from a February 2000 West Entrance snowmobile monitoring project (NPS 2000a) and the winter motorized average mean daily use (AMDU) scenarios (NPS 2000b), a methodology was developed to estimate the peak hourly traffic volume for each alternative. The traffic counts from the monitoring project indicate that the period between 9 A.M. and 10 A.M. represents the peak traffic hour, and that an average of 309 snowmobiles entered the park during that time. The average total daily entrance was 923

snowmobiles. This implies that about 33% of daily snowmobiles entered the park during the peak hour.

The winter motorized-use scenarios indicate that the ratio of the AMDU to the average peak day use of snowmobiles is 0.57 for alternative A (no action alternative). Assuming these percentages hold true for the other alternatives and for each vehicle type, the hourly peak traffic volume may be calculated as AMDU x 0.33/0.57, where AMDU is the average mean daily use. Videotapes recorded during the monitoring project indicate that the average idle time length at the two tollbooths is 30 seconds and the average approach speed is about 10 mph. Although the third lane was designed to be free flowing, it has been observed that on average motorists idle for about 5 seconds. For alternative G, it was assumed that no express lane exists and that all lanes have the same idle time of 30 seconds.

The composite wintertime CO and PM_{10} idle emission factors for the queue links and traveling emission factors for the approach and departure links were calculated based on the traffic volumes and the emission factor for each vehicle type. The traveling CO emission factors for automobiles, trucks, vans, and buses were obtained from the EPA emission factors publications for an average speed of 10 mph, high altitude location, and desired fuel type (EPA 1998a). The traveling PM_{10} emission factors for automobiles, trucks, vans, and buses were estimated from the EPA emission factor model PART5 (EPA 1995c) for an average speed of 10 mph, high altitude location, average fleet mix, and desired fuel type. For the Bombardier snowcoach, pre-1970 gasoline light-truck emission factors were used. Idle emission factors were obtained from the EPA idle emission factors publication (EPA 1998b). Since gasoline-fueled vehicle idle PM_{10} emissions are negligible, they were set to 0.001 grams/hour in the modeling inputs. The snowmobile emission factors were obtained from the Southwest Research Institute studies (White and Carroll 1999). An additional assumption was that 60% of all personal light-duty vehicles entering the park are light-duty trucks and 40% are automobiles.

Meteorological conditions considered for this analysis include low wind speed of 1 meter/second, stable atmosphere (class 6), and a low mixing height of 50 meters, which was derived from the average morning mixing height data for the Jackson Hole Airport during January and February 2000[30]. The ambient background concentrations of CO and PM_{10} were estimated following the guidelines of 40 CFR 51, Appendix W using available monitoring data collected from January 12 to March 28, 1995 in the town of West Yellowstone (NPS 1996a). They were estimated to be 3.0 ppm for 1-hour average CO and 23.0 $\mu g/m^3$ for 24-hour average PM_{10}. A surface roughness of 283.0 centimeters (cm) representing a fir forest was selected. Finally, for PM_{10} modeling, a settling velocity and deposition velocity of 0.5 cm/s were selected (Zanneti 1990).

[30] This scenario was used because the logical objective for this modeling effort is to replicate some conditions under which violation of a standard could reasonably be expected. These conditions are not unrealistic.

Roadway Segments

The selected road segments also were modeled using the CAL3QHC model. When executed without a queue link, CAL3QHC behaves like CALINE3, the recommended model for road segments. The first road segment selected is a 10 kilometers (km) stretch in YNP between the West Yellowstone Entrance and the Madison Junction, starting about 3 km from the West Entrance. It was subdivided into four short links because of directional changes in the roadway. The second road segment is also a 10 km stretch in GTNP between the Flagg Ranch staging area and Colter Bay Village, starting about 12 km south of Flagg Ranch. It contains an elevated groomed motorized trail for alternatives A, B, and C. Therefore, it was subdivided into eight short links, four for the main road and four for the adjacent trail. The third road segment is a 6 km stretch of road between Mammoth Hot Springs and Tower Roosevelt in north-central YNP, starting about 10 km east of Mammoth Hot Springs. It is characterized by wheeled-vehicle use only and was subdivided into four short links.

Within the model, receptors were placed on both sides of the road segment links outside the mixing zone, and meteorological conditions defined in the West Entrance scenario assumptions were used. The fleet mixes on the road segments were determined using the methodology explained in the West Entrance scenario. The composite wintertime traveling emission factors of CO and PM_{10} were calculated similarly to the West Entrance scenario, but for an average speed of 35 mph. The 24-hour average PM_{10} background concentration was integrated from the IMPROVE network data to be 5.0 $\mu g/m^3$. Because no CO monitor exists inside the park, the West Entrance 1-hour average CO background concentration was used. However, the West Entrance CO and PM_{10} background concentrations were used for the West Entrance to Madison junction road segment.

Staging Areas

The two staging areas modeled in this analysis were Old Faithful and Flagg Ranch. Old Faithful contains three main parking areas designed for visitors, while Flagg Ranch contains two main parking areas designed for visitors, guides, and outfitters. Compared to the West Entrance and the roadway segments, traffic in both staging areas is believed to be in idling or in slow-moving mode for relatively long periods. The staging areas were modeled as area sources using the EPA ISCST3 model. ISCST3 is a refined dispersion model based on the steady-state Gaussian plume equation designed to estimate concentration or deposition levels for each source-receptor combination. It requires source characteristics, source strength, hourly meteorological data, receptor locations, and terrain data as critical input data. In each of the two staging areas, a single area encompassing the major parking lots was drawn and used as the modeling area.

Based on the park official estimated number of vehicles present in the staging areas on a peak winter hour and the winter motorized average mean daily use scenarios (NPS 2000b), a methodology was developed to estimate the peak hourly traffic volume. It was assumed that the ratio of the average daily mean use of the roadways leading to the staging area for a given vehicle type to the total daily mean use was the same in the

staging area. It was also assumed that 20% of the machines are idling at Old Faithful, and that all machines idle for an average of 10 minutes at Flagg Ranch. The peak hourly vehicle number was then calculated by multiplying the peak vehicle population by the vehicle type ratio and the idle time. Moreover, for alternative G, the number of snowcoaches present in the staging areas was calculated by assuming that former snowmobile users would utilize the snowcoach fleet, and snowcoaches were assumed to be late model light-duty truck conversions.

The composite wintertime CO and PM_{10} idle emission factors were calculated similar to the West Entrance to YNP scenario. To obtain the hourly surface and upper air meteorological data required by ISCT3, the Jackson Hole Airport data for the winter months were obtained from the National Climatic Data Center and processed. In the model, a gridded receptor system was placed around the areas using a 100-meter spacing up to a distance of 1,000 meters. The 24-hour average PM_{10} background concentration was integrated from the IMPROVE network data to be 5.0 $\mu g/m^3$. Since no CO monitor exists inside the park, the West Entrance 1-hour average CO background concentration was used.

Impacts

The discussion of impacts of alternatives on vehicle emission exposure focuses on the exposure of employees, visitors, and snowmobile operators and riders to CO and PM_{10} worst-case air pollutant levels predicted by the air dispersion modeling. The intensity of an impact is categorized as negligible, minor, moderate, or major relative to alternative A, the no action alternative. For this analysis, the definition and intensity of the impact categories are summarized in Table 58. All impacts on air quality and public health are defined as short term (see introduction to *Assumptions and Methods for Evaluating Impacts*).

Table 58. Definition and intensity of impacts to air quality and public health.

Impact Category	Definition	Intensity
Negligible	The impact on public health is not measurable or perceptible.	<5%
Minor	The impact is measurable or perceptible and is localized within a relatively small area. However, the overall exposure would not be affected.	5-20%
Moderate	The impact is sufficient to cause a change in exposure, but remains localized. The change is measurable and perceptible but could be reversed.	21-50%
Major	The impact is substantial, highly noticeable, and may be permanent.	>50%

Visibility

Visibility impacts are assessed by whether the air pollution emissions from an alternative are likely to cause a visibility impairment that would be perceptible to an observer.

Screening threshold values described in the Workbook for Plume Visual Impact Screening and Analysis (EPA 1992) are used.

Public Safety

Public safety, for the purposes of this analysis, relates to dangerous incidents, motor vehicle accidents, and avalanches potentially involving park visitors and employees. Public safety is evaluated in relation to existing conditions as documented in the *Affected Environment*.

Impacts to public safety at YNP, GTNP, and the Parkway are closely related to changes in winter use activity levels, use of trails by different user groups, and the implementation of safety-oriented policy changes. Changes in activity levels affect the potential for conflict among and between user groups. For example, if participation in a particular activity is expected to decrease through the implementation of an alternative, the potential for incidents among that activity group will be expected to decrease. The use of trails for different activities also increases the potential for incidents or conflicts between user groups. Speeds associated with motorized use inherently decrease reaction time when nonmotorized participants are encountered on the same trail.

The impact levels identified for each alternative are relative to those stated for alternative A. All impacts on public health are defined as short term (see the introduction to *Assumptions and Methods for Evaluating Impacts*).

Table 59. Definition of impacts to public safety.

Impact Category	Definition
Negligible	The impact to public safety is not measurable or perceptible.
Minor	The impact to public safety is measurable or perceptible, and is limited to a relatively small number of winter use visitors at localized areas. Impacts to public safety may be realized through a minor increase or decrease in the potential for visitor conflicts in current accident areas.
Moderate	The impact to public safety is sufficient to cause a permanent change in accident rates at existing low accident locations or create the potential for additional visitor conflicts in areas that currently do not exhibit noticeable visitor conflict trends.
Major	The impact to public safety is substantial either through the elimination of potential hazards or the creation of new areas with a high potential for serious accidents or hazards.

Geothermal Features

Visitor access can cause degradation to geothermal features. Increases or changes in access may increase the degree to which geothermal features are impacted. Geothermal areas near roads or developments are more likely to be impacted than geothermal areas located in the backcountry. YNP monitors and seasonally removes trash from geothermal features, providing an indirect means of measuring the impact of visitor use on these areas. In addition the knowledge of park staff was utilized to describe the current types of damage that are occurring to geothermal features in the parks.

Water Resources

Studies on snowpack and snowmelt chemical analysis are being conducted to determine the effects, if any, of 2-stroke engine emissions on water quality. Until these studies are complete, it may be assumed that emissions and discharge from snowmobiles may directly or indirectly contribute to water pollution, particularly in areas where roads parallel riparian and wetland areas. The closer the road is to water or wetland areas, the higher the risk of water pollution. To assess the potential risk of pollutants entering surface and subsurface waters, road segments, upon which winter motorized use occurs (based upon their proximity to surface waters or wetlands as shown on the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory maps), are categorized as "high," "medium," or "low" risks for water quality and aquatic resources degradation.

"High" risk segments are within 100 meters of rivers, lakes or other waters for a significant portion (76% to 100%) of the road segment, thereby posing a higher potential or risk of pollutants entering surface and subsurface waters. "Medium" risk segments are within 100 meters of rivers, lakes, other waters, or wetlands for a moderate portion (51% to 75%) of the road segment. "Low" risk segments are within 100 meters of rivers, lakes or other waters less than 50% of the road segment. Assessment of risks is the initial step in assigning an impact level to an action.

Impacts to water and aquatic resources are defined at various levels described in Table 60. Consideration of impacts and their disclosure is a function of risk, intensity, duration, and extent.

Table 60. Definition of impacts to water and aquatic resources.

Impact Category	Definition
Negligible	An action that is a low risk of degrading water quality because of sufficient separation between the action and conveyance routes to the resource, or because the action does not generate impact sources harmful to water resources.
Minor	An action that could represent a low risk of degrading water quality, involving non-toxic or non-point and minor sources of pollution that do not persist in the environment.
Moderate	An action that could represent a moderate risk of degrading water quality by proximity to surface water, involving sources of pollution that are persistent in the environment and may be toxic to aquatic biota, but which are mostly local in extent.
Major	An action that could represent a high risk of degrading water quality by immediate proximity to surface water, involving sources of pollution that are persistent in the environment and may be toxic to aquatic biota beyond the local area.

Wildlife, Including Federally Protected Species and Species of Special Concern

Regulations and policies for management of wildlife underlie the analysis determinations presented in the consequence discussions. A summary of this direction (including legislation and executive orders) is presented in Appendix C.

Methods

The following sources of information were used to assess the level of impact on wildlife:

1) Scientific literature on species' life histories, distributions, habitat selection, and responses to human activities.
2) Site-specific information on wildlife species in the parks, including complete and on-going studies (when available), and the professional judgment of park biologists familiar with the management concerns related to individual species.

The results of this information review are included in its entirety under alternative A; subsequent alternative analyses compare and contrast effects relative to alternative A.

The effects analyses for wildlife is structured according to the types of actions that are addressed programmatically in all alternatives. These are: (1) the effects of groomed roads and trails; (2) the effects of motorized oversnow use of groomed roads and trails; (3) the effects of plowed roads; 4) the effects of motorized use of plowed roads; (5) the effects of nonmotorized use of groomed and designated ungroomed routes; (6) the effects of unregulated backcountry nonmotorized use; and (7) the effects of the presence and use of winter support facilities (i.e., warming huts and campgrounds). Variations in alternatives that mitigate the impacts of these actions are included and reflected in the statements of effects. Additional recommended mitigation is provided at the end of the wildlife analysis for each alternative. Wildlife effects discussions are grouped under the

general headings of *Ungulates*, *Federally Protected Species*, and *Species of Special Concern*.

In addition to the effects analysis presented in this document, a biological assessment (BA) was prepared as required by Section 7 of the Endangered Species Act to assess the effects of the preferred alternative on federally protected species. Effects in the BA were described as mandated by the USFWS, and include a determination of whether the preferred alternative, including all related actions, may or may not affect each federally protected species. Readers are advised that this type of determination, in which the alternative is treated in its entirety, is different from the effects analysis presented in this EIS. As stated in the preceding paragraph, the level of impact associated with *each* action under each alternative is defined; the impact of the alternative *as a whole* is not defined. Table 61 defines the levels of impact on wildlife in this document.

Table 61. Definition of impacts to wildlife, including federally protected species and species of special concern.

Impact Category	Definition
No Effect	An action that does not affect a species.
No Known Effect	An action that may affect a species elsewhere but for which there are no demonstrated impacts known to occur in the parks.
Adverse Negligible Effect	An action that may affect a population or individuals of a species, but the effect will be so small that it will not be of any measurable or perceptible consequence to the population.
Adverse Minor Effect	An action that may affect a population or individuals of a species, but the effect will be small; if it is measurable, it will be a small and localized consequence to the population.
Adverse Moderate Effect	An action that will affect a population or individuals of a species or a natural physical resource; the effect will be measurable and will have a sufficient consequence to the population but is more localized.
Adverse Major Effect	An action that will noticeably affect a population or individuals of a species or a natural physical resource; the effect will be measurable and will have a substantial and possible permanent consequence to the population.

In GTNP and the Parkway five areas that have been shown to be particularly sensitive to wintering wildlife have been regulated and are closed to use throughout the winter season. The areas are shown on all alternative maps, and are listed below along with short descriptions of the wildlife use. Closure to all winter uses eliminates the potential effects of the actions listed above on wildlife species.

- The Snake River floodplain, from the confluence of the Buffalo Fork (at Moran Junction) downstream to the Menor's Ferry crossing north of the Moose development, provides winter habitat for elk, moose, bison, trumpeter swans, bald eagles, and wolves.
- The Willow Flats area (northwest of the Jackson Lake junctions) including the Second, Third, Pilgrim, Spring, and Christian Creeks drainages south and west of US 89/287, but excluding the Jackson Lake Lodge, provides important habitat for moose.
- The Buffalo River floodplain and the Uhl Hill area east of Moran Junction provides winter habitat for bison and elk and winter prey for wolves.
- Kelly Hill (southeast of Moose Junction) near the Gros Ventre River provides important bison and bighorn sheep winter range.
- Static Peak provides additional bighorn sheep winter range.

In YNP a closure is enforced on McMinn Bench, an important winter range for bighorn sheep.

Natural Soundscape

Analysis Approach for Determining Noise Impact on the Natural Soundscape

Different metrics are presented to assist in evaluating the potential impacts of noise on the natural soundscape. "Audibility" of vehicles (oversnow vehicles, autos, and buses) is an approach that is easily understood and can be used to compare different types of vehicles and different project alternatives. Audibility is expressed in terms of distances to the limits of vehicle audibility, acres of park land affected by audible vehicle traffic, and the percentages of time vehicles are audible in sections of park land. "Sound level" is used to convey the loudness of vehicular sound at different distances from park roads.

To compare the audibility of different vehicle types, the greatest distance that an individual vehicle pass-by can be heard was calculated. Since this distance to the limit of audibility depends upon both the background (ambient) sound level and the rate at which sound drops off with distance, calculations for different background sound conditions and different terrain types were performed.

The following paragraphs first summarize how ambient levels were determined, and then present the measured sound levels of various vehicles. Next, the method of using these data to compute the maximum distances at which the various vehicles are audible is described. Then, the computation of cumulative audibility of vehicles at different distances from the road is presented. Finally, the calculation of average sound levels as a function of distance is described. Appendix J presents more details on these methodologies.

Background Sound Conditions and Terrain Characteristics

As described in Chapter III, *Affected Environment*, sound level measurements were conducted at several locations throughout YNP and GTNP in February and March 2000. These sound level measurements, supplemented by simultaneous audibility logging for portions of the measurement periods, were used to establish the background sound conditions for this analysis.

Based on the logging and observations made during site visits, hours during the day (8 A.M. to 6 P.M.) at each site were selected when intruding sound sources were likely to be present less than 50% of the time. These selected hours became the set of hourly statistical sound level data from which the background sound conditions were derived.

For the purposes of this analysis, two specific background sound level conditions were identified for assessing impacts over the range of conditions: 1) the "average" condition,

which includes the average effects of wind during the day; and 2) the "quiet" condition, which represents times when winds are light or calm.

Also, as described in Chapter III, the analysis assumed that the A-weighted sound level exceeded 90% (the L_{90}) of each hour in which there were no or relatively few intrusions would be the level used in the impact analysis for each alternative. Based on the site characteristics and the measured sound level data, two categories of sites were assumed: 1) sites in mostly open or lightly forested areas ("open"); and 2) sites in moderately forested to heavily forested areas ("forested"). The background sound levels in the open areas were slightly lower than those in the forested areas, the difference being due to the sound of wind in the trees.

The "average" background sound level in the open areas was 20 dBA; in forested areas, it was 22 dBA. The "quiet" background sound level in the open areas was 15 dBA. In the forested areas, the quiet sound level was 18 dBA.

Audibility of a sound depends upon the frequency content (spectrum) of that sound and of the background sound. Sound spectra for each of the background conditions were thus required. Spectra corresponding to the background A-levels cited above were taken from tape recordings of the background sound environment made at each site during the measurement program.

Wheeled and Oversnow Vehicle Sound Levels

Sound level projections start with reference noise emission levels, the maximum pass-by sound level of an individual wheeled or oversnow vehicle at a reference distance, usually 50 feet. Table 62 shows the A-weighted reference pass-by emission levels at 50 feet for the oversnow vehicles for the speeds used in the sound level projections. Table 62 also shows the reference emission levels for the rubber-tired road vehicles (automobiles and buses) used in the analysis (Menge 1998). The audibility and sound propagation models require an analysis by frequency, so the one-third octave frequency band spectral values corresponding to the A-weighted vehicle emission levels were obtained and incorporated in the model.

Table 62. Reference wheeled and oversnow vehicle noise emission levels.

Vehicle Type	Speed (mph)	Emission Level at 50 Feet (dBA)
Snowmobile	40	74
Bombardier snowcoach	30	75
4-track conversion van snowcoach	30	69
Snowplane	28	90
Automobile and van	40	68
Bus	40	76

The rate at which sound drops off with distance by frequency was taken from the FHWA Traffic Noise Model's (TNM's) sound-propagation algorithms, using snow as a ground-cover type. TNM also includes tree zones as an input type, which was used for the moderately forested to heavily forested area analysis. The effect of trees is to reduce propagating sound levels by 5 dB to 10 dB over longer distances. The losses are less for low frequencies than for high frequencies. Most of the terrain throughout the study area is rolling or nearly flat. For practical purposes, the modeling assumed flat terrain.

Audibility Analysis — Single Events

Audibility was computed for each of the wheeled and oversnow vehicle types based on auditory signal detection calculations, which compare the computed vehicle sound levels by frequency to the background sound levels by frequency. The metric of audibility is called d' (d-prime). A threshold for audibility derived from field observations occurs where 10 log d' = 7 dB (Fidell 1994). This threshold was used in this analysis. Appendix M provides more details.

Audibility Analysis — Combined Effects of All Oversnow and Wheeled Vehicles

The next level of analysis combined all of the wheeled and/or oversnow vehicles projected to be on each roadway segment for each study alternative for combined audibility calculations. For Jackson Lake, a single path was assumed, essentially down the middle of the lake in a north-south orientation, even though snowplanes and snowmobiles are free to travel anywhere on the lake surface.

The distance to the limit of audibility for each segment was determined for the "average" and "quiet" background conditions and for the appropriate proportion of open and forested terrain for that segment. Appendix M contains tables of these distances for each alternative. Also determined was the percentage of time any of the oversnow or wheeled vehicles on a given roadway segment would be audible at different distances back. Composite summaries of total area (acreage) of park land affected were computed by multiplying the distance to audibility by the segment length. Appendix M provides more details on these calculations.

The results that will be presented in Chapter IV include the acres of park land (by road segment) where any wheeled or oversnow vehicle noise is audible for each alternative. These results are for both the "average" and "quiet" background conditions and for three categories of audibility: (1) audible any amount of time ("audible at all"); (2) audible for 10% of the time or more; and (3) audible for 50% of the time or more. These categories were chosen as reasonable means of assessing impacts and comparing alternatives.

It is important to note that audibility does not mean the sound levels of the oversnow or wheeled vehicles are necessarily high. Even if a oversnow vehicle would be barely audible, not even to the extent of raising the overall A-weighted sound level, that acreage would be counted.

In the calculations, it was assumed that the number of wheeled and oversnow vehicles would be evenly, but randomly, distributed during the day. In reality, for many of the modeled road segments, there tends to be a concentration of vehicles over certain hours based on the distance a site is from the major points of origin and destination. This concentration applies to, for example, day trips by snowmobile or snowcoach tours to Old Faithful, wheeled vehicles bringing people to the staging areas for these tours, and snowplanes going out onto Jackson Lake for ice fishing. If this concentration were modeled, the probable result would be increased acreage for the "audible at all" category (concentration produces higher levels at any given time), but decreased acreage for the other two categories because there would be more time when few or no vehicles passed by.

Average Sound Level Analysis

To permit an evaluation of the average magnitude of the noise from wheeled and oversnow vehicle traffic, computations of the hourly equivalent or "average" sound level (L_{eq}) over the day were performed. Levels were computed for each road segment at two distances, 100 feet and 4,000 feet, and for both open and forested terrain.

These hourly L_{eq} values do not have the background sound level added into them. Also, they cannot be compared against the background levels to assess audibility, because L_{eq} represents a long-term average of both quiet and loud moments.

For example, if only a single snowmobile, with a maximum level of 70 dBA, passed by a site 100 feet from a trail in an entire hour, the L_{eq} for that hour at that site would be about 40 dBA to 45 dBA. If ten 70-dBA snowmobiles passed by instead of one, the L_{eq} would be about 50 dBA to 55 dBA.

The concentration of vehicles during certain periods of the day, discussed above, would result in a modest increase in the hourly L_{eq} during the heavy-use hours, but a much greater reduction in L_{eq} (possibly to zero) for those hours when very few or any vehicles would pass by. Concentration of vehicles does not affect the reported average daylong L_{eq} values.

Cultural Resources

The assessment of impacts to cultural resources followed a three-step process:

1) Determining the area of potential effect of the proposed actions;
2) Identifying the cultural resources within the area of potential effect that are either listed in or eligible for listing in the National Register of Historic Places; and
3) Assessing the extent and type of impacts the proposed actions may have upon cultural resources.

Regulations and policies for cultural resource management underlie the analysis determinations presented in the consequence discussions. A summary of this direction is found in Appendix C.

An impact on a cultural resource occurs if an action has the potential of altering in any way the characteristics that qualify the resource for inclusion in the National Register. If a proposed action diminishes the integrity of such characteristics, it is considered to have an adverse effect. Impacts that may occur subsequent to or at a distance from the location of a proposed action are also potential impacts of the action, and are considered indirect effects.

Potential impacts are based on best professional judgment and have been developed through discussions with staff from the NPS, the Wyoming, Montana, and Idaho State Historic Preservation Offices, the Advisory Council on Historic Preservation, affiliated American Indian tribes, and representatives of other state and local agencies and organizations.

This plan will provide state and local agencies and the public with information on the effects that the alternatives would have on cultural resources. It also describes the ways in which significant effects, if any, would be mitigated.

Visitor Access and Circulation

Changes in how people access park attractions or resources (that is, the modes of transportation they use and the activities they pursue) are evaluated. Potential access changes may occur in alternatives that provide incentive for shifts in park access from one entrance station to another or in alternatives that may potentially divert existing visitors to other areas outside the park units.

In comments on the DEIS, cooperating agencies and others supported the inclusion of use limitations. Specified use limits were not part of the DEIS. At the same time, they expressed concern about how displaced snowmobile use would affect lands adjacent to the parks. The DEIS included no quantitative predictions about use redistribution, although it did discuss the subject qualitatively. In response to these comments, the NPS determined that it needed to provide quantitative scenarios of the resulting use for each alternative. It should be understood that the NPS cannot predict what will happen. However, CEQ regulations (40 CFR §1502.22) allow NEPA processes to be completed despite unavailable data. It allows the construction of reasonably foreseeable impact scenarios upon which to proceed. Through comments on the DEIS, the NPS feels there is sufficient demand through comments on the DEIS to engage in this approach.

A scenario is provided that shows a reasonably foreseeable distribution of current use in each alternative. The scenarios are used for showing impacts on visitor access, and as inputs for modeling or assessing possible impact on, or risks to, other resources such as noise, air quality, and water.

Appendix J provides the calculations for each scenario. The basis for redistributing use is the current average daily use on each road or motorized trail segment. Where this use is not available under an alternative, it is considered to be displaced from that location. Depending on the alternative, a percentage of displaced users are assumed to continue to

snowmobile in the GYA parks, but distributed to other open gateway road segments. From visitor use surveys, it is known that a percentage of all winter users go to various destinations in YNP. These percentages are applied to the existing and displaced (or redistributed) use on the open gateway road segments in each alternative. For alternatives in which no segments are closed to oversnow motorized use, use remains at levels described in current management.

Figures used in the calculations were derived from the following sources: entrance station and visitor use statistics from Visitor Services Offices of Yellowstone and Grand Teton National Park and the Parkway 1992-1999, interior road segments in YNP and GTNP (Borrie et al. 1997; Littlejohn 1996; Duffield et al. 2000). Table 63 provides definitions for evaluating potential impacts by duration and extent.

Table 63. Definition of impacts to visitor access and circulation.

Impact Category	Definition
Negligible	The impact to access is not measurable or perceptible. Trip characteristics or access to desired destinations are not altered through implementation of the alternative action.
Minor	The impact to access is measurable or perceptible, and is limited to a relatively small number of winter use visitors desiring access to a localized area or attraction. However, access to the localized area or attraction can be gained through alternative routes with little disruption of circulation patterns or loss of winter use opportunities.
Moderate	The impact to access is sufficient to cause a shift in circulation patterns and trip making characteristics requiring a change in the provision of visitor services at desired destination areas or the shifting of services to other destination areas within the park units. The change is measurable and perceptible but does not deny visitors access to specific park attractions.
Major	The impact to access is substantial through the elimination of access to specific park attractions. Implementation of the alternative action would cause a loss of access to many current winter use visitors.

Visitor Experience

This assessment is based on visitor surveys of several different groups of respondents. The first group includes data from surveys of winter visitors to the parks. The second group includes surveys that examine the opinions of summer visitors and the local, regional and national populations at large concerning winter use management. The third set of surveys includes information from studies conducted by the states of Montana, Idaho and Wyoming, and Teton County, Wyoming. Two indicators of impact level were used in the analysis. First, the availability of the range of winter visitor opportunities was determined for each alternative. Second, the range of opportunities available under each alternative was compared with the satisfaction, importance and value that the various survey respondents place on that particular experience or opportunity. Where the opinions of different user groups diverge concerning a particular value they are identified in the analysis.

Criteria that are used to gage visitor satisfaction in each alternative are:

- Opportunities for viewing wildlife;
- Opportunities for viewing scenery;
- The quality of the groomed or ungroomed snow surface;
- Safety (the safe behavior of others);
- Access to winter activities and experience;
- Opportunities for quiet and solitude; and
- Clean air.

These indicators of visitor satisfaction were derived from eight primary sources: Littlejohn (1996); Friemund (1996); Borrie and Friemund (1997); Borrie et al. (1999), Davenport (1999); and Duffield et al. (2000a. 2000b, and 2000c). Other winter use surveys and assessments from Teton County, Wyoming and the states of Wyoming, Montana and Idaho, and YNP and GTNP were used to validate the criteria. Please refer to the *Visitor Experience*, Chapter III section for more detailed discussion of the survey data used in this analysis. Table 64 includes definitions for impacts to visitor experience.

Table 64. Definition of impacts to visitor experience.

Impact Category	Definition
Negligible	Little noticeable change in visitor experience.
Minor	Changes desired experiences but without appreciably limiting or enhancing critical characteristics of the experience.
Moderate	Changes critical characteristics of the desired experience or reduces or increases the number of participants.
Major	Eliminates, detracts from or greatly enhances multiple critical characteristics of the desired experience or greatly reduces or increases participation.
Neutral	An action that will create no change in the defined indicators of visitor satisfaction or quality of park experience.

Regulations and policies for management of visitor activities underlie the analysis determinations presented in the consequence discussions. A summary of this direction is presented in Appendix C.

EFFECTS COMMON TO ALL ALTERNATIVES

Socioeconomics

Actions that affect park visitation levels can impact socioeconomics. If visitor use capacities different than current use levels are enforced by reservations, permits, or differential fees, there may be significant impacts on socioeconomics. At this time, future visitor use capacity changes, if any, are unknown.

Wildlife

Effects of oversnow motorized sound. Animals may exhibit physiological and behavioral responses to human-caused noise. Because physiological responses are difficult to measure in the wild, Moberg (1987) recommended using outcome measures

such as reproductive success and survivorship as indicators of noise-induced stress in free-ranging animals. Most effects of sound are mild enough that they are never detectable as changes in population size or growth (Bowles 1995). This fact demonstrates to the ability of animals to tolerate unnatural noise. Ungulates in particular are especially adaptable to predictable, repeated noise and, if good hiding cover is available, they may show little change in habitat use or home range size (Eckstein et al. 1979; Edge et al. 1985). In general most wildlife species rarely respond with uncontrolled, panic behaviors to noise that is not associated with danger (Bowles 1995). Instead, most responses are subtle and short term.

It is the association of sound with danger that apparently dictates the degree of response. Studies have shown that the range at which animals avoided traffic was about the range at which they could detect traffic noise (Dorrance et al. 1975; Singer and Beattie 1986; Gese et al. 1989). This finding suggests that traffic noise was meaningful through its association with human activity. Repeated exposure without harassment increases tolerance, thus decreasing response. Of course, at some point, there may be a trade-off between the energy saving value of habituation and decreased wariness to potential danger, such as high levels of traffic.

An analysis of the effects of sound on wildlife is implicit in the assessment of motorized use for each alternative. It can be inferred that as the level, location, and type of motorized use changes, so will the associated effects of motorized sound. An analysis of how the natural soundscape is impacted by alternative is included in this chapter.

Natural Soundscape

Table 65 presents the computed distances to the limits of audibility of a single pass-by of each vehicle type in the open and forested terrain conditions for both the “average” and “quiet” background conditions.

The quieted oversnow vehicles, which were modeled in alternatives B and D, are shown here for completeness. Likewise, a distinction is made for snowplanes, showing the existing average pass-by level and the level if all snowplanes were held to the current 86 dB regulated level. Except for those distinctions, the results shown in Table 65 do not differ among the alternatives because they are associated with single pass-by events. A vehicle type of “group of 4 snowmobiles” is included because snowmobiles tend to travel in groups, which is not so for the other vehicle types.

Because the distances to audibility limits are based on the unique frequency characteristics of the sound sources, the background environments and the human auditory system, comparisons of the A-weighted sound levels alone will not lead to an understanding of differences. For example, the Bombardier snowcoach can be heard at greater distances than the snowplane, which exhibits significantly higher A-weighted sound levels. Most of the sound energy from the snowplane at 50 feet is in the mid-and high frequencies, which become significantly reduced over long distances, whereas most

of the sound energy from the Bombardier snowcoach is in the lower frequencies, which are much less attenuated by distance.

Table 65. Distances to limits of audibility for individual vehicle pass-bys in open and forested terrain and in average and quiet background conditions.

Vehicle Type	Noise Emission Condition	Maximum 50 ft Pass-by Level (dBA)	Distance to Limit of Audibility (feet)			
			Open Terrain		Forested Terrain	
			Average Background	Quiet Background	Average Background	Quiet Background
Automobile	Existing	68	2,180	2,330	1,130	1,200
Bus	Existing	76	5,520	6,090	2,620	2,860
Snowmobile	Existing	74	3,860	4,120	1,990	2,230
Group of 4 snowmobiles	Existing	74 each	7,000	7,510	3,340	3,790
Bombardier Snowcoach	Existing	75	8,560	9,690	3,860	4,230
4-Track Conversion Van SC	Existing	69	2,030	2,200	1,110	1,210
Snowplane	Existing	90	6,680	7,340	3,010	3,200
Snowmobile	Quieted - 70	70	2,690	2,860	1,450	1,620
Group of 4 snowmobiles	Quieted - 70	70 each	4,730	5,060	2,370	2,670
Bombardier Snowcoach	Quieted - 70	70	5,440	6,160	2,540	2,780
4-Track Conversion Van SC	Quieted - 70	69	2,030	2,200	1,110	1,210
Snowplane	Regulated 86	86	4,550	4,950	2,190	2,320
Snowmobile	Quieted - 60	60	2,150	2,260	1,160	1,290
Group of 4 snowmobiles	Quieted - 60	60 each	3,790	3,990	1,920	2,150
Bombardier Snowcoach	Quieted - 60	60	3,840	4,300	1,840	1,990
4-Track Conversion Van SC	Quieted - 60	60	1,240	1,340	720	790

These distances were used to compute impacted acreage by road segment for three categories of audibility: 1) audible any amount of time ("audible at all"); 2) audible for 10% of the time or more; and 3) audible for 50% of the time or more. See Appendix M for details on the approach: tables are presented for each alternative in the discussions of effects by alternative.

In those tables, the road segment from Moran Junction to the South Entrance of GTNP contributes the greatest to the total acreage values for all three audibility categories. For each alternative, amounts that remain almost constant for all of the alternatives. This plowed road, which is mostly along open terrain, carries a great deal of wheeled-vehicle traffic either passing through the park on US 26 or destined for Jackson Hole Airport or park offices in Moose and Beaver Creek. This road segment also carries a smaller amount of alternative-specific traffic destined for Flagg Ranch, Colter Bay, Teton Park Road and ski trailheads in GTNP.

Another major contributor to the "audible at all" acreage and, to a lesser extent, "audible 10% or more" is the plowed road segment from Mammoth to the YNP Northeast

Entrance, by far the longest of the modeled segments. Its contribution to the acreage amounts also remains virtually unchanged across all of the alternatives.

Visitor Experience

Visitors who have physical disabilities would have improved access under all alternatives as winter access action plans are implemented and barriers to facilities and programs are removed. All facilities, such as warming huts, mass transit or snowmobile staging areas and restrooms, proposed for construction or reconstruction, would comply with all federal and NPS accessibility requirements.

MITIGATION COMMON TO ALL ALTERNATIVES

Water Resources Mitigation

- Best management practices would be used during the construction, reconstruction, or winter plowing of trails and roads to prevent unnecessary vegetation removal, erosion, and sedimentation.
- New sanitary facilities would be constructed in locations using advanced technologies that would protect water resources.
- Separate winter-motorized trails from drainages to mitigate the routing of snowpack contaminants into surface water.
- Any new or reconstructed winter use sanitary facilities would be constructed in locations and with advanced technologies that would protect water resources.
- A focused monitoring program would reduce the uncertainty of impacts from oversnow vehicles, and if necessary indicate best management practices that might be implemented.

Wildlife, Including Federally Protected Species and Species of Special Concern

- All area closures to protect sensitive resources would be enforced through regular patrols by NPS personnel.
- Monitoring of eagle populations to identify and protect nests would continue. The park would continue to support the objectives of the Greater Yellowstone Bald Eagle Management Plan.
- Monitoring of wolf populations would continue.
- Lynx surveys would occur to document the distribution and abundance of lynx in the parks, and the parks will abide by the recommendations of the Lynx Conservation Assessment Strategy. The presence of other carnivores will be documented.
- Monitoring of grizzly bear populations would continue in accordance with the Interagency Grizzly Bear Management Guidelines and the parks' bear management plans.
- Monitoring and protection of trumpeter swan habitats and nests would continue, including the closure of nest sites, when warranted, to public access from February 1 to September 15.
- Monitoring of potential or known winter use conflicts would result in area closures if necessary to protect wildlife habitat.

Cultural Resources

- Should the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony occur during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) would be followed.
- Trails and trailheads would be sited to avoid adversely impacting known cultural resources, including potential cultural landscapes. In addition the use of natural materials and colors

for all permanent signs erected would allow the signs to blend into their surroundings.

IMPACTS OF IMPLEMENTING ALTERNATIVE A — NO ACTION

Effects on the Socioeconomic Environment

Regional Economy. In 1996, the states of Montana, Idaho, and Wyoming had a combined total economic output of about $109.5 billion and total full- and part-time employment of about 1.5 million jobs. The much smaller five-county GYA in 1996 had a total economic output of $5.7 billion and total employment of 97,000 jobs.

The no action alternative would not impose any management changes on winter use in the parks that would restrict or change winter visitation from its current level and trends.

Minority and Low-Income Populations. Currently, about 11.9% of winter visitors to the GYA report annual household incomes below $25,000. This figure is substantially higher for winter recreationists who live within the GYA (25.1%), and lower for visitors from outside the three-state area (5.2%). The racial composition of winter visitors is very homogeneous with 99% of respondents classifying themselves as white.

Under the no action alternative the current distribution of income and racial composition could be expected to remain unchanged.

Social Values. The general public has strongly held and divergent values and opinions on public policy issues concerning winter management of YNP and GTNP. Respondents to the 1999 winter visitor survey reported overall support for continued mechanized winter access to YNP. About 67% of respondents to the survey either agreed or strongly agreed with the statement "visitors should have the opportunity to have mechanized winter access to YNP." Over 61% of respondents also agreed with the statement "I am concerned about the possible disturbance of YNP wildlife in the winter."

Continuation of the current policies under the no action alternative would be in concert with the majority support by current winter users for continued winter mechanized access. On the other hand, as discussed in the chapter on the *Affected Environment*, the existing winter access policy is not preferred by the public in the region or the nation.

Nonmarket Values. Impacts on benefits that visitors and others derive from YNP and the GYA would result from any changes in park visitation levels, and the quality and extent of changes in park management. The average nonmarket willingness to pay for a winter trip to the national parks within the GYA is $91 per person.

Under the no action alternative, there would be no expected changes in park visitation levels resulting from any NPS management changes. Therefore, no management-related change in aggregate nonmarket values would be expected to occur.

Conclusion

The no action alternative would continue current policies in place within the GYA parks. No policy-related impacts on socioeconomics would result.

Effects on Air Quality and Public Health

Under alternative A winter use activities would continue at a level similar to current conditions. As noted in Chapter III, a number of studies have been conducted in recent years to characterize air quality on high snowmobile use days. Also, short-term air quality analyses were performed by means of atmospheric dispersion modeling for carbon monoxide (CO) and particulate matter (PM_{10}) to assess the relative impacts of the winter use alternatives, including alternative A, on ambient air quality in the GYA. Table 13, Table 14, and Table 15 summarize the results of CO modeling for six locations in the three parks for alternative A. Table 66 and Table 67 show the predicted maximum 1-hour average CO concentrations and the calculated maximum 8-hour average CO concentrations, respectively. The percent contribution of each vehicle type to the maximum CO concentrations also is provided in Table 68 for the six locations. As noted in the *Methodologies* section, the maximum concentrations are based on a peak morning hour of a high use winter day, which typically occurs during President's Day weekend in February.

Table 66. Maximum 1-hour average CO concentrations for alternative A.

Location	1-hr Maximum Concentration (w/o Background) (ppm)	1-hr Maximum Concentration (w/background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	29.20	32.20	N.A.
West Entrance to Madison Roadway	11.80	14.80	
Old Faithful Staging Area	1.29	4.29	
Flagg Ranch Staging Area	1.72	4.72	
Flagg Ranch to Colter Bay Roadway	1.10	4.10	
Mammoth to NE Entrance Roadway	0.30	3.30	

Table 67. Maximum 8-hour average CO concentrations for alternative A.

Location	8-hr Maximum Concentration (w/o Background) (ppm)	8-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	13.74**	15.15**	N.A.
West Entrance to Madison Roadway	5.55**	6.96**	
Old Faithful Staging Area	0.21	1.62	
Flagg Ranch Staging Area	0.29	1.69	
Flagg Ranch to Colter Bay Roadway	0.52**	1.93**	
Mammoth to NE Entrance Roadway	0.14**	1.55**	

** Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

As noted in Table 66 CO levels are highest at the West Entrance and along the West Entrance to Madison road, where relatively large numbers of snowmobiles operate in relatively small geographic areas. Although the maximum West Entrance 1-hour average concentration is larger than the Montana 1-hour ambient air quality standard of 23.0 ppm and the 8-hour average CO concentration is larger than the federal ambient air quality standards of 9.0 ppm, this does not indicate that violations of the standards are predicted. Violations of the standards are based on the second highest CO concentration measured, while the model provides only the highest value. Although there are relatively large numbers of snowmobiles at the two staging areas, modeled CO concentrations are relatively low since the machines are spread out over a wider area. Finally, the Mammoth to Northeast Entrance roadway exhibits the lowest CO concentrations. Coincidentally, no snowmobiles or snowcoaches operate along this roadway.

Table 68. Vehicle contribution to CO concentrations for alternative A.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	97.9	2.0	0	0	0.1	0	0
West Entrance to Madison Roadway	98.6	1.4	0	0	0	0	0
Old Faithful Staging Area	98.1	1.9	0	0	0.1	0	0
Flagg Ranch Staging Area	72.2	1.2	7.9	15.8	0.1	0.1	2.7
Flagg Ranch to Colter Bay Roadway	49.8	0	12.8	31.8	0.3	0.2	5.1
Mammoth to NE Entrance Roadway	0	0	26.5	66.9	0.5	0	6.1

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Table 69 and Table 70 provide corresponding model results for PM_{10} for the same locations and conditions as those for CO. Like CO levels, predicted PM_{10} concentrations are highest at the West Entrance. However, violations of the state and federal ambient air quality standards of 150µg/m3 are not predicted by the 24-hour maximum predicted concentrations.

Table 69. Maximum 24-hour average PM_{10} concentrations for alternative A.

Location	24-hr Maximum Concentration (w/o Background) (µg/m3)	24-hr Maximum Concentration (w/Background) (µg/m3)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	45.19**	68.19	N.A.
West Entrance to Madison Roadway	10.74**	33.74	
Old Faithful Staging Area	0.64	5.64	
Flagg Ranch Staging Area	0.63	5.63	
Flagg Ranch to Colter Bay Roadway	0.95**	5.95	
Mammoth to NE Entrance Roadway	0.32**	5.32	

** Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

Table 70. Vehicle contribution to PM_{10} concentrations for alternative A.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	99.3	0.2	0	0	0.5	0	0
West Entrance to Madison Roadway	97.6	1.1	0	0	1.3	0	0
Old Faithful Staging Area	99.8	0	0	0	0.2	0	0
Flagg Ranch Staging Area	99.3	0	0	0	0.4	0.3	0
Flagg Ranch to Colter Bay Roadway	45.4	0	10.2	20.9	13.1	7.1	3.4
Mammoth to NE Entrance Roadway	0	0	22.5	46.6	26.7	0	4.2

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Visibility

The visibility assessment indicates that under this alternative, vehicular emissions would cause localized, perceptible, visibility impairment near the West Entrance and in the area around Old Faithful and Flagg Ranch. The emissions along heavily used roadway segments would also lead to localized, perceptible, visibility impairment under certain viewing conditions.

Conclusion

Based on previous studies and the results of air dispersion modeling conducted for this analysis, short-term, adverse impacts at the West Entrance would continue at times, during high winter use days. In YNP the effects of wintertime wheeled-vehicle use on air quality would continue to be negligible due to the limited number of automobiles and buses operating in the park during the wintertime. Under this alternative, YNP would continue to use bio-based fuels and lubricants in the park. Since the use of these products produces fewer emissions than other types of fuels and lubricants, a minor reduction in impacts to air quality and public health would be expected.

Effects on Public Safety

Current public safety conditions for visitors and employees in all three park units are identified in the Affected Environment section of this document. Under the no action alternative motor vehicle accident rates (both snowmobile and wheeled) would continue to increase as visitation in the three park areas increases. Accidents on the Continental Divide Snowmobile Trail (CDST) would continue to occur, although infrequently (1 occurred in 1999). Because of the shared automobile/snowmobile travel corridor, safety on this route would remain a concern. The poor condition of some groomed routes would also continue to be a safety concern, particularly on the heavily used section from the West Entrance to Madison Junction and south to Old Faithful.

Avalanche control activities would continue on YNP's East Entrance road, at the Talus Slope and Washburn Hot Springs (spring only) and in GTNP.

Information on snowmobile safety would continue to be provided by ISSA; however, the average first-time visitor would have limited access to snowmobile safety information in the parks.

Conclusion

Alternative A would result in minor adverse impacts to visitor safety along the road from West Yellowstone to Old Faithful, and the CDST, and negligible adverse impacts on less heavily traveled routes. These impacts would directly affect employees and visitors.

Safety concerns for the 3% of winter visitors who utilize the East Entrance will be minor to moderate and adverse. For employees who conduct avalanche control on Sylvan Pass (and other areas) impacts will continue to be minor to moderate and adverse.

Effects on Geothermal Features

Adverse impacts can occur to geothermal features when visitors have unregulated access to geothermal basins. Park visitors can alter or damage geothermal resources by traveling off trail or throwing objects into features. Under alternative A, minor adverse impacts to geothermal resources in both front country and backcountry areas would continue. Some actions, such as throwing objects into the features that block the flow of water, would have major adverse impacts on individual resources. Because of the length of time it takes for this sensitive resource to recover, most impacts would be long term. Currently park personnel educate visitors and mark trails to mitigate adverse impacts on geothermal resources.

The 1990 plan approved the construction of a warming hut at Norris Geyser Basin. The addition of a warming hut would increase winter visitor use in this geothermal basin. Increased visitation would have direct minor adverse effects on geothermal features.

Conclusion

Minor adverse long-term impacts to geothermal features located along groomed roads, around destination areas, and in the backcountry would continue. Degradation to thermal

features located in the Norris Geyser Basin would increase slightly when the warming hut is built.

Effects on Water and Aquatic Resources

Pollutants that are emitted into the air are deposited on the ground or in the snowpack where they either volatilize, percolate into soil materials, or remain stored in snow. Pollutants that persistent in snowpacks or in soil materials can be washed into drainages with snowmelt, or move through the soil into nearby surface water sources, or into groundwater storage over time. Due to geology and topography, the most likely potential pathway for pollutants in the three park units is from snowpack into surface water with snowmelt, or into shallow groundwater reservoirs that enter surface drainages during late summer and early fall.[31] Pollutants present in surface waters are available for uptake by aquatic resources such as vegetation, fish, amphibians, or others who ingest the affected water. Pollutants that persist over time in the environment can be washed beyond the source of impact, eventually to settle in sediments or other traps, or they can be trapped fairly close to the source in wetland vegetation, bottom sediments, or by instream structures (such as dams and wiers).

The following assessment focuses on sources of pollution, and potential pollutants, relating to winter use – combustion products from motorized vehicles (see air resources) – and their impacts on 1) water quality, and 2) water dependent or aquatic resources. The discussion frames potential effects while the conclusion expresses a final analysis of impact on the three park units.

Water Quality

Many different chemical compounds enter the environment from snowmobile emissions but benzene, toluene, ethylbenzene, and xylenes (collectively known as BTEX); methyl tertiary butyl ether (MTBE); and polycyclic aromatic hydrocarbons (PAHs) are widely recognized as the most toxic of the organic compounds. At least two inorganic compounds of potential concern, sulfate and ammonium, are also found in snowmobile emissions (Hagemann and VanMouwerik 1999).

Information is available on issues related to emissions from personal watercraft (PWC) that have 2-stroke engines and use fuel mixtures similar to those used in most snowmobiles. CO and PM emissions from snowmobiles would be different from those produced by PWC because of the colder operating temperatures and differences in the exhaust systems. Reports by VanMouwerik and Hagemann (1999) and Hagemann and VanMouwerik (1999) are the primary source of the following information.

[31] Some people who commented on the draft EIS pointed out that the discussions of air and water seemed to be confused. These sections are rewritten in the Final EIS. NPS wishes to make clear that there is a strong relationship between airborne pollutants and water quality. A number of monitoring sites exist in the GYA and in many places throughout the United States to monitor acid deposition on the ground from ambient air pollution. The strict protocol for locating such sites in snow-dominated climates includes avoiding areas used by snowmobiles or other motorized vehicles.

Studies on emissions from PWC indicate that MTBE and PAHs are the two contaminants most likely to degrade water quality from snowmobile emissions. These contaminants are more likely than others to be found in water primarily due to their persistence in the environment.

The contamination of lakes and reservoirs with MTBE and PAHs has been documented where 2-stroke PWC and outboard motors are used (Metropolitan Water District of Southern California 1998; Reuter et al. 1998; Mastran et al. 1994; Oris et al. 1998). Recreational use of these watercraft has been identified as a primary cause of this contamination. Because water quality degradation has been documented in association with 2-stroke motor usage, it follows that water quality adjacent to areas of high snowmobile use also could be degraded by MTBE and PAH.

It is not known whether or how much fuel used by oversnow vehicles in GTNP and YNP has MTBE additives, however, MTBEs are not currently perceived to be an issue for the parks. MTBEs are not used in fuels sold in Montana (Haines, pers. com., 2000). Wyoming DEQ has no knowledge regarding whether or not MTBE is used in fuels within the State of Wyoming (Potter, pers. com., 2000), however if it is, it would probably be the result of acquiring fuels from refineries in areas where it is used, such as Colorado. Some fuels in Idaho, particularly those obtained from refineries near Salt Lake City, Utah do contain MTBEs; however, EPA has proposed a rulemaking to require the nationwide elimination of MTBE as a fuel additive by the year 2003 (Viswanathan, pers. com., 2000).

Deposition of airborne PAHs onto the ground is a commonly accepted phenomenon, and deposition of PAHs in areas of high snowmobile use is expected. PAHs may also be imparted to snowpack from the injection of tailpipe emissions into deep snow. Losses of PAHs from the snowpack are minimal since degradation processes such as photo-oxidation and volatilization do not occur or are severely impeded (Boom and Marsalek 1988). Studies have measured PAHs in snow from nearby automobile pollution and other point sources (Ettala et al. 1986; Viskari et al. 1997; Gjessing et al. 1984). PAHs from nearby automobile pollution have also been found in surface water (Gjessing et al. 1984). In the St. Lawrence River in Canada, springtime concentrations of PAHs were “most likely caused by snowmelt” from nearby urban, rural, and industrial areas (Pham et al. 1993). Atmospheric PAHs deposited onto snow also were found in a karst groundwater system during and after snowmelt (Simmleit and Herrmann 1986). The PAHs documented in these studies are found in snowmobile emissions.

PAH molecules preferentially bind to organic matter in soil. One study found “an essential part of the PAHs” in snowmelt drainage off of a highway to be retained in the soil surface layer (Gjessing et al. 1984). However, the amount of PAH-contaminated meltwater that will pass over soil is difficult to predict. Some deposition will occur directly onto snow-covered bodies of water. PAH-contaminated soil particles could also be carried with runoff meltwater into nearby water bodies whereby PAHs could

contaminate water bodies by transferring from the soil particles to the water or by accumulating as sediment. Some expect the possible effects of PAH-contaminated sediments to be a more serious, but currently less understood, risk to aquatic life than PAH-contaminated water. Finally, PAHs could also be transported to surface water bodies via overland flow during a rain-on-snow event.

BTEX are quite volatile and do not tend to bind to soil or sediment particles (Irwin et al. 1998). Volatilization rates from snow are not reported in the literature but are expected to be similar to those from water and soil surfaces that vary widely, ranging from less than one minute to a few weeks. Most values reported fall within the range of a few hours to a few days (Irwin et al. 1998). Given this, BTEX compounds are expected to mostly evaporate before the spring melt arrives. However, it may also be possible that BTEX emitted onto the snow from one snowmobile could become packed into the snow by snowmobiles following immediately behind it, in effect trapping these compounds in the snowpack until the spring melt. If this were the case, the amount of BTEX entering an adjacent receiving water will be determined largely by volatilization processes during the spring melt and the time and pathway taken to reach the water. This needs further study. Where snowmobiles are operated directly over frozen bodies of water, the chances of BTEX and other snowmobile contaminants entering the water are greater.

Sulfate in the snowpack associated with snowmobile use would be mobilized with the onset of snowmelt (Ingersoll 1999; Ingersoll et al. 1997). Once sulfate reaches groundwater or surface water, acidification is possible in alpine areas where buffering potential is low because of thin soils and exposed rock (Corn and Vertucci 1992). Pulses of acidity have been observed during spring snowmelt in lakes in the Rocky Mountains (Corn and Vertucci 1992) and in southern Norway (Hagen and Langeland 1973). Water bodies in the Rocky Mountains are thought to be influenced by point sources of atmospheric pollution (Corn and Vertucci 1992; Ingersoll et al. 1997). Nearby lakes on the Bridger-Teton and Shoshone National Forests, for example, are the most highly susceptible lakes in the nation to acidification.

Aquatic Resources

According to EPA's Office of Mobile Sources, about 30% of the U.S. gasoline supply currently contains oxygenates such as MTBE to improve air quality. These oxygenates enhance octane level, increase burning efficiency, and reduce the emission of atmospheric pollutants. MTBE is a suspected carcinogen (California EPA 1999b). There is little known about the risk to aquatic organisms from MTBE, however one of the most thorough studies to date found that there is little toxicity of MTBE to aquatic organisms (Johnson 1998). The study found that adverse effects on rainbow trout are not expected until concentrations of MTBE in the water column reach 4,600 to 4,700 µg/L. These levels are much greater than the human health standards for MTBE in drinking water supplies. Green algae have the lowest tolerance to MTBE but, according to this study,

the results "indicate that there is low potential for adverse ecological effects from levels of MTBE currently in surface waters."

These studies indicate that the emission of MTBE from motor vehicles and incidental spillage have the potential to contaminate water. This contamination is most acute in lakes from the use of PWC where it is at levels that could pose a risk to human health. However, because no sampling has been conducted in the areas of snowmobile use, there is no evidence to conclude for certain that MTBE is present or, if present, if it is in concentrations that would pose a risk to humans and aquatic organisms that consume or contact water. The presence of MTBE and its potential risk in areas of snowmobile use can only be determined through snow- and water-sampling studies.

PAHs (polycyclic aromatic hydrocarbons), which are found in snowmobile emissions (White and Carroll 1998) are known carcinogens and are toxic to aquatic life. PAH concentrations dangerous to human health are very low. The lowest water quality standards for individual carcinogenic PAHs for the consumption of fish from a PAH-contaminated water body is 49 ng/L (parts per trillion), and for the consumption of both fish and drinking water it is even lower at 4.4 ng/L (U.S. EPA 1998b).

PAHs have also been found to be toxic to aquatic life at very low concentrations due to their phototoxic effects (Oris et al. 1998). PAH concentrations of 5-70 ng/L were toxic to aquatic life, and calculated no-observed-effect-concentrations (NOEC) for PAHs were only 3 ng/L, 7 ng/L, and 9 ng/L for zooplankton reproduction, zooplankton survival, and fish growth, respectively (Oris et al. 1998). Another recent study, based on toxicity tests, suggests a water quality standard for total PAHs of only 10 ng/L. This includes a safety factor of about 100 times (Heintz et al. 1999). Levels of PAHs in excess of human health standards and levels that could harm aquatic life have been found in lakes and reservoirs where 2-stroke engines are used (VanMouwerik and Hagemann 1999).

Adams (1975), found hydrocarbons in water and fish tissue as a result of snowmobile use on a frozen pond surface in Maine. Though PAHs were not specifically measured, it is quite possible they were part of the hydrocarbons found. Hydrocarbon concentrations before and after the winter snowmobiling season increased from non-detect to 10 parts per million ppm in water, and from non-detect to 1 ppm in fish tissue. These increases were attributed to snowmobile emissions.

Referenced studies show that the emissions of PAHs from motorboats can contaminate water and that PAHs from motor vehicles can contaminate snow. The PAHs from motorboat pollution have been found at levels that pose a risk to aquatic life and human health. However, because no sampling for PAHs has been conducted in the areas of snowmobile use, it is not known whether they are present or, if present, if they are in concentrations that would pose a risk to humans and aquatic organisms that consume or contact water. Snow and water sampling studies are needed to determine the presence of PAHs and their potential risk in areas of snowmobile use.

BTEX (benzene, toluene, ethylbenzene, and xylenes) are much less persistent and thought to be less of a water quality concern than PAHs, however preliminary and extremely limited sampling in YNP found low levels of toluene in snowmelt waters (Ingersoll 199). Additional monitoring and analyses are needed to verify those findings. BTEX was also detected in the waters of Lake Tahoe, California; however, concentrations were over 1,000 times lower than aquatic life protection levels, even during periods of high motorboat (including PWC) activity (Allen et al. 1998).

No water sampling for sulfate has been conducted in the areas of snowmobile use; therefore, it is not known if acidification is occurring. The presence of sulfate or acidified waters and the potential for aquatic risk in areas of snowmobile use can only be determined through snow- and water-sampling studies. During snowmelt intervals, the rapid decreases in pH may pose a risk to amphibian embryos in breeding habitats in the Rocky Mountains (Corn and Vertucci 1992).

Ammonium has also been found in snowpack in association with snowmobile use (Ingersoll et al. 1997). In snow, it has been found to remain unchanged as ammonium (USGS, Campbell, pers. com., 1999). It is thought to dissolve into meltwater where it remains intact until it passes over soil or enters an oxygenated water body; at this point it can be used by terrestrial flora or be converted to nitrate in soil or in the receiving water. This could contribute to acidification, a decrease in dissolved oxygen, and eutrophication of receiving waters (USGS, Campbell and Mueller, pers. com., 1999).

The potential effects summarized from the literature, above, are circumstantial, and point to concerns about winter use. Specific to YNP, Ingersoll (1999) and Ingersoll et al. (1997) found that concentrations of ammonium, sulfate, benzene, and toluene were positively correlated with oversnow traffic in YNP. Where more snowmobile traffic occurred near West Yellowstone, and Old Faithful, higher concentrations of the pollutants were detected. At the lower-traffic locations near Lewis Lake Divide and Sylvan Lake, lower concentrations were found. At the higher snowmobile-use locations, in-road samples were substantially more concentrated than off-road samples. Concentrations of ammonium and sulfate at the sites in the snowpacked roadways between West Yellowstone and Old Faithful were greater than those observed at any of the 50 to 60 other snowpack-sampling sites in the Rocky Mountain region. Results indicate that snowmobile use along the routes originating at the South and East Entrances may not be substantially affecting atmospheric deposition of ammonium, sulfate, and hydrocarbons relating to gasoline combustion. Sample concentrations in snow collected a distance of 50 meters or more off-road were similar to many lower, background levels around YNP where minimal snowmobile use (if any) occurs.

Ingersoll (1999) concludes, from the analysis of five of the six snow sampling sites, that elevated emission levels in snow along highway corridors generally are dispersed into surrounding watersheds at concentrations below levels likely to threaten human or ecosystem health. Localized, episodic acidification of aquatic ecosystems in these high

snowmobile traffic areas may be possible but verification will require more detailed chemical analyses.

Given the possibility of impacts, it is appropriate as a guide to future monitoring to assess risks. The methods section for water and aquatic resources explains the risk analysis. Risk is predicated on pollutants sources (emissions), types of pollutants (toxicity and persistence), amounts of pollutants, and proximity of the source to water. Sources include emissions from oversnow vehicles and toxic and persistent pollutants (see Air Quality methods and alternative analyses). Quantities of pollution are indexed to the number of oversnow vehicle miles traveled along a segment, and segments are ranked according to their proximity to surface water (and wetlands).

For the existing condition, the relative risks are conveyed in Table 71.

Five road segments totaling about 22% of the current oversnow route miles in YNP, GTNP, and the Parkway (Madison to Norris, Canyon Village to Fishing Bridge, Madison to Old Faithful, Grassy Lake Road, and Colter Bay to Moran Junction) are defined as a "high" risk because more than 76% of each road segment is within 100 meters of rivers, lakes, or other waters, thereby posing a higher potential or risk of pollutants entering surface and subsurface waters.

Table 71[32]. Relative risks considering current oversnow motorized use.

Road Segment	Risk ± Rating	Impact: Daily Vehicle Miles Traveled Along the Segment*	
		SM	SC
Mammoth to Northeast Entrance	Medium	0	0
Mammoth to Norris	Medium	641	69
West Entrance to Madison	Medium	7759	127
Madison to Norris	High	3458	73
Norris to Canyon Village	Low	2214	47
Canyon Village to Fishing Bridge	High	2370	50
Fishing Bridge to East Entrance	Medium	983	0
Fishing Bridge to West Thumb	Medium	2627	55
Madison to Old Faithful	High	7818	165
Old Faithful to West Thumb	Medium	3560	73
West Thumb to Flagg Ranch	Medium	4219	103
Grassy Lake Road	High	184	0
Flagg Ranch to Colter Bay	Low	379	0
Colter Bay to Moran Junction	High	248	0
Moran Junction to East Entrance	Medium	49	0
Moran Junction to South Entrance	Low	0	0
Teton Park Road	Low	156	0
Moose-Wilson Road	Low	6	0
Antelope Flats Snowmobile Route	Low	0	0

Seven road segments totaling about 32% of the current oversnow routes (Mammoth to Norris, West Entrance to Madison, Fishing Bridge to East Entrance, Fishing Bridge to West Thumb, Old Faithful to West Thumb, West Thumb to Flagg Ranch, and Moran Junction to East Entrance) are defined as a “medium” risk because 51% to 75% of each road segment is within 100 meters of surface water or wetlands.

Four road segments totaling about 7% of the current oversnow routes (Norris to Canyon, Flagg Ranch to Colter Bay, Teton Park Road, and Moose-Wilson Road) are defined as posing a “low” risk because less than 50% of each road segment is within 100 meters of surface water or wetlands.

[32] *SM = Snowmobile, SC = Snowcoach; Vehicle-miles derived from visitor use scenarios shown in Appendix J. The source of pollutants is emissions from snowmobiles, which produce (conservatively) 10 times as many emissions per mile as most wheeled vehicles. Single snowcoaches produce less emissions then single snowmobiles.
±High = within 100 meters of rivers, lakes, or other waters for a significant portion (76% to 100%) of the road segment; Medium = within 100 meters of rivers, lakes, other waters, or wetlands for a moderate portion (51% to 75%) of the road segment; and Low= risk segments are within 100 meters of rivers, lakes, or other waters less than 50% of the road segment.

Three road segments (Mammoth to Northeast, Moran Junction to South Entrance, and Antelope Flats Snowmobile Route) currently have no snowmobile traffic and therefore have no impacts from snowmobile emissions.

Based on the literature summarized above, the use of snowmobiles and snowplanes directly on the surface of Jackson Lake is likely causing the direct deposition of hydrocarbons, MTBEs, and PAHs into lake water with ice and snowmelt. This has the potential for a moderate to high adverse impact, as defined, although the effects of use to date have not been measured.

Conclusion

Deposition into snowpack would continue to occur from 2-stroke engine emissions along groomed park roads in YNP and GTNP. The effect of this deposition on water quality is undetermined but there is currently no evidence of measurable changes in water quality or effects on aquatic resources. Elevated emission levels in snow along highway corridors generally are dispersed into surrounding watersheds at concentrations below levels likely to threaten human or ecosystem health. Localized, episodic acidification of aquatic ecosystems in these high snowmobile traffic areas may be possible but verification will require more detailed chemical analyses.

Accumulations of pollutants in aquatic systems may have as yet unmeasured adverse impacts on wetlands and aquatic resources downstream from high-risk road segments. Continued oversnow vehicle use at current levels involves localized high risk to surface water quality along 22% of the road segments in the three park units. Snowmobile and snowplane use on Jackson Lake would continue the risk of moderate to major adverse impacts on water quality in the lake. The continued use of bio-based fuels by the park service and the availability of fuels in gateway communities may result in a minor decrease in pollutant deposition into snow, but could significantly reduce the persistence of emission products in aquatic systems.

Effects on Wildlife

General Effects

Winter recreation activities take place during the season when animals are stressed by climate and food shortages. Disturbance or harassment of wildlife during this sensitive time can have a negative effect on individual animals and, in some cases, populations as a whole (Moen et al. 1982). The most critical times for wildlife involve cold weather, late pregnancy, and other times when animals are in a state of negative energy balance (Geist 1978). The consequences of human-caused wildlife disturbance include: elevation of heart rate and metabolism; flight; displacement from habitats; reduced reproduction; increased susceptibility to predation; and diminished health as a result of increased energy costs (Moen et al. 1982; Geist 1978; Cassier et al. 1992; Picton 1999; Aune 1981). Thus, although animals may appear unaffected by human activities (Aune 1981), adverse effects may nonetheless be occurring. In YNP's Madison, Firehole, and Gibbon

River valleys, Aune (1981) reported that wildlife developed crepuscular patterns in response to winter recreation activity, were displaced from trailsides, and that their movements were inhibited by traffic and snow berms created by plowing and grooming operations.

Ream (1980) reviewed 232 publications on the impacts of recreation on wildlife, and concluded that in general living near small numbers of nonaggressive humans did not significantly impact wild animals. Recreationists, however, because of their numbers and sometimes inappropriate behavior, were causing severe impacts because of harassment and the habituation of particular species.

Ungulates

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative A, YNP maintains 184 miles of groomed motorized roads and 37 miles of groomed nonmotorized trails. GTNP (including the Parkway) maintains 36 miles of groomed motorized surfaces.

As described in Chapter III, biologists agree that bison use groomed roads in winter to travel to different foraging areas, but disagree as to the extent that they use roads or how this use affects population dynamics (Meagher 1993; Meagher et al. 1994; Bjornlie and Garrot 1998; Cheville et al. 1998; Kurz 1998; NPS 1998). A three-year monitoring project (Kurz et al. 2000) and another research project (Bjornlie 2000) showed that only a relatively small proportion of bison activity[33] involved the use of groomed roads (Bjornlie and Garrot 1998; Kurz 1998; Kurz et al. 2000; Bjornlie 2000). The amount of use varied by year, and may be related to snow depth and population size. Furthermore, bison use of roads was negatively correlated with road grooming, with peak periods of road use occurring before and after the winter use season (Bjornlie 2000). Data also indicated that bison were not using the groomed road surface for major shifts in distribution (Bjornlie and Garrot 1998; Bjornlie 2000). Instead, the vast majority of bison were described as traveling primarily along established game trails, geothermal areas, and river corridors.

On the other hand, long-term studies of bison population dynamics, distribution, and movements suggest that groomed roads have provided bison with increased access to foraging areas, and have facilitated population expansion and shifts in distribution (Meagher 1989; Meagher 1993; Meagher et al. 1994; Meagher 1998). Using the groomed roads to travel to existing and new foraging habitats reduces the energy costs relative to traveling through deep snow. Bison use of winter roads may have changed the energetics of bison ecology by facilitating shifts in the distribution of wintering groups

[33] An average of 7.6% of bison observations in the Hayden Valley study area were on the road during the winters of 1997-98, 1998-99, and 1999-2000 (Kurz et al. 2000). Bjornlie (2000) reported use of groomed roads to account for 17% of all observed travel in the Madison-Gibbon-Firehole area during the winters of 1997-98 and 1998-99.

within the YNP population, increasing the overall abundance of bison in the park, and leading to the dispersal of bison into new habitats within and outside YNP (Meagher 1993; Meagher et al. 1994).

In recent years, a number of bison have traveled from the preferred thermal habitats in the north central portion of YNP to other areas of winter range within and outside of park boundaries. Along the northern portion of YNP, bison may travel on ungroomed trails (e.g., the Yellowstone River Trail), game trails, or over open terrain to and through public lands outside YNP. They travel east of the Yellowstone River into the Eagle Creek/Bear Creek area, or west of the river through open terrain in the Stephens Creek area. Here they are currently prevented from moving onto private lands immediately adjacent and north of the YNP boundary. Along YNP's western boundary, bison may move to lands outside the park in the Cougar Creek and Duck Creek areas or they may travel along or near the Madison River to public lands in the Horse Butte area. Nearly all bison movement to the west appears to occur on game trails, open terrain, or along the Madison River, with the exception of a short section of road through the Madison Canyon, where use peaks in the fall and spring. Bison use of groomed roads was reported as highest in mid-winter (February – March) between Fountain Flats and Old Faithful along the Firehole River (Bjornlie 2000). According to Bjornlie (2000), changes in bison distribution and movement patterns over the past 30 years occurred as a result of natural range expansion as the population increased from near extirpation and began to use alternate foraging areas.

Elk, moose, and deer may also travel on groomed or packed routes (Tyers 1999; Aune 1981; Richens and Lavigne 1978). In one study, elk use of groomed routes in YNP increased throughout the winter as snow became increasingly deeper and more crusted and as animals' conditions declined (Aune 1981). In another study, deer mobility appeared to be enhanced by packed snowmobile trails during periods of deep snow in Maine (Lavigne 1976). It is unknown if the energy saved by walking on groomed routes is greater than the associated disturbance caused by traffic on these routes (Clark 1999).

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause injury and death to wildlife, especially in poor lighting conditions and during snowfall, and displacement from preferred habitats. Under alternative A, these effects are associated with about 184 miles of groomed road surface in YNP and about 72 miles of groomed and ungroomed surfaces for motorized use in GTNP and the Parkway. Although both snowmobiles and snowcoaches use these routes, impacts are associated with the sound, speed, and number of snowmobiles — there are no documented accounts of snowcoaches hitting and killing any large mammal in the park (Gunther et al. 1998).

Over a 10-year period ending in 1998, 14 ungulates were killed by snowmobiles in YNP, primarily between Madison Junction and the West Entrance (Gunther et al. 1998). Bison were the most commonly hit (10), followed by elk (3), and moose (1). The majority of

mortalities occurred in areas of ungulate winter range, thus alternatives for winter use that increase vehicular traffic (oversnow or wheeled) in these areas would likely increase the frequency of road-killed wildlife. There are no statistics that account for injuries or increased energy expenditures that may eventually lead to mortality. Impacts, including mortalities, related to oversnow motorized use are considered to be negligible relative to the size of the ungulate population. Gunther et al. (1998) estimated that the annual number of road-kills (for both oversnow and wheeled-vehicles) has been 1% or less of each species' total population.

Because moose instinctively stand their ground when faced with a perceived threat, they may be especially vulnerable to collisions. Under alternative A, Highway 89/287 and the Continental Divide Snowmobile Trail (CDST) would continue to intersect and parallel riparian habitat between the Buffalo Fork, Snake River, and Willow Flats. Therefore, collisions between moose and vehicles, although they involve a negligible percentage of the moose population, would continue at the present rate along this stretch.

In YNP Aune (1981) observed that snowmobile-bison interactions increased with snow depth. Although bison habituate to snowmobiles to some degree, when a response was elicited, it most often resulted in the bison fleeing, with snowmobiles frequently herding them down the packed trail. However, at the time of Aune's 1981 study, bison populations were increasing, so apparently disturbance and the extra energy expenditure associated with it were not decreasing reproductive success (Cherry and Kratville 1999). Bjornlie (2000) also observed bison responding to snowmobiles, and reported that 60% of all bison groups observed traveling on groomed roads had negative reactions, most of these reactions included running.

Displacement caused by human activities may be considered a form of habitat fragmentation because it prevents animals from using parts of their home range. Because elk are restricted to limited winter range where food and cover may be of marginal quality, any human winter activity that could prevent the species from using all or part of their winter range may have adverse effects on their ability to survive or successfully reproduce (Clark 1999). Increased access into elk winter range as provided by plowed and groomed roads may reduce the overall scale and effectiveness of elk habitat, and lead to increased harassment and energetic stress (Picton 1999).

Dorrance et al. (1975) studied the responses of two white-tailed deer (*Odocoileus virginianus*) herds, one that was habituated to snowmobile activity and one that was not. Behavioral responses of the habituated herd were of short duration: deer fled from snowmobiles but returned within several hours. Deer that were previously unexposed to snowmobiles exhibited greater response, increasing the size of their home ranges and becoming displaced from habitats near trails. Huff and Savage (1972) reported that snowmobiling activity forced white-tailed deer into less preferred habitats, and Richens and Lavigne (1978) found that snowmobiles moving at low speeds (<16 km/h) disturbed white-tailed deer less than snowmobiles at higher speeds. However, when people

stopped to view deer, they elicited the greatest response, causing the deer to flush. Although Aune (1981) observed many immediate behavioral responses to snowmobiles, he did not determine that winter recreation was a major factor influencing wildlife distribution, population or movement.

In the parks, bighorn sheep are not known to occupy winter habitats near oversnow motorized routes. Consequently, the potential for displacement of sheep from key winter range is not likely to occur as a result of snowmobile or snowcoach activity.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to ungulate movements (Aune 1981). In addition plowed roads, like groomed roads, may also provide an energy efficient mechanism for wildlife movements, including bison, elk, and moose. Under alternative A, the effects described above are associated with about 76 miles of plowed road in YNP, including US Highway 191, a commercial 55 mph route linking the communities of West Yellowstone and Bozeman, Montana. GTNP (including the Parkway) maintains about 100 miles of plowed road.

Bison use plowed roads in a manner similar to groomed roads. In one study, 44% of bison groups observed reacted negatively to wheeled-vehicles (Bjornlie 2000). Portions of the plowed road between Old Faithful and West Yellowstone are used by a small percentage of bison in the spring as they search for areas with early vegetation (Bjornlie 2000); on the north side of the park, bison travel down the highway from Tower over Blacktail and down to Mammoth (Kurz, pers. com., 2000). This latter road intersects winter range and has been plowed since the 1940s. The extent to which it influences bison movements is unknown (Cherry and Kratville 1999).

Elk and moose also may travel on plowed routes. It is unknown if the energy saved by walking on groomed routes is greater than the associated disturbance caused by traffic on these routes. The snow berms associated with these routes may trap elk and other species and increase their susceptibility to collisions with vehicles (Clark 1999). Given the large size of the ungulate population in the parks relative to the number of animals that are impacted by snow berms, the effect is considered minor.

Snow berms and guardrails may impede bighorn sheep movements in YNP (Caslick 1993), but intentional use of roads as travel corridors has not been documented.

Effects of motorized use of plowed roads. The effects of plowed roads are similar to those of groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause displacement from preferred habitats and injury and death for wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall.

As discussed above, displacement caused by human activities may be considered a form of habitat fragmentation because it prevents animals from using parts of their home

range. Because elk are restricted to limited winter range where food and cover may be of marginal quality, any human winter activity that could prevent the species from using all or part of their winter range may have adverse effects on their ability to survive or successfully reproduce (Clark 1999). Increased access for humans into elk winter range as provided by plowed and groomed roads may reduce the overall scale and effectiveness of elk habitat and lead to increased harassment and energetic stress (Picton 1999).

Morgantini and Hudson (1979) reported that weather conditions combined with harassment resulting from human activities associated with roads resulted in displacement of elk to marginal foraging areas in Alberta. Impacts were especially acute during severe winters when energy budgets were stressed.

During the winters from 1989-98, wheeled-vehicles accounted for 99% of all road-killed large mammals (predominantly ungulates) in YNP. Of the 1,090 animals killed, elk (427), mule deer (335) and bison (98) were the species most often involved in fatal collisions (Gunther et al. 1998). The majority of the collisions occurred on U.S. Highway 191, where both posted speed limits and actual speeds exceed those on the road from the North Entrance to Cooke City. Overall, considering all species, the average ratio of wheeled-vehicle road-kill mortality to snowmobile road-kill mortality was 17 to 1. Thus, alternatives that that change road use from snowmobiles to wheeled-vehicles would likely result in an increase in road-killed animals. The use of mass transit and enforcement of lower speed limits could ameliorate this effect.

In GTNP and the Parkway the CDST follows US Highway 89/287 from the eastern boundary of GTNP near Moran Junction to Flagg Ranch (see *Access and Circulation*) and parallels moose winter range in both the Buffalo Fork Valley and the northern edge of Willow Flats. The proximity of the road and trail inhibits the movement of moose within their winter range. Automobiles on the highway and snowmobiles on the trail conflict with moose as they attempt to cross the trail and road. Moose are particularly vulnerable to collisions with vehicles along this highway because the plowed road provides relief from snow conditions as well as a travel corridor to foraging areas. Moose use of this road in combination with their instinctive response of standing their ground in the face of a perceived threat make them particularly vulnerable to vehicles (Tyers 1998). Berms are constructed between the road and trail throughout the CDST to prevent snowmobile versus automobile conflicts and, in many locations, the trail surface is located substantially higher than the plowed highway. Therefore, moose using the CDST that are forced to exit onto the plowed roadway have a considerable drop (commonly greater than three feet) to negotiate. Occasional breaks are provided to allow moose to avoid vehicles and exit the CDST. These measures are not always effective as 6 to 15 moose-vehicle collisions occur each year.

Under alternative A, Highway 89/287 and the CDST would continue to intersect and parallel riparian habitat near the Buffalo Fork and Snake Rivers and Willow Flats. Therefore, collisions between moose and vehicles, although they involve a negligible

percentage of the moose population, would continue at the present rate along this stretch of highway.

In addition to mortality, wheeled-vehicles may also displace moose. In Denali National Park, a 50% increase in vehicular traffic over ten years corresponded with a 72% decrease in moose sightings along the main park road (Singer and Beattie 1986). In YNP, GTNP, and the Parkway, however, there is no evidence that traffic is significantly displacing moose.

In YNP the road between Gardiner, Montana and Mammoth, Wyoming intersects bighorn sheep winter range. Although off-road public access is restricted, traffic may disrupt sheep movement. Another affected area is sheep winter range between Mammoth, Wyoming and Cooke City, Montana. Traffic on the plowed road disrupts migration patterns and habitat use. In addition vehicles on both of these roads have killed five bighorn sheep in a 10-year period (Gunther et al. 1998). In Alberta, bighorn sheep subjected to predictable vehicular traffic exhibited few behavioral responses, thus sheep may become habituated to repeated traffic (MacArthur et al. 1982).

Effects of nonmotorized use of groomed and designated ungroomed routes. The primary effects of nonmotorized use on ungulates are displacement from preferred habitats, especially geothermal areas that are important for winter survival in YNP, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. These effects are believed to be of a greater magnitude than those caused by motorized vehicles using established, predictable routes (Cole 1978; Schultz and Bailey 1978; Walter 1978; Aune 1981; Cassier 1986). Under alternative A, YNP maintains 37 miles of groomed nonmotorized trail, and with the exception of trails in the Mammoth Hot Springs and Blacktail Plateau areas, routes are not located in areas of high ungulate use. GTNP and the Parkway do not maintain groomed trails for nonmotorized use, but do provide 26 miles of designated ungroomed routes for nonmotorized use. These trails are not located in winter range.

Bison were found to respond noticeably to the presence of skiers who were off established trails (Aune 1981). Like elk, bison apparently habituate to some degree to repeated, predictable patterns of human activity on designated routes.

Elk are easily conditioned to predictable human activities, but tend to be disturbed by deviations of normal patterns (Ward et al. 1973). Consequently, skiing may affect elk behavior more than snowmobiling on established roads and trails (Aune 1981; Cassier et al. 1992). Cassier et al. (1992) measured elk movements when disturbed by cross-country skiers in YNP, and determined that the amount of winter range used by skiers and the number of days involved were more important factors than skier numbers. They recommended restricting skiers to more than 700 yards away from elk wintering areas to minimize elk displacement on shrub-steppe and upland steppe winter ranges.

In Alberta, elk moved away from heavily used ski trails, but skiing did not alter their overall wintertime distribution (Ferguson and Keith 1982). Aune (1981) reported snowmobiles on groomed roads resulted in an average elk flight distance of 38.8 meters, compared to average flight distance of 53.5 meters from skiing. Studies conducted outside the parks in Wyoming determined that elk preferred to be 0.5 miles distant from recreationists, and therefore recommended that people concentration areas should be at least this distance away from elk feeding sites (Ward et al. 1973)

Although moose are considered to be relatively tolerant of humans (Tyers 1999), winter recreation, including cross-country skiing, has been documented as a cause in displacing them (Rudd and Irwin 1985; Ferguson and Keith 1996). However, moose do habituate to predictable human activities (Tyers 1999). Consequently, nonmotorized activities on designated routes are considered to have negligible effects on moose.

The effects of skiing on bighorn sheep are restricted to the backcountry (i.e., non-designated routes) and are described below.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and ungulates may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Overall, these effects are moderately disturbing, but short term.

The primary concern related to backcountry use and wildlife is effects on bighorn sheep. Both YNP and GTNP have designated Sheep Management Closures to protect sheep winter range. The closures in YNP encompass most bighorn winter range, and thus are effective in minimizing disturbance related to winter recreation in that park. In GTNP area closures at Static Peak and Kelly Flats would continue to protect some important bighorn sheep winter range from disturbance caused by backcountry winter recreation (i.e., skiing). However, under alternative A, other sheep winter ranges in GTNP would remain open to public use.

Activities outside of established routes are more disruptive to ungulates than activities on designated routes. Bison and elk were found to respond more quickly to skiers who were off established trails than to skiers who were on designated routes (Aune 1981). Tyers (1999) reported that moose in backcountry areas were more likely to run away from skiers than were moose in front country areas where skiers were more commonly encountered.

GTNP and the Wyoming Game and Fish Department are concerned with the impacts that skiers and snowshoers may be having on moose and elk on Blacktail Butte, and on elk and bison on Wolff Ridge (see Chapter III, *Ungulate Winter Ranges*). Specifically, these activities may be displacing these ungulates, and incurring upon them additional

energetic costs. Because alternative A does not restrict use of these areas, any potential impacts would continue.

Effects of the presence and use of winter support facilities. Increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. Under alternative A, a warming hut would be constructed at Norris in the vicinity of ungulate winter range important to elk, deer, and bison. Introducing winter human use into this area would reduce its habitat effectiveness by potentially causing these species to be displaced to lower quality habitats. However, over time, the predictable nature of the recreation expected to occur in the area may allow these species to habituate to the increase in human activity.

Federally Protected Species

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel for wildlife into areas that would normally be inaccessible due to deep snow. Under alternative A, YNP maintains 184 miles of groomed motorized roads and 37 miles of groomed nonmotorized trails. GTNP maintains 36 miles of groomed motorized roads including the Parkway.

Groomed roads do not affect bald eagles or grizzly bears.

Groomed routes could affect wolf-prey interactions and habitat use (Thurber 1994; Paquet et al. 1998). However, the ecological significance of altering natural movement and foraging patterns is not fully known (Reinhart 1999). Furthermore, wolves in YNP have not been documented to travel on groomed snowmobile routes (Smith, pers. com., 2000).

Lynx may be affected by groomed routes because snow compaction may enable other predators, especially coyotes, to compete in deep snow conditions where lynx would otherwise have an advantage (Bider 1962; Ozoga and Harger 1966; Murray and Boutin 1991; Koehler and Aubry 1994; Murray et al. 1995; Lewis and Wenger 1998; Buskirk et al. 1999). Increased competition may reduce the value of habitat for lynx, and may exclude them altogether (USFS 1999). The degree to which packed trails may affect interspecific competition among lynx and other predators is poorly understood (USFS 1999); no studies in the GYA exist that document this relationship. The rapid recolonization of wolves to the parks may reduce coyote populations and consequently reduce the risk of coyote competition with lynx (USFS 1999). The investigation of lynx and lynx habitat use in the parks is a prerequisite to assessing impacts to lynx and is a high priority for the NPS.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats. Under alternative A, the effects described above are associated with about 184 miles of groomed road surface in YNP (for both motorized and nonmotorized use) and about 72 miles of groomed and ungroomed surfaces for motorized use only in GTNP and the Parkway. To date, no federally protected species have been killed by collisions with snowmobiles or snowcoaches in the parks.

The primary effect of oversnow, motorized use on bald eagles is displacement of foraging eagles, especially along river corridors (e.g., the Madison River from the West Entrance to Madison Junction; the Firehole River to Old Faithful; the Gibbon River near Norris; and the Yellowstone River from Fishing Bridge to Canyon). In GTNP and the Parkway oversnow motorized traffic would not be expected to disturb eagles because the travel corridor does not closely follow the Snake River. Disturbance to breeding eagles would be minimal because eagle breeding activities initiate as winter activities begin to decrease in the parks in late February (McEneaney, pers. com., 2000). Furthermore, only one eagle nest is visible from the roadside in YNP and in GTNP under current park policy, areas within a 0.5-mile radius around bald eagle nests on the Snake River are closed to public access beginning February 15. Disturbance caused by snowmobiles on the frozen surface of Jackson Lake would continue to cause only negligible impacts to eagles because foraging and nesting activities would be minimal prior to the breakup of the ice. In all park units, if monitoring indicates disturbance to bald eagles, additional closures may be enacted.

Few data exist on the impacts of human activity on denning grizzly bears (Reinhart and Tyers 1999). The following excerpt is from the Montana Chapter of the Wildlife Society's review of recreation impacts to denning grizzly bears (Claar et al. 1999):

> Winter motorized recreation can be associated with defined routes or dispersed over the landscape. Mace and Waller (1997) reported no den abandonment by grizzly bears in the northern Swan Range, Montana, although they routinely observed snowmobile activity within 2 km of grizzly bear dens. The den sites were usually located on steep timbered slopes that the researchers believed were nearly impossible for snowmobiles to traverse. However, Harding and Nagy (1980) reported den abandonment due to hydrocarbon exploration activities in Northwest Territories, Canada. Reynolds et al. (1986) reported on the responses of denning grizzly bears in Alaska to winter seismic surveys, including snowmachines, drill rigs, aircraft, and detonation of dynamite. Detonations within 0.8-1.2 miles of denning bears did not cause abandonment, but movements within dens were noted in some cases. A female with yearlings did not abandon her den when vehicle use was occurring within 325 feet. They reported probable den abandonment by an unmarked bear when seismic activity was within 650 feet of the den. When vehicles operated within about 3,300 feet of denned bears, their heart rates were elevated compared to undisturbed

conditions. The heart rate of denned bears increased in response to overflights by small aircraft near the time of den emergence but not at other times.

Although abandonment of dens was not reported as a frequent result of the winter human uses described, Reynolds and Hechtel (1980), Watts and Jonkel (1989) and Mace and Waller (1997) expressed concern that the physiological stresses could result in serious consequences to bears. Mace and Waller (1997) believed that the greatest potential for disturbance from snowmobile activity occurs when females with cubs are still confined to the den vicinity during spring and when bears descend to lower elevations and more gentle terrain, which is more suitable to snowmobiling.

Any potential effects of recreation on denning bears are ameliorated because, in the parks, preferred denning habitats are generally remote (Gunther, pers. comm.), and snowmobiles are required to stay on designated routes.

Of greater concern are the effects of human activities that occur near important grizzly bear foraging habitats during the pre- and post-denning period. Whether or not conflicts occur is largely dependent upon the number of visitors in the parks, where recreational activities occur, and the abundance and distribution of natural bear foods in any given year. During years of high whitebark pine production, bears are not as likely to come into conflict with human activities prior to denning because this food source occurs at high elevations in remote, less visited areas. Most bear management actions occur in the early to mid-fall, prior to the initiation of the winter use season, when the whitebark pine seed crop has failed and bears seek out human sources of food, including garbage (Gunther, pers. comm.). Park policy currently calls for closing areas of high bear use at any time to reduce the risk of bear-human conflicts.

The likelihood of visitors encountering grizzly bears in the initial weeks of the winter use season (mid- to late December) is extremely small as the vast majority of bears (about 96%) have denned by the second week of December (Haroldson et al. in prep). To date, no conflicts have occurred during this period (Gunther, pers. com., 2000).

Winter activities in late February and March may conflict with emerged male grizzly bears, 31% of which are out of their dens by March 15 (Haroldson et al. in prep). In particular, activities in ungulate winter range may disturb grizzly bears feeding on winter-killed carcasses. In YNP ungulate winter range includes geothermally influenced areas in the Firehole, Gibbon, and Norris vicinities where the potential for human-bear conflict in the spring is high (Reinhart and Tyers 1999).

To date, only one bear-human conflict has occurred prior to April in the parks (Gunther, pers. com., 2000; Cain, pers. com., 2000). According to YNP's Bear Management Area Program, many important grizzly bear spring foraging areas are closed to the public beginning March 15 to reduce displacement of bears and bear-human conflicts. For example, the Old Faithful area, where bears graze on thermally influenced spring

vegetation and scavenge winter-killed carcasses, is closed from the third Sunday in March through April 14. From April 14 through Memorial Day weekend at the end of May, 20,670 acres of the most important ungulate winter range in the area remains closed to all recreational use. Consequently, grizzly bears have undisturbed use of most winter-killed ungulate carcasses in the Old Faithful area during the entire spring season. Furthermore, before opening areas to the public, winter-killed carcasses that remain within the developed area boundaries or within 100 yards of open roads are moved to areas away from human activity. With the exception of the road from Mammoth to Cooke City, other roads within YNP are closed to public entry by March 15 (latest closing date), and most roads will remain closed to all public vehicles until at least April 15 (earliest opening date).

Impacts associated with the use of motorized oversnow vehicles on gray wolves are related to disturbance. Wolves have been documented to avoid areas of snowmobile activity thus becoming permanently displaced from some habitats (Carbyn 1974; NPS 1996); however, wolves in YNP have not been documented to travel on groomed snowmobile routes (Smith, pers. comm.). Wolves do use areas near groomed snowmobile roads in ungulate winter range, and in 1997, a pack was displaced from an elk carcass by snowmobiles (Smith 1998). In GTNP continued snowmobile use in the Antelope Flats and Ditch Creek areas could cause some disturbance to wolves due to noise and human activity. However, snowmobiles are required to stay on designated routes, preventing random use of the area.

Impacts to denning wolves would not be expected to occur because wolves den in April, after the closure of the winter recreation season in the parks. In accordance with park policy, areas within a 1-mile radius of the dens are closed to public entry in YNP; GTNP also has the authority to enact closures. In addition in YNP, many of the wolf dens are within grizzly bear spring closure areas, and thus are not subjected to disturbance from humans.

Motorized routes pass through potential lynx habitat in the parks. Assessing the degree of impacts to lynx in the parks is speculative because very little is known about lynx distribution and abundance. Motorized oversnow recreation may affect lynx by fragmenting habitat, reducing the effectiveness of intact habitat, causing displacement from or avoidance of habitat, and creating added energetic stress (Halfpenny et al. 1999). Impacts to breeding lynx would not be expected to occur because the winter recreation season ends prior to the initiation of the breeding season.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to wildlife movements (Aune 1981). In addition similar to groomed roads, plowed roads may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative A, the effects described above are associated with about 76 miles of plowed road in YNP, including US Highway 191, a commercial 55 mph route

linking the communities of West Yellowstone and Bozeman, Montana. GTNP, including the Parkway, maintains about 100 miles of plowed road.

Plowed roads do not affect bald eagles.

The current winter season in YNP occurs from mid-December to mid-March. The majority of bears have denned prior to the beginning of the winter season. Consequently, plowed roads are not expected to affect grizzly bears. See *Effects of motorized use of groomed and ungroomed roads and trails* for additional information on grizzly bears and winter use.

Similar to the effects of groomed roads, plowed roads could potentially affect wolf-prey interactions and habitat use (see *Effects of groomed roads and trails*). However, wolves in the parks have not been documented to use plowed roads as travel corridors (Smith, pers. comm.).

Lynx have been documented to travel along roadways providing that adequate cover is available on both sides of the road (Koehler and Brittell 1990). Any vegetative cover along plowed roadsides in the parks is generally buried under the snow; consequently, it is doubtful that lynx, which require cover for security and for stalking prey (Koehler 1990), would use these roads as travel corridors. Most impacts associated with roads are related to traffic volumes and are discussed below.

Effects of motorized use of plowed roads. The effects of traffic on plowed roads are similar to those of traffic on groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause injury and death for wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall, and can cause displacement from preferred habitats.

Motorized vehicles may strike bald eagles foraging on carcasses along roadsides, in particular wheeled-vehicles on Highway 191 and on the road from Mammoth to Cooke City. To date, only one bald eagle mortality has been attributed to a vehicle; it was hit on Highway 191 on the northwest side of YNP (McEneaney, pers. comm.). Park policy requires that carcasses on and along roads be routinely removed to avoid attracting bald eagles and other scavengers. Eagles may also be displaced from perches by traffic on these road segments, although such displacement is considered minor and short term due to the fidelity bald eagles have to their traditional perches (McEneaney, pers. comm.). Chronic disturbance, may, however, ultimately cause bald eagles to abandon their perch sites (Cain, pers. comm.). No evidence exists, however, to suggest that bald eagles are being chronically disturbed in the parks.

Although grizzly bears generally avoid road corridors (Reinhart and Tyers 1999), bears may be attracted to carrion found along or near roads during the pre- and post-denning period, thereby making them vulnerable to collisions with wheeled-vehicles. During a 10-year period, wheeled-vehicles killed two grizzly bears during the winter use season

(Gunther et al. 1998). Displacement is not likely to occur because the majority of bears have denned during this time. See *Effects of motorized use of groomed and ungroomed roads and trails* for additional information regarding grizzly bear activity and winter recreation.

From 1995-98, vehicles killed six wolves during the winter use season in YNP (Gunther et al. 1998). In general, wolves avoid roads that are open to the public, but have been documented to use closed or limited use roads (Thurber et al. 1994; Carbyn 1974). In YNP wolves cross roads periodically, but little use of roads as travel corridors has been documented (Smith, pers. comm.). The likelihood of wolves being hit by automobiles is highest for those packs that inhabit areas on the north side of YNP, and to a lesser degree, packs in GTNP.

Although a possibility, there are few records of lynx being killed on highways (USFS 1999) and no road-killed lynx have been documented in the GYA (Halfpenny et al. 1999). Carnivore research in Canada suggests that traffic volumes of 2,000 to 3,000 vehicles a day are problematic in terms of lynx being killed on highways (USFS 1999). Winter traffic levels in the parks do not approach this volume. Other effects of wheeled-motorized traffic on lynx are similar to the effects of oversnow motorized traffic. Both may displace individual lynx or cause them to avoid certain habitats. Wheeled-vehicles can also impact hare abundance and activity at night, thereby affecting an important food source for lynx.

Fragmentation of potential lynx habitat would continue to occur under alternative A because several road sections in the parks intercept lynx habitat. In YNP the effects are limited to US Highway 191 along the western boundary of the park. In GTNP US Highway 89/287 from Moran Junction to Flagg Ranch intercepts potential lynx habitat.

Effects of nonmotorized use on groomed and designated ungroomed routes. The primary effects of nonmotorized use on wildlife are displacement from preferred habitats and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. These effects are believed to be greater than those caused by motorized vehicles using established, predictable routes (Cole 1978; Schultz and Bailey 1978; Walter 1978; Aune 1981; Cassier 1986). In addition packed ski trails may influence wildlife movements and distributions by allowing access to areas outside of their normal range. Under alternative A, YNP maintains 37 miles of groomed nonmotorized trail. GTNP and the Parkway do not maintain groomed trails for nonmotorized use, but do provide 26 miles of designated ungroomed routes for nonmotorized use. The area affected by nonmotorized trails in the parks is very small relative to the total area of the park units. Minor site-specific impacts are possible where trails occur in or near nesting sites or foraging areas. Nonmotorized uses of groomed and ungroomed routes occur primarily where vehicular access permits easy access.

In contrast to motorized activities, nonmotorized recreation (e.g., cross-country skiing), especially when it occurs outside of predictable use areas or in riparian areas, may be highly disruptive to bald eagles (Harmata and Oakleaf 1992; Grubb and King 1991; Stalmaster and Newman 1978; McGarigal et al. 1991; Stangl 1994). In YNP this includes areas along the Firehole, Madison, Yellowstone, and Lewis Rivers. In GTNP the most important bald eagle wintering area, the Snake River floodplain, is entirely closed to public access in the winter. Although recreational activities may occasionally displace eagles from perches, the displacement is considered negligible and short term due to the fidelity bald eagles have to their traditional perches (McEneaney, pers. com., 2000). Chronic disturbance, may, however, ultimately cause bald eagles to abandon their perch sites (Cain, pers. com., 2000). No evidence exists to suggest that bald eagles are chronically disturbed in the parks. In all park units, if monitoring indicates disturbance to bald eagles, additional closures may be enacted. Furthermore, disturbance to breeding eagles would be minimal because eagle breeding activities initiate as winter activities begin to decrease in the parks in late February. Under current park policy, areas within a 0.5 mile radius around bald eagle nests on the Snake River are closed to public access beginning February 15.

Nonmotorized recreation is not likely to adversely affect grizzly bears because the majority of bears have denned during the period of winter use. See *Effects of motorized use of groomed and ungroomed roads and trails* for additional information regarding grizzly bear activity and winter recreation.

Nonmotorized groomed trails pass through wolf winter range in YNP and could negatively affect predator-prey relationships. To date in YNP, this has not been documented to occur. In GTNP wolf activity in the winter is sporadic, and generally focused in areas of relatively low human use.

Front country nonmotorized activities may occur in potential lynx habitat. Because the abundance and distribution of lynx in the parks is unknown, it is difficult to assess the impact of these activities. The majority of skiers in the parks remain on groomed routes, therefore use is largely predictable. With the exception of human activity near den sites, many researchers believe that lynx may be relatively tolerant of humans (USFS 1999). Bowles (1995) reported that lynx may adapt to some level of human activity, and other researchers documented lynx use of ski areas and winter construction camps in Colorado (Halfpenny et al. 1982; Thompson 1987; Thompson and Halfpenny 1989 and 1991).

Minimizing disturbance to denning habitat is important from May to August (USFS 1999); consequently, winter recreation in the parks will not affect denning lynx.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and federally protected wildlife species may only occur sporadically, they may cause

displacement and additional energy expenditure and stress that reduces animals' chances of survival and reproduction.

The effects of nonmotorized recreation in backcountry areas on bald eagles would likely be greater than those on designated routes in the front country (Harmata and Oakleaf 1992; Grubb and King 1991; Stalmaster and Newman 1978; McGarigal et al. 1991; Stangl 1994). Nonetheless, the effects of current winter use on eagles are not considered a major concern in the parks (McEneaney, pers. com., 2000). See *Effects of nonmotorized use on groomed and designated ungroomed routes* for a discussion of nonmotorized activities and bald eagles.

Nonmotorized recreation in high-elevation backcountry areas frequented by grizzly bears immediately before and after denning may potentially result in bear-human conflicts. Conflicts may result in management actions taken against individual bears, including translocation (most commonly) and lethal control (rarely). By mid-December the majority of bears have denned, therefore the chance of backcountry skiers encountering bears is low. Likewise, although some bears will be out of their dens during the first two weeks of March, the odds of bear-human interactions are minimal.

Impacts to bears are more likely to occur prior to and following the winter use season as bears seek out feeding opportunities. Backcountry recreation at these times may lead to conflicts, potentially resulting in management actions taken against individual bears including translocation and lethal control. Management actions may also occur as a result of human-caused displacement of grizzly bears, or when bears seek food attractants at park developments during years of low natural food availability (primarily whitebark pine seeds). Similarly, displaced bears may be attracted to park developments and other sources of human food. Current Bear Management Area restrictions (see *Effects of motorized use of groomed and ungroomed roads and trails*) serve to minimize bear-human confrontations in spring.

Nonmotorized groomed trails pass through wolf winter range in YNP and could negatively affect predator-prey relationships. To date in YNP, this has not occurred. In GTNP wolf activity in the winter is sporadic, and generally focused in areas of relatively low human use.

Nonmotorized, backcountry recreation may affect lynx because disturbance is dispersed and unpredictable (Schultz and Bailey 1978; Gabrielson and Smith 1995). With the exception of habitat that is intercepted by roads, the majority of potential lynx habitat occurs in the backcountry and takes considerable effort to access. Consequently, the number of skiers potentially present in most lynx habitat in the winter is expected to be low and their odds of encountering or displacing lynx is small. Regardless, restrictions on backcountry use may be implemented at anytime to protect important lynx habitat.

Presence and use of winter support facilities. Warming huts and campgrounds can cause habituation in some wildlife species due to the presence of human food and

garbage, and can subsequently lead to human-wildlife conflicts. In addition increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. Effects of such disturbance would be the same as those previously discussed. Under alternative A, a warming hut would be constructed at Norris.

Winter support facilities in the parks are not known to affect bald eagles.

A major problem associated with human development in occupied bear habitat is the availability of food attractants. Bears that become conditioned to human foods and garbage are often the targets of management actions, including lethal control. High winter visitor use has contributed to a garbage problem in YNP. Garbage that has accumulated throughout the winter may attract hungry grizzly bears in the spring. To date, YNP does not have adequate winter garbage storage facilities but will rectify this issue by constructing a winter garbage storage facility that is wildlife-proof in the Old Faithful, Grant, Lake, and Canyon areas. This is a feature of all alternatives.

In YNP the construction of a warming hut at Norris will likely lead to an increase in human activity in the surrounding area. Because the hut will be located in thermally influenced ungulate winter range, any associated increase in human use could affect the availability of bison and elk carcass, which provide important spring foods for grizzly bears. Because ungulates have been known to habituate to predictable human activities any displacement would most likely be short term. In addition as stated previously, the majority of bears do not emerge from hibernation until after the winter use season at which time the Bear Management Area restrictions will be in affect to allow bears uninterrupted use of spring carcass habitats in known winter ranges. Areas of high bear use may be closed at any time according to park policy.

Wolves may be affected in the short term by ungulate displacement in the Norris area.

The increase in human use expected in the Norris area as a result of the new warming hut is not expected to affect lynx because the hut is outside of potential lynx habitat.

Species of Special Concern.

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow; inhibit foraging activities of carnivores that tunnel beneath the snow to hunt subnivian prey; and, reduce subnivian prey availability by increasing mortality of these small mammals. Under alternative A, YNP maintains 184 miles of groomed motorized roads and 37 miles of groomed nonmotorized trails. GTNP maintains 36 miles of groomed motorized roads including the Parkway.

Because so few studies of wolverine ecology exist, it is unknown if wolverines would use groomed routes. Because wolverines are considered especially sensitive to human disturbance (Copeland 1996), it is unlikely that they would use routes frequently traveled

by humans. The maintenance of the Sylvan Pass groomed route requires periodic blasting to alleviate the risk of avalanches. This practice may affect wolverines and wolverine habitat in the Sylvan Pass area.

The scarcity of fisher sightings in the parks and the paucity of studies on this species inhibit an assessment of the impacts of winter use. They are known to travel on packed snowshoe hare trails or reuse their own trails when snow is deep (Trochta 1999); consequently, the potential exists for fishers to use groomed routes. However, the fisher has been described as a species that typically avoids humans (Powell and Zielinski 1994); thus, it may be inferred that they would not frequent these routes very often due to their associated high levels of human activity.

American marten tunnel beneath the snow to prey upon small mammals. Raine (1983) found that martens hunted beneath the snow less often when it was crusty and compacted. Furthermore, prey may be less available in these areas as a result of displacement and increased mortality caused by compaction (Trochta 1999). Martens reportedly use packed snow trails created by other animals to conserve energy (Strickland and Douglas 1987); therefore, it may be inferred that they may also use groomed trails to some extent.

River otters closely associated with aquatic and riparian habitats seldom venture far from water, and otter would not be expected to make use of groomed routes. Indirect effects to otters related to the impact of motorized oversnow recreation on the aquatic environment are discussed below.

Impacts on trumpeter swans are associated with motorized traffic on groomed routes (discussed below), and not the routes themselves.

Sagebrush lizards hibernate throughout the winter use season but may be impacted by winter activities that disturb rocky, geothermal areas. Groomed routes would not affect sagebrush lizards because they are restricted to the road footprint and consequently do not alter the rocky substrates preferred by this species.

Impacts on rubber boas, fish, and amphibians are limited to activities that affect the aquatic environment. In regards to winter use, these impacts are limited to the use of motorized oversnow recreation.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The most likely impacts on species of special concern in the parks are displacement from preferred habitats and degradation of the aquatic environment from pollutants in the snowpack. Documented mortality caused by collisions with oversnow vehicles in the parks is rare. In ten years only one of these species (a marten) was reportedly killed by a snowmobile in YNP (Gunther et al. 1998). Under alternative A, the effects described above are associated with about 184 miles of groomed road surface in YNP and about 72 miles of groomed and ungroomed surfaces for motorized use in GTNP and the Parkway.

Habitat displacement of wolverines has been documented to occur outside the parks, with wolverines rarely using parts of their home range bisected by roads (Arthur et al. 1989; Copeland 1996; Gunther et al. 1997 and 1999). It is unknown whether wolverines use or are affected by groomed roads in the parks.

Because there is a chance that fishers, if they exist in the parks, may use groomed routes, the possibility for fishers to be affected by traffic on these routes also exists. However, the fisher has been described as a species that typically avoids humans (Powell and Zielinski 1994). Thus, it may be inferred that they generally avoid these routes due to their associated high levels of human activity. Impacts associated with displacement would be negligible because vast areas exist in the parks that are off-limits to snowmobile and snowcoach use.

American martens may be displaced by snowmobile and snowcoach activities, but similar to fishers, the impact would be negligible because vast areas exist in the parks that are off limits to snowmobile and snowcoach use.

Species that are associated with aquatic habitats (river otters, fish, and amphibians) may be indirectly affected by the impact of motorized oversnow recreation on the aquatic environment. The river otter's piscivorous diet and high position on the food web may make it especially vulnerable to water pollution (Melquist and Dronkert 1987). Direct discharge of snowmachine exhaust into the snowpack may create elevated contamination by hydrocarbons, carbon monoxide, nitrous oxides, and particulate matter, which may end up in aquatic ecosystems, including sensitive amphibian habitats (Ruzycki and Lutch 1999). These contaminants can lead to loss of overall health of amphibian populations and result in direct and indirect mortality of aquatic resources (Adams 1974). See *Water and Aquatic Resources* for an assessment of the impacts of exhaust on water quality in the parks.

Sagebrush lizards hibernate throughout the winter use season but may be impacted by winter activities that disturb rocky, geothermal areas. Oversnow motorized routes do not occur in these areas and consequently would not affect sagebrush lizard habitat.

In YNP trumpeter swans that winter along the Lewis, Firehole, Madison, and Yellowstone Rivers may be affected by motorized oversnow traffic, but disturbance is considered minor (Wyoming Game and Fish Department, McEneaney, pers. com., 2000). In GTNP impacts from motorized use are considered negligible because groomed and ungroomed routes for motorized oversnow use are not immediately adjacent to wintering areas. Similar to bald eagles, swans demonstrate more tolerance to continually moving vehicles than they do to stopped ones or people on foot or skis (Shea 1979; Aune 1981). In the parks, the predictability of vehicles on groomed or otherwise designated routes allows swans to habituate to traffic thus alleviating impacts related to disturbance.

Effects of plowed roads. Similar to groomed roads, plowed roads also provide an energy efficient mechanism for wildlife movements. Under alternative A, the effects

described above are associated with about 76 miles of plowed road in YNP, including US Highway 191, a commercial 55 mph route linking the communities of West Yellowstone and Bozeman, Montana. GTNP, including the Parkway, maintains about 100 miles of plowed road.

Because so few studies of wolverine ecology exist, it is unknown if wolverines would use plowed routes. Because wolverines are considered especially sensitive to human disturbance (Copeland 1996) it is unlikely that they would use routes frequently traveled by humans. Habitat displacement of wolverines has been documented to occur outside the parks, with wolverines rarely using parts of their home range bisected by roads (Arthur et al. 1989; Copeland 1996; Gunther et al. 1998 and 1999).

Little information exists that documents the effects of plowed roads on fishers. Anecdotal information from Alberta documented three individual fishers using snowplow banks as vantage points to hunt hares browsing on saplings in the rights-of-way (Johnson and Todd 1985).

The effects of plowed roads on marten movements are unknown.

River otters are closely associated with aquatic and riparian habitats, seldom venturing far from water. Therefore, otters would not be expected to make use of plowed roads as travel corridors, but may occasionally cross roads that bisect riparian habitats.

Impacts to trumpeter swans are associated with motorized traffic on plowed roads (discussed below), and not the roads themselves.

Sagebrush lizards hibernate throughout the winter use season but may be impacted by winter activities that disturb rocky, geothermal areas. Consequently, plowed roads would not affect sagebrush lizard habitat.

Impacts to rubber boas, fish, and amphibians are limited to activities that affect the aquatic environment. In regards to winter use, these impacts are limited to the use of motorized oversnow vehicles and their effects on water quality. See *Water and Aquatic Resources* for an assessment of the impacts of exhaust on water quality in the parks.

Effects of motorized use of plowed roads. The most likely impacts to park species of special concern are displacement from preferred habitats and mortality caused by collisions.

As stated previously, habitat displacement of wolverines has been documented to occur outside the parks, with wolverines rarely using parts of their home range bisected by roads (Arthur et al. 1989; Copeland 1996; Gunther et al. 1997 and 1999). Therefore, it is possible that plowed roads and traffic affect wolverines in the parks. Because vast areas exist in the parks that are not roaded, any effects related to the use of wheeled-vehicles on plowed roads would be limited.

Fishers, like wolverines, require contiguous blocks of habitat. Within their home ranges they reportedly rarely use areas bisected by roads (Arthur et al. 1989; Copeland 1996; Gunther et al. 1997 and 1999). Because vast areas exist in the parks that are not roaded, any affects related to the use of wheeled-vehicles on plowed roads would be limited.

The effects of wheeled-vehicle traffic on marten habitat use in the parks are unknown. Similar to fishers and wolverines, the impact would be negligible because vast areas exist in the parks that are not roaded. From 1989-98, wheeled-vehicles killed 18 marten in the winter in YNP (Gunther et al. 1998).

River otters are closely associated with aquatic and riparian habitats, seldom venturing far from water. Nonetheless, wheeled-vehicles killed a total of seven otters from 1989-98 in YNP (Gunther et al. 1998). The effects of wheeled-vehicle traffic on otter habitat use in the parks are unknown.

Under current management, there are no plowed roads immediately adjacent to open water habitats for trumpeter swans in YNP. In GTNP swans may use open water habitats of the Snake River near US Highway 287/89/191, but displacement has not been a significant issue, possibly because swans have habituated to the predictable nature of the traffic on this highway.

Sagebrush lizards hibernate throughout the winter use season and consequently are not affected by wheeled-vehicles on plowed roads.

Impacts to rubber boas, fish, and amphibians are limited to activities that affect the aquatic environment. In regards to winter use, these impacts are limited to the use of motorized oversnow vehicles and their effects on water quality.

Effects of nonmotorized use on groomed and ungroomed designated routes. The primary effects of nonmotorized use are displacement from preferred habitats, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. These effects are believed of greater magnitude than those caused by motorized vehicles using established, predictable routes (Cole 1978; Schultz and Bailey 1978; Walter 1978; Aune 1981; Cassier 1986). Under alternative A, YNP maintains 37 miles of groomed nonmotorized trail. GTNP and the Parkway do not maintain groomed trails for nonmotorized use, but do provide 26 miles of designated ungroomed routes for nonmotorized use. The area affected by nonmotorized trails in the parks is very small relative to the total area of the park units. Minor site-specific impacts are possible where trails occur in or near nesting sites or foraging areas. Nonmotorized uses of groomed and ungroomed routes occur primarily where vehicular access permits easy access.

Copeland (1996) reported that human activity near denning wolverines might cause them to abandon their dens thus potentially affecting reproductive success. Because denning occurs in late February to early March, it is possible that winter recreation could affect

denning wolverines. However, wolverines typically den in high-elevation, subalpine cirque basins (Trochta 1999), therefore any affect associated with winter recreation would be limited to backcountry travel (discussed below).

Fishers, especially when denning, may be sensitive to human disturbance (Trochta 1999). Because very little is known about this species and their distribution in the parks, it is difficult to assess the potential degree of impact from winter recreation, including nonmotorized use.

Little is known about the sensitivity of martens to human activity. They are described as inquisitive and may show greater tolerance than wolverines or fishers, having been found in areas of high human activity (Strickland and Douglas 1987).

Arrhythmic variations in activity patterns have been observed in river otters as a result of individual differences and human activity (Melquist and Dronkert 1987), with otters exhibiting more nocturnal or crepuscular activity in disturbed areas. How winter recreation may affect otters in the parks is unknown.

Swans have shown greater displacement behavior to people on foot or skis than to motorized traffic (Shea 1979; Aune 1981). They are especially sensitive during the breeding season, which occurs outside of the period of winter use. Skiing or snowshoeing near open water habitats may cause swans to flush; however, this is not considered a major problem for swans in the parks (McEneaney, pers. com., 2000).

Sagebrush lizards hibernate throughout the winter use season but may be impacted by winter activities that disturb rocky, geothermal areas. Consequently there is a small potential that visitors to sensitive geothermal areas may disturb lizard habitats.

Impacts to rubber boas, fish, and amphibians are limited to activities that affect the aquatic environment. In regards to winter use, these impacts are limited to the use of motorized oversnow vehicles and their effects on water quality.

Unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and species of special concern may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction.

Protection of natal denning habitat from human disturbance is critical for wolverine and fisher persistence (Copeland 1996; Arthur et al. 1989). Backcountry use is largely unregulated and may displace wolverines from critical denning sites and forage areas. Wolverine denning habitats are remote, rugged, and difficult to access. Consequently the odds of backcountry skiers disturbing denning wolverines are low.

Fishers, especially when denning, may be sensitive to human disturbance (Trochta 1999). Because very little is known about this species and their distribution in the parks, it is difficult to assess the potential degree of impact from winter recreation, including nonmotorized use.

Little is known about the sensitivity of martens to human activity. They are described as inquisitive and may show greater tolerance than wolverines or fishers, having been found in areas of high human activity (Strickland and Douglas 1987).

Arrhythmic variations in activity patterns have been observed in river otters as a result of individual differences and human activity (Melquist and Dronkert 1987), with otters exhibiting more nocturnal or crepuscular activity in disturbed areas. How winter recreation may affect otters in the parks is unknown.

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Sagebrush lizards hibernate throughout the winter use season but may be impacted by winter activities that disturb rocky, geothermal areas. Consequently there is a small potential that visitors to sensitive geothermal areas may disturb lizard habitats.

Impacts to rubber boas, fish, and amphibians are limited to activities that affect the aquatic environment. In regards to winter use, these impacts are limited to the use of motorized oversnow vehicles and their effects on water quality.

Presence and use of winter support facilities. The primary effects of warming huts and campgrounds on park species of special concern are associated with increases in human activity and the subsequent disturbance and displacement of species or their prey. Habituation is not a concern for the species discussed below.

Under alternative A, the only new support facility would be the construction of a warming hut at Norris. This hut would be located in thermally influenced ungulate winter range. It is possible that increased human presence in the area may displace ungulates and consequently lower the availability of carcasses for wolverines, fishers, and martens. The effect would be minor and short term as ungulates habituate to human activity in the area.

Potential impacts to river otters would be limited to those associated with increased human activity; specific effects are largely unknown.

The hut site would not be immediately adjacent to swan habitat; therefore, no effects on swans would occur.

Sagebrush lizards hibernate throughout the winter use season but may be impacted by winter activities that disturb rocky, geothermal areas. Consequently there is a small potential that hikers in sensitive geothermal areas may disturb lizard habitats.

Impacts to rubber boas, fish, and amphibians are limited to activities that affect the aquatic environment. In regards to winter use, these impacts are limited to the use of motorized oversnow vehicles and their effects on water quality. See *Water and Aquatic Resources* for an assessment of the impacts of exhaust on water quality in the parks.

Conclusion

Most impacts from winter recreation do not result in long-term effects to populations. The effects of plowed and groomed surfaces on ungulate movements may contribute to energy savings, but it is uncertain if energy saved is greater than associated effects incurred from displacement and overall disturbance. The effects of packed surfaces on carnivores, especially lynx, are unknown and in need of investigation. Mortalities resulting from collisions with wheeled-vehicles are much higher than with snowmobiles, and primarily affect ungulates. On a population level, road-kill mortalities are negligible to minor for all species, but loss of individuals of federally protected species (i.e., grizzlies and wolves) is a concern. No documented road-kills of large mammals exist for snowcoaches (Gunther et al. 1998). Nonmotorized recreation in the front country and backcountry, with the exception of bighorn sheep, is generally associated with minor to moderate effects, and has not presented a long-term threat to any park species. Backcountry skiers may be impacting the imperiled sheep population in GTNP and effects may be moderate to major without mitigation. The presence and use of winter support facilities may incur impacts due to habituation to human foods (primarily a problem for bears) and displacement of species sensitive to human activities. Displacement effects are considered negligible to minor, and habituation is mitigated by installation of wildlife-proof winter garbage facilities, a feature of all alternatives.

Although impacts to populations resulting from winter recreation are neither long term nor very significant, impacts to individual members of the population can be important, leading to death either directly from collisions or continued harassment, or indirectly through management actions taken as a response to habituation to human presence and food. Although concerned about impacts to individuals, for the most part (with the exception of federally protected species), the NPS bases management actions on the protection of populations of native animals. For example, see NPS 77, Natural Resources Management, Chapter II.

Ungulates

- Effects of groomed roads and trails on animal movements — unknown if and to what extent beneficial effects outweigh negative effects.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on: (1) mortality caused by collisions – adverse, negligible, and short term, and (2) displacement from preferred habitats – adverse, moderate, short term.

- Effects of plowed roads on: (1) habitat fragmentation – adverse, minor, and short term; and (2) animal movements – unknown if and to what extent beneficial effects outweigh negative effects.
- Effects of motorized use of plowed roads on: (1) mortality caused by collisions – adverse, minor, and short term; and (2) displacement from preferred habitats – adverse, moderate, and long-term.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, minor, and short term.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, moderate, and short term. Impacts to bighorn sheep in GTNP would be moderate to major and long-term if no mitigation is applied.
- Effects of the presence and use of winter support facilities on displacement – adverse, minor, and short term.

Federally Protected Species

- Effects of groomed roads and trails on animal movements: (1) bald eagles, grizzly bears, and wolves — no effect; and (2) lynx – adverse, negligible to major and short term, depending upon lynx distribution and abundance in the parks.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement from preferred habitats – adverse, negligible, and short term for all species excluding the grizzly bear, which, for the most part, will not be active during the winter use season.
- Effects of plowed roads on: (1) habitat fragmentation – no effect on any of the listed species; and (2) animal movements – no known effect on any of the listed species.
- Effects of motorized use of plowed roads on: (1) mortality caused by collisions – adverse, negligible, and short term (bald eagles and grizzly bears); adverse, minor, and short term (wolves); no known effect to date on lynx; and (2) displacement from preferred habitats – adverse, negligible, and short term (bald eagles), no effect (grizzly bears); no known effect to date on wolves and lynx.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, negligible, and short term (bald eagles); no effect (grizzly bears); no known effect to date on wolves and lynx.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, minor, and short term (bald eagles); adverse, negligible, short term (grizzly bears); no known effect to date on lynx and wolves.
- Effects of the presence and use of winter support facilities on displacement – no affect (bald eagles); adverse, negligible, and short term (grizzly bears, with mitigation); adverse, minor, and short term (wolves); no effect on lynx because the Norris Warming Hut will not be in lynx habitat.

Species of Special Concern

- Effects of groomed roads and trails on (1) animal movements – no known effect (wolverines); adverse, negligible, and short term (fishers, martens); no effect (otters, swans, reptiles, amphibians, and fish); (2) foraging activities – adverse, negligible, and short term (marten); no effect on the other species; and (3) subnivian prey availability — adverse, negligible, and short term (marten); no effect on the other species.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement – no known effect (wolverine); adverse, negligible, and short term (fishers and marten); no effect (otters, reptiles, amphibians, and fish); adverse, minor, and short term (swans).
- Effects of plowed roads on animal movements – no known effect (wolverines, fishers, and martens); no effect (otters, swans, reptiles, amphibians, and fish).

- Effects of motorized use of plowed roads on (1) displacement from preferred habitats – adverse, negligible, and short term (wolverines, fishers, martens); no effect (otters, swans, reptiles, amphibians, and fish) and (2) mortality from collisions — adverse, negligible, and short term (otters and martens); no effect to date on other species.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – no effect (wolverines); no known effect (fishers, martens, and otters); adverse, minor, and short term (swans); adverse, negligible, and short term (sagebrush lizard) no effect (rubber boa, amphibians, and fish).
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible, and short term (wolverines and sagebrush lizard); no known effect (fishers, martens, and otters); adverse, minor, short term (swans); no effect (rubber boa, amphibians, and fish).
- Effects of the presence and use of winter support facilities on displacement of potential prey (carcass) availability – adverse, minor, and short term (wolverines, fishers, and martens); no effect (swans, rubber boa, amphibians, and fish); no known effect (otters); adverse, minor, and short term (sagebrush lizard).

Mitigation

- Closures around wolf dens and swan and eagle nests would continue to be implemented. Closures would be posted and enforced for the duration of time during which the species is most sensitive to human disturbance.
- The monitoring and evaluation of backcountry nonmotorized use in GTNP should be enhanced and closures to use should be implemented as warranted.
- Ramps or pullouts where moose could exit plowed roads to reduce collisions between snowmobiles and moose along the CDST would be provided.
- Use of groomed and plowed surfaces by bison and other ungulates would continue to be monitored.
- Snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes would be conducted.

Effects on Natural Soundscape

Audibility analysis — combined effects of all wheeled and oversnow vehicles.

Table 72 presents the acres of park land by road segment where any wheeled or oversnow vehicle noise would be audible under the two background conditions, “average” and “quiet”, as defined in the *Assumptions and Methodologies* section of this chapter. For each background condition, acreage is presented for three categories of audibility: (1) audible for any amount of time (labeled “audible at all”); (2) audible for 10% of the time or more; and (3) audible for 50% of the time or more. Appendix M contains tables with distances to audibility for each segment for each alternative.

The results show that for the no action alternative, under average background sound level conditions during the time during the day, oversnow and/or wheeled-vehicles would be audible to some degree for over 181,000 acres in the three park units. For over 94,000 of those acres, oversnow or wheeled-vehicles would be audible for at least 10% of the time during the day. For 23,000 of those acres, they would be audible for at least half of the time during the day. These acreage totals increase by 11% to 4% for the “quiet” background conditions.

The segment from Moran Junction to the South Entrance of GTNP, which carries a great deal of wheeled-vehicle traffic unrelated to the alternatives, contributes the greatest to the

total acreage values for all three audibility categories. Since the traffic and its high level of audibility remain almost constant for all the alternatives, the magnitude of audibility effects is somewhat masked.

The second largest contributor to the "audible at all" and "audible 10% or more" categories is Jackson Lake, with its snowplanes and snowmobiles. The 50-foot noise emission level used for snowplanes was 90 dBA, higher than the regulated 86 dBA, based on data collected in 1995 and 1996. (Bowlby & Associates 1995, 1996) The effect is even more evident when noting that Jackson Lake is the fourth shortest of the twenty analyzed "road" segments; the reason is the very high noise emission level of the snowplanes. However, Jackson Lake is not a contributor to the "audible 50% or more" categories because of the relatively low number of snowplanes and snowmobiles in use.

The plowed road from Mammoth to the YNP Northeast Entrance is a major contributor to the "audible at all" acreage (and, to a lesser extent, "audible 10% or more"), which remains virtually unchanged across all of the alternatives.

Other major contributors to the "audible at all" and "audible 10% or more" acreage are the Fishing Bridge-West Thumb and West Thumb-Flagg Ranch segments.

The other key segments for the "audible 50% or more" categories are from the YNP West Entrance to Madison and from Madison to Old Faithful.

Average sound level analysis

To give a sense of the effect of the number of oversnow or wheeled-vehicles on a road segment, and their speed and sound level, Table 73 shows the computed hourly equivalent or "average" sound level (L_{eq}) over the daytime period. Levels are shown for each road segment at two distances, 100 feet and 4,000 feet, and for both open and forested terrain. These hourly Leq values do not have the background sound level added in to them. Also, they cannot be compared against the background levels to assess audibility, since L_{eq} values represent a long-term average of both quiet and loud moments.

These hourly L_{eq} values show that the segment representing Jackson Lake (snowplanes and snowmobiles), plus the segments from the YNP West Entrance to Madison and Madison to Old Faithful (snowmobiles and snowcoaches) have the highest average sound levels at any given point along them.

Conclusion

The no action alternative impacts the soundscape of very large areas of the three park units. The sources are the snowmobiles and snowcoaches in YNP and a combination of snowplanes, snowmobiles, and wheeled-vehicles in GTNP and along the Parkway. A major portion of the impacted acreage is due to through traffic on US 26 for the road segment from Moran Junction to the sound environment of GTNP. Snowplanes and snowmobiles on Jackson Lake are also major contributors to audibility for at least 10% of

the time. Except for US 26, the only other areas with significant audibility 50% of the time or more are the segments in YNP from the West Entrance to Madison and from Madison to Old Faithful.

Table 72. Acres of park land affected by vehicle audibility.

Road Segment	Miles	With Average Background Conditions			With Quiet Background Conditions		
		Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More	Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More
1. Mammoth to Northeast Entrance	47	16,126	5,445	0	16,822	6,342	0
2. Mammoth to Norris	21	11,400	761	0	12,372	1,043	0
3. West Entrance to Madison	14	8,032	6,482	5,282	10,090	7,060	6,032
4. Madison to Norris	14	6,853	5,505	347	7,249	6,029	419
5. Norris to Canyon Village	12	5,443	3,955	0	5,683	4,420	0
6. Canyon Village to Fishing Bridge	16	9,999	6,559	0	11,173	7,426	166
7. Fishing Bridge to East Entrance	27	10,760	1,381	0	11,762	1,582	0
8. Fishing Bridge to West Thumb	21	15,645	9,490	0	17,785	10,884	0
9. Madison to Old Faithful	16	8,781	7,583	5,546	11,064	8,324	6,604
10. Old Faithful to West Thumb	17	7,713	6,057	0	8,053	6,643	0
11. West Thumb to Flagg Ranch	24	12,716	8,781	671	13,577	9,884	944
12. Grassy Lake Road	7.6	3,033	0	0	3,303	0	0
13. Flagg Ranch to Colter Bay	15.6	7,706	3,225	0	8,344	3,574	0
14. Colter Bay to Moran Junction	10.2	4,631	2,434	0	5,019	2,669	0
15. Moran Junction to East Entrance	2	1,225	755	489	1,319	866	534
16. Moran Junction to South Entrance	26	21,714	14,536	11,123	23,842	16,922	11,825
17. Teton Park Road	15	7,805	0	0	8,512	0	0
18. Moose-Wilson Road	2.5	1,007	0	0	1,053	0	0
19. Antelope Flats Snowmobile Route	--	No Veh.†	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	9.7	20,540	11,649	0	23,655	13,706	0
TOTAL		181,127	94,599	23,459	200,676	107,373	26,525

†No Veh. = No Vehicles

Table 73. Average hourly L_{eq} from wheeled and oversnow vehicle noise at two distances to each road segment for alternative A.

Road Segment	L_{eq} at Distance (dBA)			
	Open Terrain		Forested Terrain	
	100 feet	4,000 feet	100 feet	4,000 feet
1. Mammoth to Northeast Entrance	35	2	33	0
2. Mammoth to Norris	44	4	42	0
3. West Entrance to Madison	56	16	54	8
4. Madison to Norris	53	13	51	5
5. Norris to Canyon Village	51	12	50	4
6. Canyon Village to Fishing Bridge	50	10	49	2
7. Fishing Bridge to East Entrance	44	4	43	0
8. Fishing Bridge to West Thumb	50	10	48	2
9. Madison to Old Faithful	56	16	54	8
10. Old Faithful to West Thumb	52	12	50	4
11. West Thumb to Flagg Ranch	51	11	50	3
12. Grassy Lake Road	42	2	41	0
13. Flagg Ranch to Colter Bay	44	7	42	0
14. Colter Bay to Moran Junction	44	9	43	1
15. Moran Junction to East Entrance	47	13	45	5
16. Moran Junction to South Entrance	46	14	44	6
17. Teton Park Road	39	0	37	0
18. Moose-Wilson Road	34	0	32	0
19. Antelope Flats Snowmobile Route	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	58	12	56	4

Effects on Cultural Resources

Because this alternative reflects current use and management practices in the three parks, there would be no new direct or indirect impacts to cultural resources. Ongoing cultural resource management activities would continue to be directed toward the long-term preservation of cultural resources.

Conclusion

The protection, preservation, and interpretation of cultural resources would follow existing trends and, with appropriate mitigation, there would be no adverse impacts to such resources.

Effects on Visitor Access and Circulation

Access

How visitors currently arrive at the park, the activities they participate in, and the facilities available to accommodate varying modes of transportation are described in

Chapter III. All facilities, activity use levels, modes of transportation, and circulation patterns would remain the same. No changes are assumed in alternative A. The following table provides baseline winter-use levels by activity at multiple facilities and destination areas within the park units.

Table 74. Existing winter use visitation by facility or destination area.

Park / Facility	Snowmobile	Cross-Country Skiing / Snowshoe	Snowcoach Tours	Snowplanes	Wheeled-Vehicles
Yellowstone National Park					
North Entrance	None	None	None	N/A	Moderate
Northeast Entrance	None	Light	None	N/A	Moderate
East Entrance	Light	Light	None	N/A	None
South Entrance	Moderate	None	Moderate	N/A	None
West Entrance	High	Light	High	N/A	None
Mammoth	Light	High	Moderate	N/A	Moderate
Tower-Roosevelt	None	High	None	N/A	Moderate
Canyon Village	Moderate	Moderate	Moderate	N/A	None
Fishing Bridge	Moderate	Light	Light	N/A	None
Lake Village	Moderate	Light	Light	N/A	None
Bridge Bay	Moderate	Light	Light	N/A	None
West Thumb	Moderate	Light	Moderate	N/A	None
Grant Village	Moderate	Light	Moderate	N/A	None
Old Faithful	High	High	High	N/A	None
Madison	High	Light	High	N/A	None
Norris	Moderate	Light	Moderate	N/A	None
Grand Teton National Park / JDR Memorial Parkway					
Moran Entrance	Moderate	None	None	N/A	High
South Entrance	None	None	None	N/A	High
Moose-Wilson Road	Light	Moderate	None	N/A	Light
Flagg Ranch	High	Moderate	Moderate	N/A	Moderate
Colter Bay	Moderate	Moderate	None	High	High
Signal Mountain	Moderate	Moderate	N/A	Light	Moderate
Jenny Lake	Light	High	N/A	N/A	N/A
Moose Visitor Center	None	Light	N/A	N/A	Moderate
Triangle Ranch	Light	None	N/A	N/A	None

The following table shows current use on all road segments of the three park units in terms of average daily use based on the peak use months of January and February. See Appendix J and the *Methods and Assumptions* section earlier in Chapter IV for more information on how this usage was determined. Appendix J also contains similar tables

that show the number of vehicle-miles that would be traveled on an average daily basis, for each alternative scenario.

Table 75. Alternative A current motorized use.

Road Segment	*Average Daily Use January-February*			
	Autos	**Buses/Vans**	**Snowcoaches**	**Snowmobiles**
Mammoth to Northeast Entrance	61	4.2	0	0
Mammoth to Norris	0	0	3.3	30.5
West Entrance to Madison	0	0	9.1	554.2
Madison to Norris	0	0	5.2	247.0
Norris to Canyon Village	0	0	3.9	184.5
Canyon Village to Fishing Bridge	0	0	3.1	148.1
Fishing Bridge to East Entrance	0	0	0	36.4
Fishing Bridge to West Thumb	0	0	2.6	125.1
Madison to Old Faithful	0	0	10.3	488.6
Old Faithful to West Thumb	0	0	4.3	209.4
West Thumb to Flagg Ranch	0	0	4.3	175.8
Grassy Lake Road	0	0	0	24.2
Flagg Ranch to Colter Bay	86	9.5	0	24.3
Colter Bay to Moran Junction	192	10	0	24.3
Moran Junction to East Entrance	562	29	0	24.3
Moran Junction to South Entrance	773	39	0	0
Teton Park Road	0	0	0	10.4
Moose-Wilson Road	5	0	0	3
Antelope Flats Snowmobile Route	0	0	0	0

Concession Services

In the *Affected Environment* section under the main heading of *Visitor Access and Circulation* there is a discussion relevant to concessions offered in the parks, titled "Park Facilities and Winter Destination Areas." Within this discussion are the subtopics of "lodging," "parking," and "other winter services and facilities." In alternative A, under current management, the concession related facilities and services noted in the *Affected Environment* would remain the same. It should be noted that concession plans and contracts provide for some management flexibility over time to deal with changing circumstances, needs and markets. Even under current management direction, changes would be expected to occur in concessions operations.

Conclusion

All facilities, modes of transportation, and circulation patterns and use trends would remain the same as described in Chapter III, in the *Affected Environment* section relating to access.

Effects on Visitor Experience

The amount and type of winter visitor opportunities offered in the parks under the no action alternative are provided in Table 76 and Table 77.

Table 76. YNP visitor opportunities.

Opportunity	Miles or Areas	Length of Season
Oversnow motorized route	184	Mid-December to Mid-March
Oversnow motorized route — snowcoach	158.6.	Mid-December to Mid-March
Oversnow motorized trail	0	Mid-December to Mid-March
Plowed route	76	Mid-December to Mid-March
Groomed nonmotorized	37	Mid-December to Mid-March
Warming huts	6	Mid-December to Mid-March
Backcountry	2.2 million ac	Contingent on snowfall in northern portion of park

Table 77. GTNP and the Parkway visitor opportunities.

Opportunity	Miles or Areas	Length of Season
Oversnow groomed motorized route	2.1	December to April†
Oversnow groomed motorized route –snowcoach	0	December to April†
Oversnow groomed motorized trail	33.9	December to April†
Plowed road	100.1	December to April†
Ungroomed motorized trail or area	35.6 and Jackson Lake	
Groomed nonmotorized	0.	December to April†
Ungroomed nonmotorized trail or area	26.4	
Warming huts/Interpretive centers	2	December to April†

†Variable, dependent on snow conditions

Visitor Experience and Satisfaction

In alternative A, the various types of visitor experience and levels of satisfaction would remain as introduced in the *Affected Environment* section. The criteria listed below were defined by visitor responses to various surveys of winter visitors in the three park units.

Opportunities to View Wildlife. Most winter visitors rate wildlife viewing as a primary or important reason for visiting the parks. Most visitors are generally satisfied with the amount of wildlife viewing opportunities currently available. One of the top three reasons for visiting YNP cited by Borrie et al. (1999) was to view bison.

Opportunities to View Scenery. Most winter visitors to YNP and GTNP (Littlejohn 1996; Borrie et al. 1999) rate viewing scenery as a primary reason for their visit. Visitors indicated that they were for the most part "totally" satisfied with the quality of scenery in the parks.

The Safe Behavior of Others. Snowmobile and skiers rate this factor as important and indicate that it has an influence on the enjoyment of their visit. Many visitors indicate that the dual use of trails and areas for both snowmobiling and skiing contributes to the perception of an unsafe environment. Under the no action alternative, the experience of visitors would continue to be impacted.

Quality of the Groomed Surface. More than 80% of winter visitors rate the quality of the road surface as very important. The groomed surface from West Entrance to Old Faithful is frequently very rough and the quality of snow cover is poor. The CDST oversnow surface is frequently in poor condition, as is the Grassy Lake Road. Under the no action alternative these conditions would continue.

The Availability of Access to Winter Activities or Experiences. Nearly all respondents to a recent survey (Borrie et al. 1999) supported oversnow mechanized access. More than 90% of winter visitors surveyed did not support plowed roads and snowcoach-only travel. Most winter visitors valued highly the winter experience in the parks and felt it was a special and unique experience. Winter respondents to the 1998-99 winter visitor survey (Duffield et al. 2000a) also favored access to the parks by snowmobile. Respondents to the summer (Duffield et al. 2000b) and telephone surveys (Duffield et al. 2000c) were more evenly divided between support for groomed roads for snowmobiles and support for groomed access for snowcoaches. Plowed access also received very low support from the summer and telephone survey respondents. Similarly, in a count of public comments supporting various alternatives in the DEIS, there was an even split between numbers of letters supporting groomed access for snowmobiles (44%) and those supporting groomed access for snowcoaches only (45%). Very little support was indicated for the proposal to plow the West Yellowstone to Old Faithful road.

Availability of Information. Surveyed winter visitors indicate that the availability of safety information is very important. Accurate and readily available information about safe travel practices and winter conditions is one of the suggested management actions that received a high level of support from most respondents.

Quiet and Solitude. Most survey respondents felt that natural quiet and solitude was important to the quality of their park visit. A recent study indicates that respondents

ranked experiencing tranquility and peace and quiet and getting away from crowds as highly important (Borrie et al. 1999). Although an important value, many visitors responded that they were somewhat dissatisfied with their ability to experience quiet and solitude. Opportunities for quiet would continue to be minimal over 50% of the time along the road from West Yellowstone to Old Faithful and 10% of the time near Jackson Lake and along US 26 from Moran Junction to the South Entrance to Yellowstone.

Clean Air. Clean air was important to most visitors (Littlejohn 1996). Surveyed visitors indicated a high level of support for management actions requiring clean and quiet snowmobiles (Duffield et al. 2000c; Borrie et al. 1999). Snowmachine emissions on high use days are often visible along the road corridors and at staging areas, particularly at Old Faithful, near the West Entrance, and at Flagg Ranch near the South Entrance of YNP.

Conclusion

Visitor experience trends in YNP, GTNP, and the Parkway under the no action alternative would continue. Little or no operational change would occur under this alternative resulting in a negligible short-term effect in the range of experiences offered. Visitation would be influenced by the method of transportation available to visitors. Incremental increases in visitation would have a short-term negligible effect on the satisfaction of the current winter visitor.

Encounters with park wildlife and scenery would continue to be primary attractions. The overall satisfaction of winter visitors would remain high. Current levels of snowmobile emissions and sound levels would continue to detract from the winter experience for many visitors resulting in direct short-term major impacts on visitor experience. The perceived unsafe behavior of others and the occurrence of visitor conflicts would continue to have a direct short-term moderate adverse effect on the experience of some users.

IMPACTS OF IMPLEMENTING ALTERNATIVE B

Effects on the Socioeconomic Environment

GYA Regional Economy. Alternative B includes a number of provisions for relatively minor changes in management and grooming of trails within YNP and GTNP. Most of these changes are unlikely to impact visitor decisions on whether or not to visit the parks for recreation. One proposed management change, however, has the potential to substantially impact visitation levels to the GYA and, therefore, visitor expenditures and the overall level of economic activity within the GYA.

Alternative B contains a proposal to plow the road from West Yellowstone to Madison Junction to Old Faithful. The 1999 GYA winter visitor survey asked respondents how their visitation would be affected if this road segment were plowed and open for car and bus travel only. Based on the responses to this survey question, visitation to the GYA by winter visitors who live outside of the five-counties would be reduced by 18.4% if the road from West Yellowstone to Old Faithful were plowed and open only for car and bus

travel. Park visitors who reside outside of the five-county GYA made up 85.9% of total sampled visitors. This estimated reduction in visitation is a net change, which takes into consideration the responses of those current winter visitors who said they would visit more often if the change occurred. Also considered in the calculation were those respondents who said they would visit the same, but would shift their use to other areas of the GYA (for example, from park lands to national forest lands).

If 18.4% of the non-GYA resident visitors decided not to recreate within the five counties because of the plowing of the West Yellowstone to Old Faithful road, the local economy would lose the local-area expenditures these potential visitors would have made.

Using the winter survey responses and an IMPLAN input/output model, it is estimated that total economic output in the five-county GYA area would be reduced by $13.2 million under alternative B. In addition it is estimated that 312 jobs within the five counties would be lost due to reduced nonresident expenditures in the area.

While $13.2 million is a negligible to minor impact on the overall $5.7 billion economic output of the five-county area, this impact likely would be concentrated in small communities such as West Yellowstone. Currently about 50% of winter visitors to the parks enter through the West Entrance. The winter economy of West Yellowstone, Montana is centered around tourists who have come to the area to recreate in the park as well as on surrounding national forest lands. Because of the small size of the West Yellowstone economy, its relatively large share of the park's snowmobile visitors, and its proximity to the affected road segment, it can be assumed that the town will bear a disproportionately large share of the nonresident expenditure reductions.

The town of West Yellowstone levies a local option tax targeted at tourist spending. Tax records show that for the period 1989-1999, tourist expenditures have been growing at a 10% annual rate. In addition tourist spending in the winter months accounts for about 25% of year-round tourist spending in the town. Given the relative size of the West Yellowstone winter economy (relative to year-round totals) and the recent growth trends for tourist spending, the estimated visitation reductions associated with alternative B would likely have a moderate to major short-term negative impact on the town's winter economy, but a minor impact on the year-round economy of the town.

The estimates of reductions in GYA visitation and nonresident expenditures are based on responses to a survey of current winter visitors. The estimated reductions in local-area spending could be lessened if users chose to utilize the new opportunity to access Old Faithful via a shuttle bus. Some shift in use patterns would be expected as visitors become aware of the wheeled-vehicle access opportunities. The shift in visitation should be accompanied by a shift in businesses to support these users. The extent that new users from outside the GYA would be attracted to the area because of the alternative B plowing action is not known at this time.

The possible effects of alternative B on visitors entering the parks from the south are not quantifiable since no specific data exists. Recent visitor surveys have focused on understanding visitor reactions to the management actions that have the likelihood to affect large numbers of visitors. For the balance of the management actions that may affect smaller numbers of visitors, qualitative statements are possible. Providing the CDST on a separate route may attract more snowmobile users to GTNP and the Parkway because the CDST may become an attraction in its own right and may provide a better experience for visitors traveling from Moran to Flagg Ranch. In addition some snowmobile users that might have traveled into YNP via the West Entrance may choose to enter the parks via Jackson. These potential increases may be offset by the closure of the Teton Park Road, which is used by about 1,100 snowmobiles per winter, to motorized use. The increases also will be tempered by the limit on parking capacity at Flagg Ranch and the relatively long travel distance from Jackson to Flagg Ranch and from Flagg Ranch to destinations in YNP. These changes in use patterns may result in a minor increase in use in GTNP and the Parkway and, therefore, a minor increase in visitor expenditures.

Three-State Regional Economy. Overall, 65.5% of winter visitors in the GYA winter visitor survey came from outside the three-state area of Montana, Idaho, and Wyoming. Responses from these nonresident winter visitors indicate that there would be a reduction of 18.6% of winter trips to the three-state area under the alternative B plowing proposal.

A loss of the regional expenditures by these nonresidents would lead to an overall reduction of $14.4 million in total economic output and 351 jobs in the three-state area. This is a negligible negative impact in the context of the regional three-state economy. This estimated reduction would be reduced to the extent that nonresidents would choose to recreate at other locations within the three-state region instead of in the GYA. The extent of any such substitution behavior is unknown.

Minority and Low-Income Populations. One of the stated actions under alternative B is to “provide affordable access through the addition of wheeled-vehicle access to the park’s interior.” Currently, mechanized access to Old Faithful from West Yellowstone can be accomplished using only snowmobile or snowcoach. For visitors without personal snowmobiles, the cost of renting a snowmobile to access Old Faithful and the remaining park trails is about $100 per day. The current cost of riding a snowcoach into Old Faithful from West Yellowstone is about $85. Alternative B proposes an alternative mode of mechanized access: buses and private automobiles. It is anticipated that the shuttle bus would be offered at a relatively low cost of $30 to $40. The estimated reduced cost of accessing Old Faithful using a shuttle bus compared to renting a snowmobile or using a snowcoach is about $70 per person.

Trip expenditures per person to the parks in the GYA vary significantly between those visitors who report having the lowest household income and those who report having the highest. Winter survey respondents who reported incomes below $15,000 per year spent

an average of $329 per person on their 1999 winter trip. Those respondents reporting incomes of $150,000 and above reported spending $1,150 per person on their trips.

This is a minor to moderate beneficial impact. However, it is not clear that plowing the road would actually change the mix of lower, middle, and higher income visitors to the parks. Summer visitors do not face the high costs of snowmobile rental or snowcoach use, yet the income distribution of summer and winter visitors to YNP is quite similar. The share of the total visitor costs that can be affected by park policy is relatively low.

If the cost of accessing Old Faithful from West Yellowstone was reduced by $70 per person, winter visitors with household incomes under $15,000 per year would save about 21% in trip costs, as opposed to a 6% decrease in trip costs for visitors with incomes over $150,000.

Social Values. In anticipation of the inclusion of a number of road management options in the EIS alternatives, the winter visitor survey asked respondents what was their preferred means of access from West Yellowstone to Old Faithful in the winter months. For the entire sample of park visitors, 56.6% preferred the existing policy of grooming for snowmobile use. A total of 13.1% preferred plowing the road and grooming a parallel route for snowmobile use. A total of 6.5% chose closing the route to snowmobiles and allowing ski or snowshoe use only. Another, 19.7% chose to allow snowcoach, ski, and snowshoe travel only on this route. The least preferred option was the alternative B proposed action of plowing the road without any parallel trail for snowmobile use, which was supported by 4.2% of respondents.

Two additional questions on winter travel route management within the park were asked on the winter visitor survey. These questions were asked in the context of the impact winter travel within the park has on bison management. Among park visitors, 52.1% favored the current bison and road management policies that allow winter access for oversnow vehicles and largely regulate bison populations and movements at park boundaries. Another 23.6% favored closing motorized winter access to the park by ceasing to groom park roads from West Yellowstone to Mammoth to better allow natural forces such as weather, nutrition, and winterkill to regulate bison populations. The remaining 24.2% of respondents said they were not sure which policy they preferred.

When the winter respondents were asked the same question again with the addition of a choice for plowing the road from West Yellowstone to Old Faithful, responses were distributed in the following way: 55.3% favored the existing policy; 23% favored closing motorized winter access, 4.7% favored plowing the road from West Yellowstone to Old Faithful, and 17.1% were not sure which policy they preferred.

Responses to these three questions show a consistent picture of very low support among current winter visitors to the GYA for the major management change contained in alternative B — plowing the road from West Yellowstone to Old Faithful.

Responses to the YNP summer visitor survey and the national telephone survey were also consistent in showing very low support for the alternative B road plowing option (see Chapter III).

Nonmarket Values. The proposed alternative B actions would potentially impact nonmarket values of winter visitors in several ways. The estimated reduction in current winter user visitation resulting from the plowing of the West Yellowstone to Old Faithful road would impact total nonmarket trip values. The proposed clean and quiet snowmobile regulations for winter 2008-2009 would impact the nonmarket values that current snowmobile users place on a cleaner, quieter means of snowmobiling in the park. Finally, the plowing of the West Yellowstone to Old Faithful road segment would impact the nonmarket value associated with having this type of auto and bus access to the park.

The nonmarket value of a trip to the parks of the GYA, based on the winter visitor survey, is $91. It is estimated that park visitation would be reduced by 18.4% resulting from the plowing of the road. Based on current winter visitation levels, a 18.4% reduction in visitation would translate into a $1.5 million reduction in the aggregate nonmarket value of winter trips to the parks. This is a moderate negative impact.

Respondents to the winter survey who rented a snowmobile on their trip were asked if they would be willing to pay a higher rental fee to rent a snowmobile that was as clean and quiet running as a typical new car. The median willingness to pay to rent a clean, quiet machine was an additional $46 per day above the current cost of renting the machine. To the extent that clean and quiet snowmobiles would be more expensive to rent, this $46 net economic value would be reduced.

In the 1999 winter user survey, 41.8% of respondents (including non-snowmobiling visitors) reported renting a snowmobile on their park trip. Based on this percentage of rentals, if only clean, quiet snowmobiles were available and exclusively rented within the park today, visitors who rent snowmobiles within the park would realize an increase in aggregate net economic value of $1.7 million. To the extent that the rental price of a clean, quiet machine is more than current rental rates, this aggregate value will be reduced. If the rental cost of a clean and quiet machine is $46 more per day than current rental rates, the estimated net economic value to renters will be reduced to near zero. This is a moderate beneficial impact relative to the total value of a current trip.

A final source of changes in net economic value of a trip to the parks of the GYA is associated with the proposed plowing of the West Yellowstone to Old Faithful road. Winter visitors for whom YNP was a destination on their trip were asked if they would pay an additional fee to cover the cost of plowing the road from West Yellowstone to Old Faithful. The median willingness to pay for winter car and bus access to Old Faithful was estimated to be $6 per person. Based on this estimate, the estimated net economic value of the road access to the park would be $440,000. This is a minor positive impact for those who would continue to visit this park.

Both the estimates for net economic value of clean quiet snowmobiles and for road access to the park take into consideration the estimated reduction in visitation to the park that would occur under this alternative due to the plowing activities. These estimates are based on reduced use by current visitors.

Conclusion

The alternative B road plowing actions would have a negligible to minor impact on the five-county and three-state economies through reduced visitation and nonresident visitor expenditures. These expenditure reductions may be a moderate negative impact on small communities adjacent to the park. The alternative B road plowing actions also would have a moderate negative impact on total current trip nonmarket visitor benefits (through reduced visitation), and a minor positive impact on nonmarket benefits through improved winter access to Old Faithful. Snowmobile renters in the parks would see a moderate benefit from requirements for clean and quiet machines within the park in future years. Low-income visitors could realize a minor to moderate benefit from the alternative B actions, which would make access to the park more affordable.

Air Quality and Public Health

In this alternative, snowmobiles would no longer enter YNP at the West Entrance and travel to Old Faithful. These snowmobiles and snowcoaches would be displaced by wheeled-vehicles, including mass transit vans that would operate on a plowed road from the West Entrance to Old Faithful. In addition by winter 2008-2009, oversnow vehicle emission rates would be 40% of the baseline CO emission rate, 75% of the baseline PM_{10} rate, and 70% of the baseline hydrocarbon emission rate. Table 78, Table 79, and Table 80 summarize the results of CO modeling for six locations in the three parks for alternative B. Table 78 and Table 79 show the predicted maximum 1-hour average CO concentrations and the calculated maximum 8-hour average CO concentrations, respectively. The percent contribution of each vehicle type, including snow plows, to the maximum CO concentrations also is provided in Table 80 for the six locations. Table 81 and Table 82 provide corresponding model results for PM_{10} for the same locations and conditions as those for CO.

Visibility

The visibility assessment indicates that under this alternative, vehicular emissions would not cause any perceptible visibility impairment in the vicinity of the West Entrance or along the roadways. Perceptible visibility degradation could occur in the vicinity of Old Faithful and Flagg Ranch when vehicles idle for extended periods.

Conclusion

As noted in Table 78, Table 79, and Table 81, the model predicts major beneficial impacts relative to alternative A at the West Entrance and along the West Entrance to Madison roadway, for the peak traffic hour on high winter use days. Both CO and PM_{10} concentrations would be reduced by more than 85%. Negligible CO reductions are

predicted for alternative B at the staging areas, and a minor adverse impact on CO concentration is predicted along the Flagg Ranch to Colter Bay roadway due to minor estimated increases in wheeled-vehicles using this roadway. For PM_{10}, a moderate beneficial impact would be realized at the Old Faithful staging area, but a minor adverse impact is predicted for the Flagg Ranch staging area.

Table 78. Maximum 1-hour average CO concentrations for alternative B.

Location	1-hr Maximum Concentration (w/o Background) (ppm)	1-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	3.30	6.30	88.7
West Entrance to Madison Roadway	0.70	3.70	94.1
Old Faithful Staging Area	.88	3.88	31.3
Flagg Ranch Staging Area	1.19	4.19	30.8
Flagg Ranch to Colter Bay Roadway	1.00	4.00	9.1
Mammoth to NE Entrance Roadway	0.30	3.30	0.0

Table 79. Maximum 8-hour average CO concentrations for alternative B.

Location	8-hr Maximum Concentration (w/o Background) (ppm)	8-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	1.55**	2.96**	88.7
West Entrance to Madison Roadway	0.33**	1.74**	94.1
Old Faithful Staging Area	0.15	1.55	31.3
Flagg Ranch Staging Area	0.20	1.60	30.8
Flagg Ranch to Colter Bay Roadway	0.47**	1.88**	9.1
Mammoth to NE Entrance Roadway	0.14**	1.55**	0

** Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}$*(t1/t2)^0.365 (Cooper and Alley 1990).

Table 80. Vehicle contribution to CO concentrations for alternative B.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	0	0	12.5	23.4	1.0	0.6	62.5
West Entrance to Madison Roadway	0	0	10.1	24.2	0.6	0.4	64.6
Old Faithful Staging Area	62.1	1.2	4.4	8.7	0.1	0.1	23.4
Flagg Ranch Staging Area	69.3	1.2	8.9	17.6	0.1	0.1	2.9
Flagg Ranch to Colter Bay Roadway	49.8	0	13.3	31.1	0.4	0.1	5.3
Mammoth to NE Entrance Roadway	0	0	26.5	66.9	0.5	0	6.1

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Table 81. Maximum 24-hour average PM_{10} concentrations for alternative B.

Location	24-hr Maximum Concentration (w/o Background) (µg/m^3)	24-hr Maximum Concentration (w/Background) (µg/m^3)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	0.63**	23.63	98.6
West Entrance to Madison Roadway	0.63**	23.63	94.1
Old Faithful Staging Area	0.12	5.12	81.3
Flagg Ranch Staging Area	0.18	5.18	72.2
Flagg Ranch to Colter Bay Roadway	0.63**	5.63	33.3
Mammoth to NE Entrance Roadway	0.32**	5.32	0

** Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

Table 82. Vehicle contribution to PM_{10} concentrations for alternative B.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	0	0	3.5	6.7	44.3	27.5	18.0
West Entrance to Madison Roadway	0	0	6.8	13.4	28.2	15.7	35.8
Old Faithful Staging Area	97.0	0	0	0	1.5	1.4	0
Flagg Ranch Staging Area	98.3	0	0	0	1.1	0.6	0
Flagg Ranch to Colter Bay Roadway	36.3	0	11.0	21.3	21.4	6.4	3.6
Mammoth to NE Entrance Roadway	0	0	22.5	46.6	26.7	0	4.2

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Effects on Public Safety

Alternative B proposes several actions that would reduce accident potential and improve safety conditions in the parks. The addition of an aggressive safety and enforcement program would provide moderate improvements to the safety of all three park units. Many visitors currently express concern over the unsafe behavior of other winter visitors, particularly those riding snowmobiles (Friemund 1996). Novice or rental snowmobile riders accounted for over 85% of all snowmobile accidents (1995-98). An aggressive safety program, particularly one operated in cooperation with gateway communities, would allow park personnel to reach more novice snowmobile riders and thereby reduce the potential for snowmachine accidents.

The implementation of nighttime (11 P.M. to 5 A.M.) travel restrictions in the parks would eliminate motor vehicle incidents during this time. The effect on public safety from this action would be negligible because less than 1% of recorded motor vehicle accidents have occurred between these hours.

Current road conditions are cited as contributing factors in about 16% of snowmobile accidents in YNP. Improved road and trail conditions would be expected to decrease accident rates. Eliminating travel on a freshly groomed route allows the surface to harden, improving its quality. Since the majority of road grooming in YNP is performed in the early evening, late night closures would have a negligible effect on the current quality of the groomed surface.

In YNP alternative B proposes plowing the road segments between West Yellowstone and Old Faithful and would implement a shuttle bus system as the primary mode of visitor access on this route. This action would provide moderate benefits to public safety because shuttle bus drivers would have greater familiarity with winter driving conditions, and local wildlife movements and the overall numbers of vehicle miles traveled per day on these road segments would be greatly reduced. However, conflict between wheeled-vehicles would be anticipated, and the potential for vehicle-animal collisions would be greater under this alternative than under the no action alternative (see Chapter III, *Motor Vehicle Accidents — YNP*).

Depending on weather conditions, the plowed road from the West Entrance to Old Faithful would greatly improve ambulance response times to Madison and Old Faithful.

Relocating the CDST in GTNP to a new pathway between Moran and Flagg Ranch would eliminate the potential for inter-modal conflicts along that stretch of road and alleviate expressed concern about safety regarding this arrangement. Phasing out snowmobile use on Jackson Lake would eliminate the potential there for snowmobile-related incidents. Closing the Teton Park Road to snowmobiles would eliminate the potential for accidents involving co-located skiers and snowmobiles.

Conclusion

Overall, implementation of this alternative would result in moderate beneficial improvements to public safety in YNP primarily due to the implementation of a mass transit system between the West Entrance and Old Faithful, an aggressive safety information and enforcement program, and a shorter response time for EMS to the Madison and Old Faithful areas. These improvements would affect employees and visitors.

Implementation of this alternative would result in moderate beneficial improvements to public safety in GTNP due to increased safety information and an enforcement program, reduction of inter-modal conflicts, separation of uses, and elimination of snowmobile conflicts on Jackson Lake. These impacts would affect employees and visitors.

Effects on Geothermal Features

In alternative B, areas of winter visitor access are the same as described in alternative A, The effects of winter access to geothermal features are similar to those described in alternative A with the following exceptions.

The additional public awareness that would result from increased interpretive opportunities would provide beneficial improvements to the protection of geothermal resources.

The longer winter visitor season (from early December through mid-March) on the road from West Yellowstone to Madison and Madison to Old Faithful would increase the number of visitors in the geothermal basins along the Madison to Old Faithful road segment and at Old Faithful. This increased use and access would cause a corresponding increase in the likelihood of adverse impacts on the geothermal resources in this area.

Plowing the road from Old Faithful to West Yellowstone would afford park managers some discretion when identifying the location of plowed pullouts and shuttle bus stops. This action would provide a minor amount of additional protection to geothermal resources along these road segments. Similarly, backcountry travel restrictions may indirectly improve the protection of geothermal features. All backcountry travel under this alternative would be restricted to designated trails in wildlife winter range, which includes geothermal areas. This restriction would benefit geothermal features since off-trail travel would not be allowed and managers would only designate winter travel routes that are away from sensitive areas.

If the adaptive management provisions (research and monitoring) of this alternative indicate that winter visitor use is causing direct long-term impacts to geothermal features, then those impacts must be mitigated or the features would be closed to visitors. The adaptive management provisions of this alternative provide major long-term benefits to the protection of geothermal resources.

Conclusion

An increase in winter visitation would result in minor adverse impacts on geothermal features near roads, staging, and destination areas. Minor adverse impacts may occur in other geothermal areas accessed by groomed roads and nonmotorized trails. These impacts may be long term. Some mitigation of the described impacts would occur through increased interpretation and winter backcountry-use restrictions. All geothermal features would be protected through the monitoring and scientific studies provisions of this alternative. If adverse impacts occur that cannot be mitigated, the geothermal feature or resource would be closed to visitor use. The short-term impacts on geothermal resources would be minor and adverse. Although some long-term adverse impacts may occur on individual features, the overall protection to these resources provided by this alternative is moderate to major and beneficial.

Water and Aquatic Resources

The potential for risk of pollutants, as described in alternative A, entering surface and subsurface waters would increase as the number of snowmobiles increase along the Canyon Village to Fishing Bridge “high” risk road segment. The risk to water quality

would decrease along the Madison to Norris and Madison to Old Faithful "high" risk road segments with the decrease or prohibition of snowmobiles on those segments.

The potential for risk of pollutants entering surface water from "medium" risk road segments would increase on the Mammoth to Norris, Fishing Bridge to East Entrance, Fishing Bridge to West Thumb, Old Faithful to West Thumb, and West Thumb to Flagg Ranch segments as the number of snowmobiles increased.

The potential for risk of pollutants entering surface water from the "low" risk Norris to Canyon and Teton Park Road segments would decrease with the decrease or prohibition of snowmobiles on that segment.

There would be no change along the remaining road segments.

Table 83[34]. Snowmachines and associated risk levels for alternative B.

Road Segment	Risk ± Rating	Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. A*		Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. B*	
		SM	SC	SM	SC
Mammoth to Norris	Medium	641	69	1176	63
West Entrance to Madison	Medium	7759	127	0	0
Madison to Norris	High	3458	73	588	70
Norris to Canyon Village	Low	2214	47	672	48
Canyon Village to Fishing Bridge	High	2370	50	3872	48
Fishing Bridge to East Entrance	Medium	983	0	1809	0
Fishing Bridge to West Thumb	Medium	2627	55	5208	63
Madison to Old Faithful	High	7818	165	0	0
Old Faithful to West Thumb	Medium	3560	73	5746	68
West Thumb to Flagg Ranch	Medium	4219	103	7728	96
Grassy Lake Road	High	184	0	200	0
Flagg Ranch to Colter Bay	Low	379	0	400	0
Colter Bay to Moran Junction	High	248	0	250	0
Moran Junction to East Entrance	Medium	49	0	50	0
Teton Park Road	Low	156	0	0	0
Moose-Wilson Road	Low	6	0	6	0

[34] *SM = Snowmobile, SC = Snowcoach; The source of pollutants is emissions from snowmobiles, which produce (conservatively) ten times as many emissions per mile as most wheeled vehicles. Single snowcoaches produce fewer emissions then single snowmobiles.
±High = within 100 meters of aquatic system on 76% to 100% of the road segment; Medium = within 100 on 51% to 75% of the road segment; Low risk segments are within 100 meters of rivers less than 50%.

Conclusion

Deposition into snowpack would continue to occur from 2-stroke engine emissions along groomed park roads in YNP and GTNP. The effect of this deposition on water quality is undetermined but there is currently no evidence of measurable changes in water quality or effects on aquatic resources. It is possible that accumulations of pollutants in aquatic systems may have adverse impacts on wetlands and aquatic resources downstream from high-risk road segments. Oversnow vehicle use in this alternative involves localized high risk to surface water quality, but reduces oversnow vehicle-miles traveled along high risk road segments in the three park units by about 65%. Snowmobile and snowplane use on Jackson Lake would continue the risk of moderate to major adverse impacts on water quality in that water body. The phasing out of snowmobile use on Jackson Lake would in time reduce the sources of pollution by half. Minor short-term water quality and wetland impacts would occur along the eastern side of US 89/287 as a result of new pathway construction.

Mitigation

The new year-round pathway would be designed and sited to minimize impacts to all park resources including wildlife, vegetation, and wetlands. Any impacts to wetlands would be minimized and mitigated in accordance with NPS Wetland Guidelines. Any needed bridges would be designed to complement, not impact, floodplains in accordance with NPS Floodplain Management Guidelines. The use of bio-based fuels by the NPS and the availability of fuels in gateway communities may result in a minor decrease in pollutant deposition into snow. Best management practices would be utilized during the construction, reconstruction, or winter plowing of trails and roads to prevent unnecessary vegetation removal, erosion, and sedimentation. The release of snowpack contaminants into surface water could be mitigated by disconnecting snowmelt drainages from trails used by oversnow vehicles. Any new or reconstructed winter-use sanitary facilities would be constructed in locations and using advanced technologies that would protect water resources. A focused program of monitoring would reduce the uncertainty of impacts from oversnow vehicles, and if necessary, indicate best management practices that might be implemented.

Effects on Wildlife

Ungulates

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into wildlife areas that would normally be inaccessible due to deep snow. Under alternative B, YNP would groom about 160 miles of road surface for use by oversnow motorized vehicles (24 less than under alternative A) and 47 miles for nonmotorized use (10 more than under alternative A). GTNP and the Parkway would groom about 36 miles, the same as alternative A.

In YNP effects related to packed trails would be reduced relative to alternative A. Effects in GTNP would remain the same.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause injury and death to wildlife, especially in poor lighting conditions and during snowfall, and can cause displacement from preferred habitats. Under alternative B, these effects would be associated with 160 miles of groomed oversnow motorized roads in YNP (24 less than current management); GTNP would maintain 36 miles of groomed motorized routes (the same as currently) and 11 miles of ungroomed motorized routes (24 miles less than current management).

Because the use of oversnow motorized vehicles would be reduced in the parks under alternative B, overall associated effects would be reduced with the exception of the routes from Moran to Flagg Ranch and Grassy Lake Road in GTNP. The separation of the CDST from the plowed roadway would cumulatively increase collision and displacement impacts associated with the use of both oversnow and wheeled-vehicles.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to ungulate movements (Aune 1981). In addition plowed roads, like groomed roads, may also provide an energy efficient mechanism for wildlife movements, including bison, elk, and moose. Under alternative B, the effects described above are associated with about 106 miles of plowed road in YNP, an increase of 30 miles over existing management. The road would be open to mass transit vehicles and about 40 private vehicles, with no late night traffic allowed. GTNP, including the Parkway, would continue to maintain about 100 miles of plowed road, the same as under current management.

In YNP the plowed road from West Entrance to Old Faithful would result in more snow berms, thus potentially increasing fragmentation along this segment. An increase in ungulate use of the plowed road as compared to the currently groomed road is not expected because plowed roads do not offer additional energy savings over groomed roads. The effects of plowed roads in GTNP would be the same as those described in alternative A.

All other potential impacts would be the same as stated in alternative A.

Effects of motorized use of plowed roads. The effects of plowed roads are similar to those of groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause injury and death for wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall, and can cause displacement from preferred habitats.

The use of plowed roads by wheeled-vehicles may increase wildlife-vehicle collisions over current rates along the road segment from West Yellowstone to Old Faithful. The limitation on late night travel (11 P.M. to 5 A.M.) and the use of NPS-managed shuttle busses with trained drivers will help to mitigate collision impacts. According to Gunther et al. (1998) no collisions have occurred between busses and ungulates in the park.

Displacement of ungulates from preferred habitats along the West Yellowstone to Old Faithful route would be reduced relative to alternative A because vehicle numbers would be reduced, and traffic would be more predictable and less dispersed.

Effects of nonmotorized use of groomed and designated ungroomed routes. The primary effects of nonmotorized use on ungulates are displacement from preferred habitats, especially geothermal areas that are important for winter survival in YNP, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative B, YNP increases nonmotorized opportunities from 37 to 47 miles of groomed nonmotorized routes, and GTNP and the Parkway increase ungroomed nonmotorized routes from 26 to 33 miles. Although the above effects may be increased due to the addition of nonmotorized routes, they are expected to be relatively minor because most with the exception of short trails in the Mammoth Hot Springs and Blacktail Plateau areas, would not be located in critical ungulate winter range.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and ungulates may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Alternative B reduces the potential for these effects in YNP by eliminating or restricting backcountry use in winter range. Use, where permitted, would be limited to designated routes where ungulate habitat would not be impacted. Because winter range in GTNP is relatively limited and already closed to public access in several areas, no new restrictions on use in this park are proposed under this alternative.

Under alternative B, impacts associated with backcountry use in GTNP would remain the same as those under alternative A. Moderate to major adverse impacts on bighorn sheep would continue, as well as potential impacts on moose, elk, and bison on Blacktail Butte and Wolff Ridge.

Effects of the presence and use of winter support facilities. Increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. Alternative B proposes an increase in the number and size of warming huts and other day-use facilities. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and areas where existing facility size is currently inadequate or nonexistent (e.g., Tower, Norris, Canyon). Warming huts in the vicinity of ungulate winter range important to elk, deer, and bison would potentially increase human use and consequently reduce habitat effectiveness. However, over time, the predictable nature of the recreation expected to occur in the area may allow species to habituate to the increase in human activity. The effects of these huts on ungulates would be the same for all alternatives.

Federally Protected Species

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel for wildlife into areas that would normally be inaccessible due to deep snow. Under alternative B, YNP would groom about 160 miles of road surface for use by oversnow motorized vehicles (24 less than under alternative A) and 47 miles for nonmotorized use (10 more than under alternative A). GTNP and the Parkway would groom about 36 miles, the same as alternative A.

In YNP effects related to packed trails would be slightly reduced from those under alternative A. Effects in GTNP would remain the same. The parks may close any area if warranted to protect federally protected species.

Effects of motorized use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats. Mortality caused by collisions with snowmobiles or snowcoaches has not occurred for any of these species. Under alternative B, these effects would be associated with 160 miles of groomed oversnow motorized roads in YNP (24 less than current management); GTNP would maintain 36 miles of groomed motorized routes, the same as current management, and 11 miles of ungroomed motorized routes, 24 miles less than current management.

Because the use of oversnow motorized vehicles would be reduced in the parks under alternative B, overall associated effects would be reduced with the exception of the route from Moran to Flagg Ranch in GTNP. The separation of the CDST from the plowed roadway would cumulatively increase displacement impacts associated with the use of both oversnow and wheeled-vehicles. Canada lynx and wolves may be affected along this route.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to wildlife movements (Aune 1981). Similar to groomed roads, plowed roads may influence wildlife movements and distributions by facilitating travel for wildlife into areas that would normally be inaccessible due to deep snow. Under alternative B, the effects described above are associated with about 106 miles of plowed road in YNP, an increase of 30 miles over existing management. The road would be open to mass transit vehicles and about 40 private vehicles, with no late night traffic allowed. GTNP including the Parkway would continue to maintain about 100 miles of plowed road, the same as under current management.

Under alternative B, impacts related to plowed roads would slightly increase in YNP as compared to alternative A. The road from West Yellowstone to Old Faithful would be plowed and open to public access two weeks earlier under this alternative, potentially leading to an increase in human-bear interactions during the pre-breeding period. However, none of the radio-collared bears in YNP have denned along this road segment, and only about 10% of bears are still active at this time (Haroldson et al. In prep). Effects related to plowed roads in GTNP would remain the same as under current management.

Effects of motorized use of plowed roads. The effects of traffic on plowed roads are similar to those of traffic on groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause injury and death for wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall, and can cause displacement from preferred habitats.

Under alternative B, impacts related to plowed roads would slightly increase in YNP as compared to alternative A. The limitation on late night travel (11 PM to 5 AM) and the use of NPS-managed shuttle busses with trained drivers will help to mitigate collision impacts. In GTNP the separation of the CDST from the plowed roadway would cumulatively increase displacement impacts associated with the use of both oversnow and wheeled-vehicles. Canada lynx and wolves may be affected along this route.

Effects of nonmotorized use on groomed and designated ungroomed routes. The primary effects of nonmotorized use on wildlife are displacement from preferred habitats and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative B, YNP increases nonmotorized opportunities from 37miles to 47 miles of groomed nonmotorized routes, and GTNP and the Parkway increase ungroomed nonmotorized routes from 26miles to 33 miles.

Although the above effects may be increased due to the addition of nonmotorized routes, they are expected to be negligible because most routes, with the exception of short trails in the Mammoth Hot Springs and Blacktail Plateau areas, would not be located in critical ungulate winter range, and consequently the species that prey upon ungulates or consume their carcasses would not be affected. Furthermore, when warranted, the parks may close any area where federally protected species are observed.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and federally protected wildlife species may only occur sporadically, they may cause displacement and additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Alternative B minimizes the potential for these effects in YNP by eliminating or restricting backcountry use in winter range. Use, where permitted, would be limited to designated routes where ungulate habitat would not be impacted. Because winter range in GTNP is relatively limited and already closed to public access in several areas, no new restrictions on use in this park are proposed under this alternative.

Impacts related to backcountry use under alternative B would be reduced as compared to current management in YNP. Impacts in GTNP would remain the same.

Presence and use of winter support facilities. Warming huts and campgrounds can cause habituation in some wildlife species by the presence of human food and garbage, and can lead to human-wildlife conflicts. In addition increases in human activity

associated with the presence of support facilities may displace species sensitive to human disturbance. Alternative B proposes an increase in the number and size of warming huts and other day-use facilities. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and areas where existing facility size is currently inadequate or nonexistent (e.g., Tower, Norris, and Canyon).

A major problem associated with human development in occupied bear habitat is the availability of food attractants. Bears that become conditioned to human foods and garbage are often the targets of management actions, including lethal control. High winter visitor use has contributed to a garbage problem in YNP as garbage that has accumulated throughout the winter may attract hungry grizzly bears in the spring. To date, YNP does not have adequate winter garbage storage facilities but will rectify this issue by constructing a winter garbage storage facility that is wildlife-proof in the Old Faithful, Grant, Lake, and Canyon areas (a feature of all alternatives). In addition under alternative B, the availability of a plowed road into the park's interior would allow for the removal of garbage, thus decreasing problems associated with habituation.

Compared to current management, impacts related displacement would be greater due to the increase in number of facilities. Specifically, huts located in thermally influenced ungulate winter range could displace ungulates, and thus affect the availability of bison and elk carcass, important spring foods for grizzly bears. Because ungulates have been known to habituate to predictable human activities any displacement would most likely be short term. In addition as stated previously, the majority of bears do not emerge from hibernation until after the winter use season at which time the Bear Management Area restrictions will be in affect to allow bears uninterrupted use of spring carcass habitats in known winter ranges. Areas of high bear use may be closed at any time according to park policy.

Species of Special Concern.

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel for wildlife into areas that would normally be inaccessible due to deep snow; inhibiting foraging activities of carnivores that tunnel beneath the snow to hunt subnivian prey; and reducing subnivian prey availability by increasing mortality of these small mammals. Under alternative B, YNP would groom about 160 miles of road surface for use by oversnow motorized vehicles (24 less than under alternative A) and 47 miles for nonmotorized use (10 more than under alternative A). GTNP and the Parkway would groom about 36 miles, the same as alternative A.

In YNP effects related to packed trails would be slightly reduced from those under alternative A. Effects in GTNP would remain the same. The parks may close any area if warranted to protect federally protected species.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The most likely impacts to park species of special concern are displacement from preferred

habitats and degradation of the aquatic environment from pollutants in the snowpack. Documented mortality caused by collisions with oversnow vehicles in the parks is rare. In ten years only one of these species (a marten) was reportedly killed by a snowmobile in YNP (Gunther et al. 1998). Under alternative B, these effects would be associated with 160 miles of groomed oversnow motorized roads in YNP, 24 miles less than current management; GTNP would maintain 36 miles of groomed motorized routes and 11 miles of ungroomed motorized routes, 24 miles less than current management.

Because the use of oversnow motorized vehicles would be reduced in the parks under alternative B, overall associated effects would be reduced with the exception of the routes from Moran to Flagg Ranch and Grassy Lake Road in GTNP. The separation of the CDST from the plowed roadway would cumulatively increase displacement impacts associated with the use of both oversnow and wheeled-vehicles.

See *Water and Aquatic Resources*, Chapter IV for an assessment of the impacts of exhaust on water quality in the parks.

Effects of plowed roads. Similar to groomed roads, plowed roads also provide an energy efficient mechanism for wildlife movements. Under alternative B, the effects described above are associated with about 106 miles of plowed road in YNP, an increase of 30 miles over existing management. The road would be open to mass transit vehicles and a small number of about 40 private vehicles, with no late night traffic allowed. GTNP, including the Parkway, would continue to maintain about 100 miles of plowed road, the same as under current management.

Under alternative B, impacts related to plowed roads would slightly increase in YNP as compared to alternative A. Effects related to plowed roads in GTNP would remain the same as under current management.

Effects of motorized use of plowed roads. The most likely impact to park species of special concern is displacement from preferred habitats and mortality caused by collisions.

Under alternative B, impacts related to plowed roads would slightly increase in YNP as compared to alternative A. In particular, swans that winter in open water habitats along the plowed road from the West Entrance of YNP to Old Faithful may be disturbed by the increase in wheeled-vehicle traffic along this route. In GTNP the separation of the CDST from the plowed roadway would cumulatively increase displacement impacts associated with the use of both oversnow and wheeled-vehicles.

Effects of nonmotorized use on groomed and ungroomed designated routes. The primary effects of nonmotorized use are displacement from preferred habitats, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative B, YNP increases nonmotorized opportunities from 37miles to 47 miles of groomed nonmotorized routes, and GTNP and

the Parkway increase ungroomed nonmotorized routes from 26miles to 33 miles. Although the above effects may be increased due to the addition of nonmotorized routes, they are expected to be relatively minor because most routes would not be located in areas critical to species of special concern (e.g., adjacent to open water habitats and ungulate winter ranges).

Unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and species of special management concern may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Alternative B minimizes the potential for these effects in YNP by eliminating or restricting backcountry use in important winter habitats (e.g., thermally influenced areas). Use, where permitted, would be limited to designated routes. Because winter habitats in GTNP are already closed to public access in several areas, no new restrictions on use in this park are proposed under this alternative.

Impacts related to backcountry use in under alternative B would be reduced as compared to current management in YNP. Impacts in GTNP would remain the same as under alternative A.

Presence and use of winter support facilities. The primary effects of warming huts and campgrounds on park species of special concern are associated with increases in human activity and the subsequent disturbance and displacement of species or their prey. Alternative B proposes an increase in the number and size of warming huts and other day-use facilities. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and areas where existing facility size is currently inadequate (e.g., Tower, Norris, and Canyon).

Compared to current management, impacts related to displacement would be greater due to the increase in number of facilities. Specifically, huts located in thermally influenced ungulate winter range could displace ungulates, and thus affect bison and elk carcass availability for wolverines, fishers, and marten. Because ungulates have been known to habituate to predictable human activities any displacement would most likely be short term. Impacts to other species of special concern would be the same as those under alternative A.

Conclusion

All effects described above and summarized in this section would be short term in nature. Effects associated with groomed roads and snowmobiles would decrease in YNP, but would remain a concern in GTNP due to the separation of the CDST from the road shoulder. Effects related to wheeled-vehicles in YNP would increase but would be mitigated through the use of mass transit and restrictions on travel in the evenings. Another important component for wildlife is the implementation of closures and

restrictions in certain backcountry wildlife winter ranges in YNP. Adaptive management may be employed to adjust management if and when impacts to wildlife are determined. Further mitigation would be afforded by an increased emphasis on visitor education and interpretive opportunities, as well as increased administrative capability.

Although impacts to populations resulting from winter recreation are neither long term nor very significant, impacts to individual members of the population can be important, leading to death either directly from collisions or continued harassment, or indirectly through management actions as a response to habituation to human presence and food. Although concerned about impacts to individuals, for the most part (with the exception of federally protected species), the NPS bases management actions on the protection of populations of native animals. For example, see NPS 77, Natural Resources Management, Chapter II.

Ungulates

- Effects of groomed roads and trails on animal movements — unknown if and to what extent beneficial effects outweigh negative effects. Effects are reduced from alternative A in YNP and remain the same in GTNP.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on: 1) mortality caused by collisions –less than alternative A for YNP, greater than alternative A for GTNP due to the separation of the CDST from the road shoulder; and 2) displacement from preferred habitats less than alternative A for YNP, greater than alternative A for GTNP due to the separation of the CDST from the road shoulder.
- Effects of plowed roads on: 1) habitat fragmentation – more than alternative A for YNP, same as alternative A for GTNP; and 2) animal movements – unknown if and to what extent beneficial effects outweigh negative effects — same as alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – more than alternative A for YNP, same as alternative A for GTNP; and 2) displacement from preferred habitats – less than alternative A for YNP, same as alternative A for GTNP.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – slighter greater than alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – less than alternative A for YNP, same as for GTNP. Impacts to bighorn sheep in GTNP would remain moderate to major and long term if no mitigation is applied.
- Effects of the presence and use of winter support facilities on displacement. Effects may be increased relative to alternative A because more huts are proposed.

Federally Protected Species

- Effects of groomed roads and trails on animal movements: 1) bald eagles, grizzly bears, and wolves — same as alternative A; and 2) lynx – less than alternative A.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement from preferred habitats – less than alternative A with the exception of the CDST/plowed road segment which would be greater than alternative A; excluding the grizzly bear which, for the most part, will not be active during the winter use season.
- Effects of plowed roads on: (1) habitat fragmentation – all species, more than alternative A for YNP, same as alternative A for GTNP; and 2) animal movements – all species, no known effect.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – bald eagles and grizzly bears, more than alternative A for YNP, same as for GTNP; wolves, more than alternative A for YNP, same as for GTNP; lynx, same or more than alternative A for all parks; and 2) displacement from preferred habitats – bald eagles, more than

alternative A for YNP, no effect on grizzly bears; no known effect to date on wolves and lynx.

- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, negligible, and short term on bald eagles; no effect on grizzly bears; no known effect to date on wolves and lynx. Effects may slightly increase relative to alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, minor, and short term on bald eagles; adverse, negligible, and short term on grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx. These effects would be less than alternative A for YNP, same as alternative A for GTNP.
- Effects of the presence and use of winter support facilities on displacement – no affect on bald eagles; adverse, negligible, and short term on grizzly bears, with mitigation; adverse, minor, and short term on wolves; no effect on lynx. Effects may be slightly increased relative to alternative A because more huts are proposed.

Species of Special Concern

- Effects of groomed roads and trails on 1) animal movements – no known effect on wolverines; adverse, negligible, and short term on fishers and martens; no effect on otters, swans, reptiles, amphibians, and fish; 2) foraging activities – adverse, negligible, short term on marten; no effect on the other species; and 3) subnivian prey availability — adverse, negligible, and short term on marten; no effect on the other species. May be a slight reduction relative to alternative A for YNP; effects would remain the same for GTNP.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement – no known effect on wolverine; adverse, negligible, and short term on fishers and marten; no effect on otters, reptiles, amphibians, and fish; adverse, minor, short term on swans. May be a slight reduction relative to alternative A for YNP; effects may increase in GTNP due to removing the CDST from the road shoulder.
- Effects of plowed roads on animal movements – no known effect on wolverines, fishers, and martens; no effect on otters, swans, reptiles, amphibians, and fish. If effects did occur, they would increase in YNP relative to alternative A.
- Effects of motorized use of plowed roads on 1) displacement from preferred habitats – adverse, negligible, short term on wolverines, fishers, martens; no effect on otters, swans, reptiles, amphibians, and fish and 2) mortality from collisions — adverse, negligible, and short term on otters and martens; no effect to date on other species. Effects may increase relative to alternative A in YNP.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – no effect on wolverines; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; adverse, negligible, and short term on sagebrush lizard; no effect on rubber boa, amphibians, and fish. Effects may slightly increase relative to alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible, and short term on wolverines and sagebrush lizard; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; no effect on rubber boa, amphibians, and fish. Effects decrease relative to alternative A in YNP, and may increase in GTNP.
- Effects of the presence and use of winter support facilities on displacement of potential prey (carcass) availability – adverse, minor, and short term on wolverines, fishers, and martens; no effect on swans, rubber boa, amphibians, and fish; no known effect on otters; adverse, minor, and short term on sagebrush lizard. Effects may be slightly increased relative to alternative A because more huts are proposed.

Mitigation

- Closures around known dens and nests would continue to be implemented.

- The monitoring and evaluation of backcountry nonmotorized use in GTNP should be enhanced and closures should be implemented as warranted.
- Ramps or pullouts for moose to exit plowed roads to reduce collisions between snowmobiles and moose along the CDST would be provided.
- Use of groomed and plowed surfaces by bison and other ungulates would continue to be monitored.
- Snow track surveys for carnivores, including lynx, on both groomed and ungroomed routes would be conducted.

Effects on Natural Soundscape

Audibility analysis — combined effects of all wheeled and oversnow vehicles

Table 84 presents the acres of park land by road segment where any wheeled or oversnow vehicle noise would be audible under the two background conditions, "average" and "quiet," as defined in the *Assumptions and Methodologies* section of this chapter. For each background condition, acreage is presented for three categories of audibility: (1) audible for any amount of time (labeled "audible at all"); (2) audible for 10% of the time or more; and (3) audible for 50% of the time or more. Appendix M contains tables with distances to audibility for each segment for each alternative.

Alternative B features plowing the road from the West Entrance of YNP to Old Faithful; use of "clean and quiet" snowmobile and snowcoach (based on a 70 dBA noise emission level at 50 feet); elimination of snowmobiles on Teton Park Road; and phasing out of snowmobiles (but not snowplanes) on Jackson Lake. This alternative also requires that all snowplanes on Jackson Lake meet the current regulated limit of 86 dBA at 50 feet.

The results for alternative B show that for the "average" background sound level, wheeled or oversnow vehicles would be audible to some degree for over 138,000 acres in the three park units. For over 59,000 of those acres, wheeled or oversnow vehicles would be audible for at least 10% of the time during the day. For over 14,000 of those acres, they would be audible for at least half of the time during the day. These acreage totals increase by 8% to 15% for the "quiet" background conditions.

The "clean and quiet" requirement results in reduced audibility acreage over all segments that carry oversnow vehicles. These reductions are less evident when looking at the totals because of large contribution from the segment from Moran Junction to the South Entrance of GTNP for all three audibility categories, acreage that remains almost constant for all of the alternatives. For example, over 75% of the acreage for the "audible 50% or more" categories is along this segment.

The other key segments for the "audible 50% or more" categories are from Fishing Bridge to West Thumb, from West Thumb to Flagg Ranch, and from Canyon Village to Fishing Bridge, although all are significantly reduced compared to the no action alternative.

The audibility acreage is greatly reduced for the West Entrance to Madison and Madison to Old Faithful segments due to the replacement of oversnow vehicles with wheeled-

vehicles on the plowed road. Likewise the, elimination of snowmobiles, on Teton Park Road reduces its audibility acreage to zero.

The plowed road from Mammoth to the Northeast Entrance is a major contributor to the "audible at all" acreage (and, to a lesser extent, "audible 10% or more"). This impact remains virtually unchanged across all the alternatives, somewhat makes the beneficial impacts of reduced sound from oversnow motorized vehicles.

Snowplanes and snowmobiles on Jackson Lake are also major contributors to the "audible at all" categories, although the acreage is greatly reduced over the no action alternative because of the sound level restrictions on both machines and the phasing out of snowmobiles.

Average Sound Level Analysis

To give a sense of the effect of the number of oversnow or wheeled-vehicles on a road segment, and their speed and sound level, Table 85 shows the computed hourly equivalent or "average" sound level (L_{eq}) over the daytime period. Levels are shown for each road segment at two distances, 100 feet and 4,000 feet, and for both open and forested terrain. These hourly L_{eq} values do not have the background sound level added in to them. Also, they cannot be compared against the background levels to assess audibility, since L_{eq} represents a long-term average of both quiet and loud moments.

The hourly L_{eq} at 100 feet is highest for the segment representing Jackson Lake, plus the segments from Canyon Village to Fishing Bridge, from Fishing Bridge to West Thumb, from Old Faithful to West Thumb, and from West Thumb to Flagg Ranch. The segments from Moran Junction to the GTNP East Entrance and to the GTNP South Entrance would have the highest L_{eq} at a distance of 4,000 feet away.

There are major 16 dB to 18 dB reductions in the L_{eq} for the West Entrance to Madison and Madison to Old Faithful segments that would be plowed.

Table 84. Acres of park land affected by vehicles audibility for alternative B.

Road Segment	Miles	With Average Background Conditions			With Quiet Background Conditions		
		Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More	Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or more
1. Mammoth to Northeast Entrance	47	16,121	5,440	0	16,816	6,337	0
2. Mammoth to Norris	21	8,383	924	0	9,069	1,014	0
3. West Entrance to Madison	14	5,302	1,396	0	5,599	1,632	0
4. Madison to Norris	14	5,203	145	0	5,538	174	0
5. Norris to Canyon Village	12	4,302	0	0	4,540	0	0
6. Canyon Village to Fishing Bridge	16	7,140	5,079	494	7,865	5,559	807
7. Fishing Bridge to East Entrance	27	8,765	1,294	0	9,655	1,416	0
8. Fishing Bridge to West Thumb	21	10,681	7,564	1,378	11,941	8,111	2,019
9. Madison to Old Faithful	16	6,205	1,707	0	6,571	1,979	0
10. Old Faithful to West Thumb	17	6,500	4,707	0	6,976	5,325	0
11. West Thumb to Flagg Ranch	24	10,249	7,105	902	11,038	8,039	998
12. Grassy Lake Road	7.6	2,203	0	0	2,414	0	0
13. Flagg Ranch to Colter Bay	15.6	7,670	2,983	0	8,328	3,279	0
14. Colter Bay to Moran Junction	10.2	4,610	2,331	0	4,959	2,535	0
15. Moran Junction to East Entrance	2	1,201	724	490	1,302	819	534
16. Moran Junction to South Entrance	26	21,714	14,812	11,293	23,842	17,207	11,996
17. Teton Park Road	15	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	2.5	807	0	0	853	0	0
19. Antelope Flats Snowmobile Route		No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	9.7	10,963	3,326	0	12,280	4,905	0
TOTAL		138,018	59,534	14,558	149,589	68,331	16,355

Conclusion

Alternative B impacts about 75% to 76% of the acreage impacted by the no action alternative, in terms of time when vehicles would be audible at all. For the 10% and 50% audibility categories as a group, the acreage drops to about 63% to 64% of that for the no action alternative. In YNP the 50% time audible acreage drops to only 23% of that for the no action alternative for average background conditions. The reasons for the reductions are the use of the 70-dBA “clean and quiet” snowmobiles and snowcoaches, the replacement of oversnow vehicles with wheeled-vehicles from West Entrance to Old Faithful, and the elimination of oversnow vehicles on Teton Park Road. In YNP the 50% time audible acreage drops to only 23% of that for the no action alternative for average background conditions. For all three audibility categories taken together, alternative B impacts the second smallest acreage after alternative D.

Table 85. Average hourly L_{eq} from wheeled and oversnow vehicle noise at two distances to each road segment for alternative B.

Road Segment	L_{eq} at Distance (dBA)			
	Open Terrain		Forested Terrain	
	100 feet	4,000 feet	100 feet	4,000 feet
1. Mammoth to Northeast Entrance	35	2	33	0
2. Mammoth to Norris	42	3	41	0
3. West Entrance to Madison	38	6	37	0
4. Madison to Norris	42	2	40	0
5. Norris to Canyon Village	43	3	41	0
6. Canyon Village to Fishing Bridge	49	9	47	1
7. Fishing Bridge to East Entrance	43	3	41	0
8. Fishing Bridge to West Thumb	49	9	47	1
9. Madison to Old Faithful	38	6	37	0
10. Old Faithful to West Thumb	50	10	48	2
11. West Thumb to Flagg Ranch	50	10	48	2
12. Grassy Lake Road	39	0	37	0
13. Flagg Ranch to Colter Bay	41	6	40	0
14. Colter Bay to Moran Junction	43	8	41	0
15. Moran Junction to East Entrance	46	12	44	4
16. Moran Junction to South Entrance	46	14	44	6
17. Teton Park Road	0	0	0	0
18. Moose-Wilson Road	31	0	29	0
19. Antelope Flats Snowmobile Route	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	54	7	52	0

Effects on Cultural Resources

The winter visitor use activities described in this alternative would occur on existing roads, deep snowpack over frozen ground, or frozen lake surfaces, and not affect known archeological resources. To ensure that adequate consideration and protection are accorded potential archeological resources during the construction of visitor services, such as permanent warming huts, and other day-use facilities, or of trails, archeological surveys would precede all significant ground-disturbing activities. Archeological monitoring would occur where less ground disturbance is expected. If previously undiscovered archeological resources are unearthed during construction activities, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary. If construction impacts upon archeological sites could not be avoided the recommended mitigation strategy of site testing and data recovery would be implemented after consulting with the Wyoming State Historic Preservation Office. Consultation would ensure that the informational significance of the sites would be preserved.

If permanent warming huts or other day-use facilities are erected either in or near historic districts or potential cultural landscapes, application of several guidelines would blend facilities into both the built and natural surroundings of the parks:

1) Sensitive design and location of facilities;
2) Use of appropriate materials and colors in construction; and
3) Select plantings of native vegetation as visual buffers.

If historic structures are adaptively rehabilitated for visitor services, the integrity and character of each structure's exterior would be preserved while establishing the most efficient use of the interior's available space. All work would be performed in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (1995). Materials removed during rehabilitation of historic structures would be evaluated to determine their value to the parks' museum collections or for their comparative use in future preservation work at the sites. Any corresponding visual, audible, and atmospheric intrusions associated with increases in visitation would not be significant enough to alter or diminish the integrity of historic districts or potential cultural landscapes.

Visual, audible, and atmospheric intrusions would occur in the vicinity of all construction activities. Such impacts would be temporary and minor.

Though potentially significant cultural landscapes would be protected and preserved, increased visitor use, resulting from the expansion or construction of visitor facilities and trailheads and trails, could cause overuse and degradation of contributing landscape features such as roads, trails, and structures. However, the parks' enhanced interpretive and educational programs also would increase visitor appreciation of and sensitivity to resources, as well as provide an understanding of how to experience resources without inadvertently damaging them.

The plowing of roads and highways and maintenance of groomed motorized routes throughout the winter season would have no effect upon roads or road systems that are either potentially eligible to be listed in the National Register of Historic Places or are contributing elements of potential cultural landscapes. Existing road contours would be unaltered.

There would be no adverse impacts to known ethnographic resources.

Conclusion

None of the actions described would adversely impact cultural resources.

Effects on Visitor Access and Circulation

Access

Plowing the roadway segments between West Yellowstone and Old Faithful is the principal action proposed in alternative B regarding access. West Yellowstone is the

most heavily used gateway community during the winter season and serves as a staging area for about 61,800 visitors each winter. On average, about 40% of all seasonal visitors entering through West Yellowstone visit during the month of February. Average non-holiday, daily visitation on weekends during February is about 840 without regard to mode of transportation. Snowmobile passengers, either on private sleds, rented sleds, or guided tours, account for about 90% of the visitation through this park access point. Snowcoach passengers account for the majority of the remaining visitors. Visitor surveys indicate that about 20% to 30% of visitors ski once in YNP (Littlejohn 1996; Borrie et al. 1999; Duffield et al. 2000a). Currently, these visitors park at various locations in West Yellowstone and use the oversnow vehicles to gain access to Madison, Old Faithful, and other areas of YNP.

Plowing the roadway segment between West Yellowstone and Old Faithful would close access to the park for oversnow motorized winter use recreational visitors from the West Entrance. Limited private vehicle access, including private snowmobile trailers, would be permitted within YNP. A shuttle system would provide access between West Yellowstone and Old Faithful for visitors destined for Madison or Old Faithful.

While not expressly defined in this alternative, limited access to Old Faithful would be provided for private vehicles. Under one potential scenario for private vehicle access, about 10 to 20 trailer spaces would be available at Old Faithful for snowmobile trailer parking with up to 40 spaces for passenger vehicles. These spaces would be managed through a reservation system. In addition to the private vehicle spaces, this scenario would provide up to 30 additional spaces for tour bus and shuttle vehicle staging. Visitor equivalents for private passenger vehicles and snowmobile trailers under this scenario are 116 passenger vehicle visitors (40 vehicles x 2.9 persons per vehicle) and up to 140 snowmobile passengers (20 trailer spaces x 7 (average) machines per trailer x 1 passenger per machine).

While access for oversnow motorized vehicles would be limited through this alternative, access for visitors could be increased to Madison and Old Faithful. The proposed shuttle system could potentially operate using 15-passenger vans with five-minute minimum headways (12 trips per hour). Given visitor arrival and departure rates, a shuttle system operating with 15-passenger vehicles and a peak headway of five-minutes, a maximum of 900 daily visitors can be accommodated between West Yellowstone and Old Faithful. Assuming an average of 20 buses operating daily (where there is capacity for 30 parked buses), an additional 800 visitors could be transported to Old Faithful (20 buses x 40 occupants per bus). Present access to YNP through the West Entrance is about 840 daily visitors per average February weekend. The number of winter visitors to Old Faithful that could be accommodated, including shuttle, bus, and private parking is about 1,920 through the actions of this alternative.

The current peak use is reflected by an actual count of 1,251 snowmobiles through the West Entrance (about 1,500 people). Peak use could be accommodated in this

alternative. The previous discussion involves existing capacity at Old Faithful. It is not a prediction of increased use at Old Faithful. It indicates that under this alternative the available physical parking capacity could accommodate current use levels. The existing physical capacity for snowmobiles far exceeds that for automobiles.

In GTNP and the Parkway alternative B alters the internal park circulation patterns for motorized oversnow vehicles on Teton Park Road as they currently operate. Access between Jackson Lake Junction and Jenny Lake for oversnow motorized vehicles is closed. However, other similar snowmobile opportunities are available in the park and total visitor access would not be expected to change.

The closure of YNP's West Entrance to oversnow access could enhance the importance of access for snowmobiles through GTNP and the Parkway to YNP. Winter scenery and wildlife in YNP will continue to attract potential visitors. Access for the numbers of snowmobile and snowcoach visitors currently using the West Entrance could shift to the South Entrance. The staging for oversnow opportunities from these routes could increase use at Flagg Ranch. Parking capacity would not increase at Flagg Ranch, providing an upper limit in the amount of use that may shift to this area. In addition the long travel distance from Jackson to Flagg Ranch and Flagg Ranch to destinations in YNP will remain a deterrent.

A reasonably foreseeable distribution of vehicle use as a consequence of this alternative is depicted in the following table. It shows a loss of 554 snowmobile trips from West Yellowstone to Madison and 489 from Madison to Old Faithful. Park wide snowcoach vehicle-miles would decrease by 40%. There would be a net decrease of 25% in snowmobile vehicle-miles traveled in the three park units and a net increase of 21% wheeled-vehicle-miles traveled on the same road segments.

Table 86. Alternative B motorized use.

Road Segment	*Average Daily Vehicle Use January-February*				
	Autos	**Vans**	**Snowcoaches**	**Snowmobiles**	**Buses**
Mammoth to Northeast Entrance	No change from current condition				
Mammoth to Norris	0	0	3	56	0
West Entrance to Madison	50	80	0	0	2
Madison to Norris	0	0	5	42	0
Norris to Canyon Village	0	0	4	56	0
Canyon Village to Fishing Bridge	0	0	3	242	0
Fishing Bridge to East Entrance	0	0	0	67	0
Fishing Bridge to West Thumb	0	0	3	248	0
Madison to Old Faithful	50	81	0	0	2
Old Faithful to West Thumb	0	0	4	338	0
West Thumb to Flagg Ranch	0	0	4	322	0
Grassy Lake Road	No change from current condition				
Flagg Ranch to Colter Bay	100	10	0	25	1
Colter Bay to Moran Junction	No change from current condition				
Moran Junction to East Entrance	No change from current condition				
Moran Junction to South Entrance	No change from current condition				
Teton Park Road	0	0	0	0	0
Moose-Wilson Road	5	0	0	3	0
Antelope Flats Snowmobile Route	No change from current condition				

Concession Services

Present concessions affected in this alternative would be those permitted to run oversnow guided services from West Yellowstone, into Mammoth and Gardiner into YNP, and those located at Old Faithful. This includes snowmobile and snowcoach tours. Oversnow guided tours to Old Faithful from West Yellowstone, Mammoth, and Gardiner could no longer operate in that fashion because of the change to wheeled, mass transit access (West Yellowstone to Madison, and Madison to Old Faithful). This represents the greatest adverse impact on concessions, relative to lost business and the need to completely change business focus regarding access.

Staging at Norris and Madison would be limited. The logistics of moving employees, clients, or supplies from Mammoth to Old Faithful involve travel both oversnow and via plowed road. According to the concessioner, this could make the lodging operation at Mammoth less desirable from both an operating efficiency standpoint and because it would be less enjoyable to visitors traveling between Mammoth and Old Faithful (Comment on the DEIS, YNP Lodge Co.). The result could be a less viable operation at Mammoth. Guided snowmobile and snowcoach tours from Mammoth and Gardiner

would be less attractive, because the trip to Old Faithful becomes longer, and is not as logistically feasible for day trips. This could result in lost business at Mammoth, and higher costs that would adversely affect the service provider.

From the perspective of the operation at Old Faithful, the logistics of moving people, fuel, supplies, or garbage would no longer be limited by oversnow means. Material storage in the park's interior would be less of a problem. For both Old Faithful, to a degree, and West Yellowstone, a different national park clientele could be expected. The mode of access changes between the two, but the business of moving people from one to the other remains. Therefore, opportunities would exist for new or adapting concessions/businesses based in West Yellowstone. Businesses would have two years to adapt, until road plowing would be implemented in winter 2002-2003.

Yellowstone National Park Lodge Company suggests plowing the entire north and west side of the park, thereby easing logistics and making the northern route to Old Faithful as attractive by wheeled-vehicle as the route from the west. The NPS determined that plowing the road from Mammoth to Norris and then south to Madison is not feasible for several reasons. These sections of road receive more snow and wind during the winter season than other road sections proposed for plowing. Park maintenance staff is concerned that during the deep winter, the narrow curvy road template, coupled with high crosswinds would prohibit any degree of certainty in keeping the road open. Plowing during the late winter season, as considered in alternative C, is the most feasible option for plowing these segments.

Implementing any alternative that might substantially affect a concessioner would require negotiation between the NPS and the concessioner, or be deferred until a new concessions contract is awarded.

Concessions or services operating at other locations in the parks or from other gateways would not be affected greatly. Current circumstances are attractive to snowmobilers who enter at the East and South Entrances to YNP. These circumstances would change in this alternative. Snowmobilers would no longer be able to travel from the other entrances to West Yellowstone (or the reverse) to stay overnight. Also snowmobilers would no longer be able to run the "Grand Loop." These circumstances affect a small percentage of use in the parks, most often on holiday weekends, and would have less effect on guides who facilitate this use. Most guided tour concessions engage in day use but offer some specialized Grand Loop trips with an evening stay in West Yellowstone.

Conclusion

Due to the net lack of change in access to YNP through the West Entrance, this alternative would result in negligible, short-term impacts on visitor access. In the future there could be adverse effects if the demand for available access to Old Faithful exceeds the capacity for parking at that location. Although oversnow use would be eliminated between West Yellowstone and Old Faithful, the introduction of alternative modes of

transportation would surpass the level of access currently realized through existing transportation modes. Access would not be impacted at other locations in YNP. Short-term impacts to visitor access in GTNP and the Parkway would be minor.

Effects on Visitor Experience — Yellowstone National Park

The amount and type of winter visitor opportunities offered in YNP under alternative B are provided in Table 87.

Table 87. YNP Visitor opportunities available under alternative B.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	154	-30	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Groomed motorized route, snowcoach only	0	0	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Groomed motorized trail	6	+6	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Plowed route	106	+30	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Groomed nonmotorized	47	+10	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Warming huts	9+/-	3	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Backcountry	2.2 million acres	Some restrictions in about. 700,000 acres	Contingent on snowfall in northern portion of park	None

Visitor Satisfaction and Experience

Opportunities to View Wildlife. Under alternative B visitor access from the West Entrance to Madison and south to Old Faithful is provided via a mass transit shuttle bus. Because visitors riding on the shuttle would be traveling in groups, wildlife viewing would rarely be a solitary or individualized experience. If wildlife habituates to the new travel patterns of the shuttle, wildlife viewing on this road section could be improved. Wildlife viewing opportunities on other road segments would be the same as under alternative A, no action.

Opportunities to View Scenery. Some views along the road segment from West Entrance to Old Faithful would be obstructed by snow. These types of impacts occur intermittently and generally on one side of the road for about 4 miles from the West Entrance to Madison Junction. From Madison Junction south to Old Faithful this type of terrain occurs intermittently for about 4 miles. Snow berms in this type of terrain could exceed 12 feet and would obstruct views. In areas where the terrain is open and flat, snow berms would be generally less than 6 feet (assuming snowfall accumulation of 95 inches). Snow blowing and removal could mitigate these impacts in some areas. However, visitors would experience short-term moderate adverse impacts on their

opportunities to view scenery along these road segments. These impacts would vary with the time of year, the type of vehicle used, and the amount of snowfall. Views along other park roads would not be impacted.

Because of the required use of mass transportation from West Yellowstone to Old Faithful visitors would not experience the personal freedom to stop and view scenery at will.[35]

Safety. The separation of some snowmobile and ski trails would have a minor beneficial effect on all users. An aggressive information program would provide visitors with more access to safety information as well as trail conditions and weather alerts.

Quality of the Groomed Surface. Late night closures would improve the condition of the groomed surface by allowing the groomed surface to hardened overnight. Under this alternative the poorest of the snow road sections from West Entrance to Old Faithful would be plowed. If eliminating oversnow travel displaces use to the park's eastern side, the quality of the snow surface there would decline.

The Availability of Access to Winter Activities or Experiences. This alternative eliminates snowmobile and snowcoach travel from the West Entrance to Old Faithful. In addition the road plowing option eliminates the opportunity for snowmobile and snowcoach riders to experience the entire Grand Loop oversnow. About 10% of winter day visitors indicated that they traveled the entire Grand Loop (Littlejohn 1996). For visitors wishing to visit more than Old Faithful in one day, this alternative will likely require some advance planning to access the YNP by different transportation modes. A limited number of private vehicles and buses would be allowed to access Old Faithful by reservation only. For these reasons alternative B would eliminate or detract from several critical characteristics of the desired winter experience for a large number of participants (about 48% of all winter users in 1998-99).[36]

Visitors who are unable, cannot afford, or do not wish to ride a snowmobile or snowcoach would have access via a shuttle vehicle to Old Faithful. Because the winter experience at Old Faithful has not been available to these users, alternative B would increase opportunities for this type of experience. However, the number of potential visitors who would utilize this form of access is unknown. Due to lack of public support for this alternative, the beneficial effects from this increase in opportunities are expected to be negligible.

[35] Impromptu stops by snowcoaches to view scenery and wildlife are frequent occurrences under current operations and there is no reason to assume that this situation would change.
[36] In recent surveys, plowing the road as a management option received support from only 4.2% of respondents (Duffield et al. 2000a, 2000b, 2000c). Results from the winter visitors survey indicated that under this alternative, YNP would experience an 18.4 % decrease in visitation. Similarly, of the public comments on the DEIS that voiced support for a particular management action, plowing the road received the least support (less than 1%).

This alternative would not affect oversnow access via the East, South, and North Entrances. However, the addition of another mode of transportation would add a degree of difficulty to trip planning for all winter visitors to YNP. These visitors, particularly those entering from the north, may choose to avoid the problems of transferring from oversnow travel to transit busses at Madison Junction and enter the park via the West Entrance.

The addition of groomed motorized trails would create a less maintained experience for motorized users, which has not previously been available to park visitors.

Availability of Information. Additional visitor contact stations, warming huts and an aggressive information program would enhance visitor safety and understanding of the winter environment.

Quiet and Solitude. Park visitors riding the shuttle bus on busy weekend days would find little opportunity for solitude on the road from West Yellowstone to Old Faithful. Because of the requirement for mass transit, visitors may experience more crowding at attractions such as Old Faithful, Black Sand Geyser Basin, and at the warming hut at Madison Junction. Snowmobilers that currently use the West Entrance may be displaced to other areas of the parks. This displaced use would adversely affect the ability of the snowmobile visitor to find solitude in the parks, and may increase use at attraction sites such as West Thumb and the Grand Canyon of the Yellowstone. The implementation of use limits in some areas of the park would mitigate these effects.

Because use in important or sensitive resource areas is restricted to designated trails, backcountry skiers may find reduced opportunities for solitude under alternative B.

Under this alternative, all oversnow vehicles would be required to meet strict sound standards. These standards would be implemented at various levels over the next 10 years. While the short-term changes in the soundscape would be minor, the long-term goal of reducing snowmobile sound emissions would greatly enhance the ability to experience quiet in YNP. The use of mass transit shuttle buses would also increase opportunities to experience quiet, particularly near the West Entrance to Old Faithful travel corridor.

Clean Air. Under alternative B, all oversnow vehicles would be required to meet strict emissions standards. These standards would be implemented at various levels over the next 10 years. While the short-term (less than 5 years) changes in visitor experience would be minor, the long-term goal of reducing snowmobile emissions and the use of mass transit shuttle buses would greatly enhance the ability to experience clean air in YNP. These effects would be particularly beneficial at the West Entrance and Old Faithful.

Conclusion

Alternative B would eliminate or detract from several critical characteristics of the desired winter experience. These adverse impacts would affect winter visitors that access YNP via the West Entrance on snowmobiles and in snowcoaches (about 48% of all winter visitors). This action would result in major to moderate adverse impacts to the desired winter experience of these visitors.

Plowing the road from the West Entrance to Old Faithful would create berms of snow that would limit opportunities to view scenery in some areas. Logistically, travel in YNP would become more complex, particularly for travelers entering the park from the north. This action would have a direct minor to moderate adverse impact on the desired winter experiences of visitors traveling these corridors.

The winter experience at Old Faithful has not been available to park visitors who do not wish or who cannot afford to ride a snowmobile or snowcoach. Because alternative B would provide a previously unavailable winter experience, it would have benefits for park visitors in this group. However the magnitude of effect of this action is expected to be negligible.

The reduction of snowmobile emissions and sound levels would, over time, provide increased opportunities for clean air, and natural quiet. The result of these actions would result in moderate to major beneficial improvements to the desired visitor experience.

Under specific circumstances, the adaptive management provisions of this alternative may result in area closures. If monitoring or scientific studies regarding winter visitor use, natural resources, and other park values indicate that sections of the park must be closed or certain uses restricted to protect park values (for example, snowmobiling or backcountry skiing), some or all visitor experiences in the closure area would be eliminated (see Chapter II, *Adaptive Management*). These areas of closure would result in direct localized adverse impacts on the desired winter visitor experience. However, the long-term protection of these resources would provide major benefits to the desired visitor experiences park-wide.

Effects on Visitor Experience — Grand Teton National Park and the Parkway

The amount and type of winter visitor opportunities offered in GTNP under alternative B are provided in Table 88.

Table 88. GTNP Visitor opportunities available under alternative B.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	2.1	0	December to April†	Late night closure
Groomed motorized route, snowcoach	2.1	0	December to April†	Late night closure
Groomed motorized trail	34.0	0	December to April†	Late night closure
Plowed road	100.0	0	December to April†	Late night closure
Ungroomed motorized trail or area	11.3	-24.3	December to April†	Late night closure
Groomed nonmotorized	0	0	December to April†	Late night closure
Ungroomed nonmotorized trail or area	32.9	6.5	December to April†	Late night closure
Warming huts/Interpretive centers	6.0	4.0	December to April†	Late night closure

† Variable, dependent on snow conditions

Visitor Satisfaction and Experience

Opportunities to view wildlife and scenery. Visitors on plowed roads, the CDST, and Jackson Lake would continue to enjoy wildlife and scenery viewing. Fewer viewing opportunities would be available for snowmachine users along the Teton Park Road and on Jackson Lake. Viewing opportunities for nonmotorized users in these areas would be similar to the no action alternative.

Safety (the safe behavior of others). Eliminating oversnow vehicles from the Teton Park Road would result in greater separation of motorized and nonmotorized users compared to alternative A. Separation of the CDST from the highway on a newly constructed, year-round pathway would enhance safety.

Quality of the groomed surface. There would be no fewer groomed surfaces in this alternative than in alternative A. Grooming more frequently would enhance the surface of the Grassy Lake Trail. Relocating the CDST to a separate path from Colter Bay to Flagg Ranch would improve the snow quality of the groomed surface while separating auto traffic from snowmachines.

The availability of access to winter activities or experiences. The forms of access would remain the same as in alternative A, but fewer miles of ungroomed motorized trails would be available. Ice fishing opportunities via snowmobile would be lost on Jackson Lake over time. Currently this represents a quarter of the angling that occurs year-round. Because snowmobiles would no longer be permitted on Jackson Lake, some backcountry skiers would find travel more difficult, particularly to Webb Canyon.

Availability of information. Increased and enhanced visitor programs, facilities, and interpretive opportunities would better meet the expectation and need for information.

Quiet and solitude. Reducing motorized sound levels over time and separating uses on the Teton Park Road would enhance quiet use opportunities, particularly for nonmotorized visitors. Opportunities for solitude would be greatly increased for nonmotorized uses. The sound of snowplanes would continue to impact backcountry users in GTNP in some areas west of Jackson Lake.

Areas of the park that have previously not experienced high levels of snowmobile use may experience an increase. Snowmobile users that currently enter the parks from the West Entrance of YNP may be displaced to other areas of the parks if mitigating interim use limits are not implemented. This displaced use would adversely affect the ability of the snowmobile visitor to find solitude and quiet in the parks, and could increase levels of use particularly from the South Entrance.

Clean air. Over time reduction of allowable emission levels, combined with separation of uses on the Teton Park Road would help meet expectations for clean air, particularly for nonmotorized users.

Conclusion

Changes in opportunities for visitor experience relating to wildlife and scenery viewing would be negligible. Separating user groups within the park and improving groomed surfaces would result in moderate benefits to safety. Access to winter activities would decrease moderately due to the net loss of areas available for snowmobile use. There would be a major beneficial improvement to visitor experience due to greatly increased availability of information, interpretation, and winter programs. Generally, there would be a moderate beneficial impact to opportunities for quiet and solitude. Opportunities to appreciate clean air would be moderately to greatly improved, particularly in the Flagg Ranch area.

IMPACTS OF IMPLEMENTING ALTERNATIVE C

Effects on the Socioeconomic Environment

Alternative C contains several provisions for relatively minor changes in trails management and grooming within YNP and GTNP. Most of these changes would not substantially affect visitor decisions on whether to visit the parks for recreation. Like alternative B, the proposal to plow the road from West Yellowstone to Madison Junction to Old Faithful has the potential to significantly impact GYA visitation levels and, therefore, visitor expenditures and the overall level of economic activity within the GYA.

Regional Economy. The impacts of alternative C with regard to plowing the West Yellowstone to Old Faithful road are the same as for alternative B. The effects of alternative C on visitation and visitor expenditures in GTNP and the Parkway are expected to be the same as alternative B.

In addition to the plowing of the West Yellowstone to Old Faithful road segment, alternative C proposes plowing the road from mid-February to mid-March from Mammoth to Norris to Madison for auto and bus use. Alternative C proposes to allow only snowcoach, ski, and snowshoe travel in the eastern portion of the park (Norris to Canyon to Fishing Bridge roads) from mid-February to mid-March. It is unknown if the combination of decreased snowmobiling opportunities and increased auto and ski opportunities would effect overall winter visitor numbers.

Three-State Regional Economy. The impacts of alternative C on the three-state regional economy with regard to plowing the West Yellowstone to Old Faithful road are the same as for alternative B.

Minority and Low-Income Populations. It is anticipated that the impacts on minority and low-income populations from the proposed alternative C actions would be the same as those found under alternative B.

Social Values. It is anticipated that the impacts on social values from the proposed alternative C actions would be the same as those found under alternative B.

Nonmarket Values. It is anticipated that the impacts on nonmarket values from the proposed alternative C actions would be similar to those found under alternative B. The exception is that under alternative C, there would be no benefits to snowmobile users from a requirement to use clean and quiet technology in the future.

Conclusion

Like alternative B, alternative C road plowing actions would have a negligible to minor impact on the five-county and three-state economies through reduced visitation and nonresident visitor expenditures. These expenditure reductions may be a moderate negative impact on small communities adjacent to YNP, primarily West Yellowstone. The alternative C road plowing actions would also have a moderate negative impact on total current trip nonmarket visitor benefits (through reduced visitation) and a minor positive impact on nonmarket benefits through improved winter access to Old Faithful. Low-income visitors could realize a minor to moderate benefit from the alternative C actions, which would make access to the YNP more affordable.

Effects on Air Quality and Public Health

Like Alternative B, under Alternative C snowmobiles would no longer enter YNP at the West Entrance and travel to Old Faithful. These snowmobiles and snowcoaches would be displaced by wheeled-vehicles that would operate on a plowed road from the West Entrance to Old Faithful. Alternative C would have fewer mass transit vans operating to Old Faithful from the West Entrance than alternative B, and only bio-based lubricants and 10% ethanol fuel blends would be sold in the park for all vehicles. Table 89, Table 90, and Table 91 summarize the results of CO modeling for six locations in the three parks for alternative C. Table 89 and Table 90 show the predicted maximum 1-hour

average CO concentrations and the calculated maximum 8-hour average CO concentrations, respectively. Table 91 also provides the percent contribution of each vehicle type, including snowplows, to the maximum CO concentrations for the six locations. Table 92 and Table 93 provide corresponding model results for PM_{10} for the same locations and conditions as those for CO.

Visibility

The visibility assessment indicates that under this alternative, vehicular emissions would not cause any perceptible visibility impairment near the West Entrance or along the roadways. Perceptible visibility degradation could occur near Old Faithful and Flagg Ranch when vehicles idle for extended periods.

Conclusion

As noted in Table 89, Table 92, and Table 93, the model predicts major beneficial impacts relative to alternative A at the West Entrance and along the West Entrance to Madison roadway. Like alternative B, both CO and PM_{10} concentrations would be reduced by more than 85%. Moderate CO reductions are predicted for alternative C at the Old Faithful staging area, and a minor beneficial impact on CO concentrations is predicted at the Flagg Ranch staging area and along the Flagg Ranch to Colter Bay roadway. For PM_{10} a major beneficial impact would be realized at the Old Faithful and Flagg Ranch staging areas, and a moderate beneficial impact is predicted along the Flagg Ranch to Colter Bay roadway.

Table 89. Maximum 1-hour average CO concentrations for alternative C.

Location	1-hr Maximum Concentration (w/o Background) (ppm)	1-hr Maximum Concentration (w/Background) (ppm)	Change Relative to alternative A (w/o Background) (%)
West Yellowstone Entrance	0.60	3.60	97.9
West Entrance to Madison Roadway	0.30	3.30	97.5
Old Faithful Staging Area	0.99	3.99	22.8
Flagg Ranch Staging Area	1.39	4.39	19.0
Flagg Ranch to Colter Bay Roadway	1.00	4.00	9.1
Mammoth to NE Entrance Roadway	0.30	3.30	0

Table 90. Maximum 8-hour average CO concentrations for alternative C.

Location	8-hr Maximum Concentration (w/o Background) (ppm)	8-hr Maximum Concentration (w/Background) (ppm)	Change Relative to alternative A (w/o Background) (%)
West Yellowstone Entrance	0.28†	1.69†	97.9
West Entrance to Madison Roadway	0.14†	1.55†	97.5
Old Faithful Staging Area	0.17	1.57	22.8
Flagg Ranch Staging Area	0.23	1.64	19.0
Flagg Ranch to Colter Bay Roadway	0.47†	1.88†	9.1
Mammoth to NE Entrance Roadway	0.14†	1.55†	0

†Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

Table 91. Vehicle contribution to CO concentrations for alternative C.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	0	0	27.5	54.0	2.3	1.5	14.7
West Entrance to Madison Roadway	0	0	23.1	58.4	1.6	1.0	15.9
Old Faithful Staging Area	77.9	0.9	6.0	12.0	0.1	0.1	3.0
Flagg Ranch Staging Area	78.9	0.8	6.1	12.0	0.1	0	2.0
Flagg Ranch to Colter Bay Roadway	49.8	0	13.3	31.1	0.3	0.2	5.3
Mammoth to NE Entrance Roadway	0	0	26.5	66.8	0.6	0	6.1

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Table 92. Maximum 24-hour average PM_{10} concentrations for alternative C.

Location	24-hr Maximum Concentration (w/o background) (μg/m^3)	24-hr Maximum Concentration (w/background) (μg/m^3)	Change Relative to alternative A (w/o background) (%)
West Yellowstone Entrance	0.32†	23.32	99.3
West Entrance to Madison Roadway	0.32†	23.32	97.1
Old Faithful Staging Area	0.18	5.18	71.5
Flagg Ranch Staging Area	0.26	5.26	59.5
Flagg Ranch to Colter Bay Roadway	0.63†	5.63	33.3
Mammoth to NE Entrance Roadway	0.32†	5.32	0

†Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

Table 93. Vehicle contribution to PM_{10} concentrations for alternative C.

Location	Contribution (%)

	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	0	0	4.5	9.2	51.9	31.8	2.5
West Entrance to Madison Roadway	0	0	8.9	18.7	43.2	24.1	5.1
Old Faithful Staging Area	98.0	0	0	0	1.0	1.0	0
Flagg Ranch Staging Area	98.8	0	0	0	0.7	0.4	0
Flagg Ranch to Colter Bay Roadway	39.8	0	9.9	19.4	19.6	7.9	3.3
Mammoth to NE Entrance Roadway	0	0	20.3	42.8	33.0	0	3.9

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Effects on Public Safety

The safety-related effects of plowing the road from West Yellowstone to Old Faithful would be similar to those of alternative B. However, potential for visitor conflicts on this road would increase due to the absence of shuttle buses and reservation limitations on private wheeled-vehicles. Unregulated private wheeled-vehicle access to both road segments would have moderate adverse impacts on the safety of park visitors. Some visitors entering the YNP in private vehicles would be ill-prepared for the harsh environment and dangerous winter road conditions. This would result in increased motor vehicle accidents, vehicle-wildlife collisions, and risk of injury due to exposure to extreme winter conditions. The late season plowing of the roadway segments from Madison to Mammoth would have the same effects as plowing the road from West Yellowstone to Old Faithful. Restricting use on the road from Norris to Canyon to snowcoaches only would reduce the potential for visitor conflicts during one month of the season.

In GTNP this alternative would slightly decrease the potential for inter-modal conflict by widening the highway shoulder between Moran and Flagg Ranch. It would increase the potential for user conflict by developing or maintaining ungroomed trails for use by both motorized and nonmotorized uses in close proximity along the Teton Park Road and Signal Mountain Road.

Conclusion

Implementing this alternative would result in moderate adverse impacts to public safety in YNP. This is primarily due to the potential for increasing visitor conflicts and vehicle-animal collisions that would result from plowing several road segments (in the absence of offsetting beneficial effects or mitigation). The safety effects of a greater separation of uses would be negligible. Impacts to public safety are expected to be minor and adverse due to the introduction of potential user conflicts.

In GTNP the widened highway shoulder for the CDST would only negligibly improve safety, because it would not extensively alter the actions currently in place to separate snowmobile and wheeled-vehicle use along the trail.

Effects on Geothermal Features

Under alternative C the park roads would be groomed near the geothermal features described in alternative B. The impacts on those features described in alternative B would be similar under this alternative.

Plowing the road from West Yellowstone to Madison and Madison to Old Faithful would have similar impacts on geothermal features as those described in alternative B. There could be increased adverse impacts on geothermal features given no fall closure along the plowed road, and visitors would be able to access the features along the road throughout the fall and early winter.

Access to Old Faithful by both snowmobiles and wheeled-vehicles would have similar impacts on Old Faithful features as described under alternative B.

The number of nonmotorized groomed trails in geothermal areas would increase. The geothermal areas included in this activity are Mammoth Terraces, Lone Star Geyser Basin, Norris Geyser Basin, the lower geyser basin, and Fountain Flats. New groomed trails would increase access and in turn increase potential adverse impacts on geothermal areas. Overall, the proposed new groomed nonmotorized trails would result in a minor increase in impacts on geothermal basins.

The construction of a Norris warming hut would have the same impacts on geothermal features as those described under alternative A. Winter campsites would be provided at Old Faithful, which could increase the amount of visitor use overnight and of the geothermal basin. More visitors in the area would cause minor increases in adverse impacts on the geothermal features. Unregulated backcountry use would have the same impacts on geothermal features as described under the no action alternative. Increased interpretation opportunities would have the same beneficial impacts on geothermal features as described under alternative B.

Conclusion

Actions in alternative C could result in an overall increase in human access to geothermal areas at Old Faithful, Norris, West Thumb, and in areas located along the roads from Madison to Old Faithful. These actions include plowed roads, longer fall and spring seasons, warming huts, winter camping, spring plowing, groomed motorized and nonmotorized trails, and nonrestricted backcountry use. As a result there would be minor incremental long-term degradations to thermal features, and in some cases permanent loss of certain features. By increasing interpretative opportunities, some of the effects of increased use could be mitigated.

Water and Aquatic Resources

Potential pollution sources are the same as described in alternative A. The potential impacts on water quality would be the same as described in alternative B with the following exceptions.

There would be no change in risk along the Teton Park Road ("low" risk) segment from that described in alternative A. There would be no change in the input of pollutants on the surface of Jackson Lake, hence no reduction in the risk of degradation in that water body.

The risk of water quality pollution would be decreased along the "low" risk Moose-Wilson Road segment with the prohibition of snowmobiles. The risk of water quality pollution would be increased along the "low" risk Antelope Flats Snowmobile Route with the increase of snowmobiles on that segment.

Table 94.[37] Snowmachines and associated risk levels for alternative C.

Road Segment	Risk Rating†	Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. A*		Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. C*	
		SM	SC	SM	SC
Mammoth to Norris	Medium	641	69	1176	63
West Entrance to Madison	Medium	7759	127	0	0
Madison to Norris	High	3458	73	588	56
Norris to Canyon Village	Low	2214	47	672	48
Canyon Village to Fishing Bridge	High	2370	50	3872	48
Fishing Bridge to East Entrance	Medium	983	0	1809	0
Fishing Bridge to West Thumb	Medium	2627	55	5208	63
Madison to Old Faithful	High	7818	165	0	0
Old Faithful to West Thumb	Medium	3560	73	5746	68
West Thumb to Flagg Ranch	Medium	4219	103	7728	96
Grassy Lake Road	High	184	0	400	0
Flagg Ranch to Colter Bay	Low	379	0	800	0
Colter Bay to Moran Junction	High	248	0	250	0
Moran Junction to East Entrance	Medium	49	0	50	0
Teton Park Road	Low	156	0	0	0
Moose-Wilson Road	Low	6	0	6	0
Antelope Flats Snowmobile Route	Low	0	0	0	0

Conclusion

Deposition into snowpack would continue to occur from 2-stroke engine emissions along groomed park roads in YNP and GTNP. The effect of this deposition on water quality is undetermined, but there is currently no evidence of measurable changes in water quality or effects on aquatic resources. It is possible that accumulations of pollutants in aquatic systems may have adverse impacts on wetlands and aquatic resources downstream from

[37] SM = Snowmobile, SC = Snowcoach; the source of pollutants is emissions from snowmobiles, which produce (conservatively) ten times as many emissions per mile as most wheeled vehicles. Single snowcoaches produce fewer emissions then single snowmobiles.
†High = within 100 meters of aquatic system on 76% to 100% of the road segment; Medium = within 100 meters on 51% to 75% of the road segment; Low within 100 meters of rivers less than 50%.

high risk road segments. Oversnow vehicle use in this alternative involves localized high risk to surface water quality, but reduces oversnow vehicle-miles traveled along high risk road segments in the three park units by about 62%. Snowmobile and snowplane use on Jackson Lake would continue the risk of moderate to major adverse impacts on water quality in that water body. Minor to moderate long-term adverse impacts on water resources throughout GTNP and the Parkway could occur because of the increased number of winter use opportunities. Minor short-term water quality and wetland impacts could occur in streams along the eastern side of US 89/287 as a result of CDST construction.

Mitigation

The portions of the CDST that would deviate from the road shoulder would be designed and sited to minimize impacts on all park resources including wildlife, vegetation, and wetlands. Focused water monitoring programs should be designed and implemented to determine whether there are specific aquatic resource effects from winter recreational use. The use of bio-based fuels by NPS and the availability of fuels in gateway communities may result in a minor decrease in pollutant deposition into snow. Best management practices would be used during the construction, reconstruction, or winter plowing of trails and roads to prevent unnecessary vegetation removal, erosion, and sedimentation. The release of snowpack contaminants into surface water could be mitigated by disconnecting snowmelt drainages from motorized trails. Any new or reconstructed winter use sanitary facilities would be constructed in locations and use advanced technologies that would protect water resources. A focused program of monitoring would reduce the uncertainty of impacts from oversnow vehicles, and if necessary, indicate best management practices that might be implemented.

Effects on Wildlife

Ungulates

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative C GTNP and the Parkway would groom about 66 miles for motorized use, an increase of about 30 miles over current management, and 4 miles for nonmotorized use. The new groomed motorized route will begin near the south boundary, follow the Gros Ventre River, and then parallel the eastern boundary up to Moran. YNP would groom 164 miles for motorized use, a decrease of 20 miles, and 47 miles for nonmotorized use. This represents an increase of 10 miles over current management.

In GTNP effects related to packed trails would be greater than those under alternative A. The elimination of a packed road surface from West Entrance to Old Faithful would decrease impacts associated with groomed roads relative to alternative A.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause injury and death to wildlife, especially in poor lighting conditions and during snowfall, and can cause displacement from preferred habitats.

The addition of 30 miles of oversnow motorized trail in GTNP could result in moderate to major impacts on wildlife. The new trail along the Gros Ventre River would displace ungulates, primarily moose and elk, from the river corridor and inhibit movements within and among winter ranges in the southern part of the park. The periodic departure of the CDST from the highway shoulder to scenic diversions could also impact ungulates, especially moose on the segment from Moran to Jackson Lake. In YNP the associated effects of oversnow motorized vehicles would be reduced due to the plowing of the route from West Yellowstone to Old Faithful.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to ungulate movements (Aune 1981). In addition plowed roads, like groomed roads, also may provide an energy efficient mechanism for wildlife movements, including bison, elk, and moose. Under alternative C the effects described above are associated with about 106 miles of road in YNP, an increase of 30 miles over existing management to accommodate private wheeled-vehicles from West Entrance to Old Faithful. The miles of plowed roads in GTNP and the Parkway would increase marginally from about 100 miles to 104 miles to allow for wheeled-vehicle access on the Moose-Wilson Road.

In YNP the plowed road from West Entrance to Old Faithful would result in more snow berms, thus potentially increasing fragmentation along this segment. An increase in ungulate use of the plowed road as compared to the currently groomed road is not expected because plowed roads do not offer additional energy savings over groomed roads. The effects of plowed roads in GTNP would be essentially the same as those described in alternative A.

Effects of motorized use of plowed roads. The effects of plowed roads are similar to those of groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause injury and death for wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall, and can cause displacement from preferred habitats.

The use of plowed roads by wheeled-vehicles may increase wildlife-vehicle collisions and displacement over current rates along the road segment from West Yellowstone to Old Faithful. These effects would be increased relative to alternative B because alternative C does not call for mass transit, nor does it prohibit late night travel. In addition plowing the Moose-Wilson Road would potentially impact moose that winter along this corridor.

Effects of nonmotorized use of groomed and designated ungroomed routes. The primary effects of nonmotorized use on ungulates are displacement from preferred habitats, especially geothermal areas that are important for winter survival in YNP, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative C, YNP increases nonmotorized opportunities by grooming an additional 10 miles (from 37 miles to 47 miles) and adds 8 more miles after motorized use ceases late in the winter season. Ungroomed trails in GTNP and the Parkway increase from 26 miles to 28 miles, and groomed trail increase 4 miles.

Overall, the potential for an increase in adverse effects is low because trails would not be located in areas of high importance to wintering ungulates. Exceptions include trails located near thermal areas (e.g., Mammoth Hot Springs or Old Faithful), or in other areas of ungulate use in the winter (e.g., moose near the Gros Ventre campground trail). Similar to alternative B, these trails could have minor effects on ungulates.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and ungulates may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Impacts under this alternative generally would be the same as in alternative A. In GTNP moderate to major adverse impacts on bighorn sheep would continue, as well as potential impacts to moose, elk, and bison on Blacktail Butte and Wolff Ridge.

Effects of the presence and use of winter support facilities. Increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. Alternative C proposes an increase in the number and size of warming huts and other day-use facilities. In addition this alternative proposes the establishment of winter campsites in the Old Faithful area. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and areas where existing facility size is currently inadequate (e.g., Tower, Norris, and Canyon). Warming huts near ungulate winter range important to elk, deer, and bison would potentially increase human use and consequently reduce habitat effectiveness. However, over time the predictable nature of the recreation expected to occur in the area may allow species to habituate to increased human activity. The effects of these huts on ungulates would be the same for all alternatives.

Federally Protected Species

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative C, GTNP and the Parkway would groom about 66 miles, an increase of about 30 miles over current management and 4 miles for nonmotorized

use. The new groomed motorized route would begin near the south boundary, follow the Gros Ventre River, and then parallel the eastern boundary up to Moran. GTNP would also groom new nonmotorized trails in the Gros Ventre River Campground and at Two Ocean Lake. YNP would groom 164 miles, a decrease of 20 miles, and 47 miles for nonmotorized use, an increase of 10 miles over current management.

Overall effects related to packed trails would increase as compared to alternative A, especially in GTNP. Because the area of the new groomed snowmobile route in the southern part of the park is not lynx habitat, impacts on lynx would only be expected to increase in the Two Ocean Lake area.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats. To date oversnow motorized vehicles have not killed any federally listed species.

In GTNP the proposed snowmobile trail from Jackson along the east boundary of the park to Moran could result in a significant increase in snowmobiling activity along the Gros Ventre River, up to the Triangle Ranch along the eastern park boundary, and along US 89 to Moran Junction. This trail would introduce snowmobiling use adjacent to areas such as Elk Ranch, Uhl Hill, and Wolff Ridge, which are important winter range for ungulates, and subsequently, wolves. Snowmobiling near these areas could result in human-wolf interactions, displacement of prey (primarily elk), and consequently displacement of wolves. The periodic departure of the CDST from the highway shoulder to scenic diversions could also displace lynx and snowshoe hares. Effects to other species are similar to those in alternative A.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to wildlife movements (Aune 1981). In addition similar to groomed roads, plowed roads may influence wildlife movements and distributions by facilitating travel for wildlife into areas that would normally be inaccessible due to deep snow. Under alternative C the effects described above are associated with about 106 miles of road in YNP, an increase of 30 miles over existing management to accommodate private wheeled-vehicles from West Entrance to Old Faithful. The miles of plowed roads in GTNP and the Parkway would increase marginally from about 100 miles to 104 miles to allow for wheeled-vehicle access on the Moose-Wilson Road.

Impacts of plowed roads on federally protected species would be the same as alternative A.

Effects of motorized use of plowed roads. The effects of traffic on plowed roads are similar to those of traffic on groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause injury and death for wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall, and can cause displacement from preferred habitats.

The road from West Yellowstone to Old Faithful would be plowed and open to public access two weeks earlier under this alternative, potentially leading to an increase in human-bear interactions during the pre-denning period. However, none of the radio-collared bears in YNP have denned along this road segment, and only about 10% of bears are still active at this time (Haroldson et al. in prep.). This alternative also calls for extending the length of the winter use season from the South Entrance to West Thumb by two weeks from mid-March to the beginning of April. This period of time overlaps with den emergence for bears (about 65% of bears are out of their dens by April (Haroldson et al. in prep.). Consequently, this alternative feature may have minor to moderate adverse effects on bears, including displacement and habituation of bears to human foods and garbage associated with human developments. This may lead to more bear-human confrontations and management actions. Effects related to plowed roads in GTNP would remain the same as under current management.

Other impacts related to displacement would be the same as those under alternative A. Collision impacts may be greater than those under alternative A because the roads are open for a longer period.

Effects of nonmotorized use on groomed and designated ungroomed routes. The primary effects of nonmotorized use on wildlife are displacement from preferred habitats and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative C, YNP increases nonmotorized opportunities by grooming an additional 10 miles (from 37 miles to 47 miles) and adds 8 more miles after motorized use ceases late in the winter season. Ungroomed trails in GTNP and the Parkway increase from 26 miles to 28 miles and groomed trails increase by 4 miles.

Overall, the potential for an increase in adverse effects to wolves is low because trails would not be located in areas of high importance to wintering ungulates and consequently, wolves. Exceptions include trails located near thermal areas (e.g., Mammoth Hot Springs or Old Faithful), or in other areas of ungulate use in the winter (e.g., the Gros Ventre campground trail). Lynx could be impacted by trails at Two Ocean Lake. Furthermore, when warranted the parks may close any area where federally protected species are observed. Other effects are the same as those under alternative A.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and federally protected wildlife species may only occur sporadically, they may cause displacement and additional energy expenditure and stress that reduces animals' chances of survival and reproduction.

Impacts under this alternative generally would be the same as in alternative A.

Presence and use of winter support facilities. Warming huts and campgrounds can cause habituation in some wildlife species by the presence of human food and garbage, and lead to human-wildlife conflicts. In addition increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. Alternative C proposes an increase in the number and size of warming huts and other day use facilities. In addition this alternative proposes the establishment of winter campsites in the Old Faithful area. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and areas where existing facility size is currently inadequate or nonexistent (e.g., Tower, Norris, and Canyon). Warming huts near ungulate winter range important to elk, deer, and bison would potentially increase human use and consequently reduce habitat effectiveness. Displacement of ungulates could lead to displacement of wolves. However, over time the predictable nature of the recreation expected to occur in the area may allow ungulates to habituate to the increase in human activity. Additional developments in or near lynx habitat could potentially displace lynx.

The construction of new campsites at Old Faithful, new and enlarged warming huts at Norris and Tower, and additional support facilities at GTNP (e.g., at Two Ocean Lake) may increase human use in those areas and may lead to minor negative effects on late winter and spring food availability for emerging bears in an area of currently low human use. Garbage and human foods improperly stored at park winter use destination areas can lead to adverse impacts on bears before and after the winter use season.

To date YNP does not have adequate winter garbage storage facilities, but will rectify this issue by constructing a winter garbage storage facility that is wildlife-proof in the Old Faithful, Grant, Lake, and Canyon areas (a feature of all alternatives). Similar to alternative B, the availability of plowed roads into the park's interior would allow for garbage removal, thus decreasing problems associated with habituation.

Compared to current management, impacts related to displacement would be greater due to the increase in number of facilities. Specifically, huts located in thermally influenced ungulate winter range could displace ungulates, and thus affect bison and elk carcass availability, important spring foods for grizzly bears. Because ungulates have been known to habituate to predictable human activities, any displacement would most likely be short term. The extension of the winter use season combined with increased human activity near new support areas may lead to more bear-human conflicts.

Species of Special Concern

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by:

- Facilitating travel into areas that would normally be inaccessible due to deep snow
- Inhibiting foraging activities of carnivores that tunnel beneath the snow to hunt subnivian prey
- Reducing subnivian prey availability by increasing mortality of these small mammals.

Under alternative C, GTNP and the Parkway would groom about 66 miles, an increase of about 30 miles over current management, and 4 miles for nonmotorized use. The new groomed motorized route will begin near the south boundary, follow the Gros Ventre River, and then parallel the eastern boundary up to Moran. GTNP would also groom new nonmotorized trails in the Gros Ventre River Campground and at Two Ocean Lake. YNP would groom 164 miles for motorized use, a decrease of 20 miles, and 47 miles for nonmotorized use, an increase of 10 miles over current management.

Impacts discussed under alternative A would potentially increase, especially in GTNP. Additional miles of groomed trail in GTNP could increase impacts on martens and fishers. New groomed trails are not in swan habitat.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The most likely impacts to park species of special concern are displacement from preferred habitats, and degradation of the aquatic environment from pollutants in the snowpack. Documented mortality caused by collisions with oversnow vehicles in the parks is rare. In 10 years only one of these species (a marten) was reportedly killed by a snowmobile in YNP (Gunther et al. 1998).

Impacts would increase relative to alternative A. The separation of the CDST from the plowed roadway would cumulatively increase displacement impacts associated with the use of both oversnow and wheeled-vehicles.

See *Water and Aquatic Resources*, Chapter IV for an assessment of the impacts of exhaust on the aquatic environment in the parks.

Effects of plowed roads. Similar to groomed roads, plowed roads also provide an energy efficient mechanism for wildlife movements. Under alternative C the effects described above are associated with about 106 miles of road in YNP, an increase of 30 miles over existing management to accommodate private wheeled-vehicles from West Entrance to Old Faithful. The miles of plowed roads in GTNP and the Parkway would increase marginally from about 100 miles to 104 miles to allow for wheeled-vehicle access on the Moose-Wilson Road.

Impacts related to plowed roads would increase slightly in YNP compared to alternative A. Effects related to plowed roads in GTNP would remain the same as under current management.

Effects of motorized use of plowed roads. The most likely impact to park species of special concern is displacement from preferred habitats and mortality caused by collisions.

Under alternative C impacts related to plowed roads would slightly increase in YNP as compared to alternative A. In particular swans that winter in open water habitats along

the plowed road from West Yellowstone to Old Faithful may be disturbed by the increase in wheeled-vehicle traffic along this route. If vehicles stop for people to get out to view swans, swans could be adversely impacted by displacement.

Effects of nonmotorized use on groomed and ungroomed designated routes. The primary effects of nonmotorized use are displacement from preferred habitats, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative C YNP increases nonmotorized opportunities by grooming an additional 10 miles (from 37 miles to 47 miles) and adds 8 more miles after motorized use ceases late in the winter season. GTNP and the Parkway increase ungroomed trails from 26 miles to 28 miles and add 4 miles of groomed trail.

Although the above effects may be increased due to the addition of nonmotorized routes, they are expected to be relatively minor because most routes would not be located in areas critical to species of special concern (e.g., adjacent to open water habitats and ungulate winter ranges).

Unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent than nonmotorized use on designated routes. Consequently, although encounters between backcountry users and species of special concern may occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction.

Impacts are generally as stated in alternative A — negligible to minor. If activity by species of concern is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Presence and use of winter support facilities. The primary effects of warming huts and campgrounds on species of special concern in the park are associated with increases in human activity and the subsequent disturbance and displacement of species or their prey. Alternative C proposes an increase in the number and size of warming huts and other day-use facilities. In addition this alternative proposes the establishment of winter campsites in the Old Faithful area. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and areas where existing facility size is currently inadequate (e.g., Tower, Norris, and Canyon).

Compared to current management, impacts related to displacement would be greater due to the increase in facilities. Specifically, huts located in thermally influenced ungulate winter range could displace ungulates, and thus affect bison and elk carcass availability for wolverines, fishers, and marten. Because ungulates have been known to habituate to predictable human activities, any displacement would most likely be short term. Impacts on other species of special concern would be the same as those under alternative A.

Conclusion

This alternative maximizes winter visitor opportunities for a range of experiences, while emphasizing motorized recreation. Consequently, effects on wildlife associated with oversnow and wheeled-vehicles increase. Plowing the road from Yellowstone to Old Faithful to accommodate private vehicles may lead to more collisions than under alternative B because there are no provisions for mass transit or restrictions on late night travel. Effects related to groomed trails and snowmobiles increase substantially in GTNP. The establishment of a groomed snowmobile trail from GTNP's south boundary to Moran along the eastern park boundary may negatively impact wildlife, including ungulates, wolves, and lynx. Periodic diversions of the CDST to points of interest may affect moose and lynx in the northern part of the park. In YNP the extension of the winter use season from mid-March to the beginning of April from the South Entrance to West Thumb combined with an increase in winter support facilities may result in an increase in grizzly bear–human conflicts. Effects may be mitigated to a degree by an increased emphasis on visitor education and interpretive opportunities, as well as increased administrative capability.

Although impacts on populations resulting from winter recreation are neither long term nor significant, impacts on individual members of the population can be important, leading to death either directly from collisions or continued harassment, or indirectly through management actions taken as a response to habituation to human presence and food. Although concerned about impacts on individuals, the NPS primarily provides for the protection of native animals populations from management actions (with the exception of federally protected species). For example, see Chapter II in NPS 77, Natural Resources Management.

Ungulates

- Effects of groomed roads and trails on animal movements – unknown if and to what extent beneficial effects outweigh negative effects. Effects would increase in GTNP and decrease in YNP relative to alternative A.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on: 1) mortality caused by collisions – adverse, negligible, and short term, and 2) displacement from preferred habitats – adverse, moderate to major, and short term. In GTNP effects would increase relative to alternative A. In YNP effects would decrease [relative to alternative A].
- Effects of plowed roads on: 1) habitat fragmentation – effects in YNP would increase over alternative A — adverse, minor, and short term; in GTNP effects would remain the same; and 2) animal movements – unknown if and to what extent beneficial effects outweigh negative effects; any effects would remain essentially the same as those associated with groomed roads in alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, minor, and short term; and 2) displacement from preferred habitats – adverse, moderate, and long term. Effects would increase relative to alternatives A and B in YNP and remain the same in GTNP.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, minor, and short term. Generally the same as alternative A, but may increase slightly.

- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, moderate, and short term. Impacts to bighorn sheep in GTNP would be moderate to major and long term if no mitigation is applied. Same as alternative A.
- Effects of the presence and use of winter support facilities on displacement – adverse, minor, and short term. May increase slightly relative to alternative A because more huts are proposed.

Federally Protected Species

- Effects of groomed roads and trails on animal movements: 1) bald eagles, grizzly bears, and wolves – no effect; and 2) lynx – adverse, negligible to major, and short term, depending upon lynx distribution and abundance in the parks. Increased groomed trails in GTNP would increase effects to lynx relative to alternative A.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement from preferred habitats – adverse, minor, and short term (wolves and lynx), adverse, negligible, and short term (bald eagles), and no effect (grizzly bear). Effects may increase for wolves relative to alternative A.
- Effects of plowed roads on: 1) habitat fragmentation – no effect on any of the listed species; and 2) animal movements – no known effect on any of the listed species. Same as alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – effects may increase over alternative A – adverse, negligible, and short term on bald eagles; adverse, minor, and short term on wolves, grizzlies; no known effect to date on lynx; and 2) displacement from preferred habitats – adverse, negligible, and short term on bald eagles; no known effect to date on wolves and lynx; adverse and minor to moderate for grizzly bears because of the longer winter use season.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, negligible, and short term on bald eagles; no effect on grizzly bears; no known effect to date on wolves; minor adverse effect on lynx. Same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, minor, and short term on bald eagles; adverse, negligible, and short term on grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx. Same as alternative A.
- Effects of the presence and use of winter support facilities on displacement – no affect on bald eagles; adverse, minor, and short term on grizzly bears (with mitigation) and wolves; unknown effect on lynx. May slightly increase relative to alternative A because more huts are proposed.

Species of Special Concern

- Effects of groomed roads and trails on 1) animal movements – no known effect on wolverines; adverse, negligible, and short term on fishers and martens; no effect on otters, swans, reptiles, amphibians, and fish; 2) foraging activities – adverse, negligible, and short term on marten; no effect on the other species; and 3) subnivian prey availability — adverse, negligible, and short term on marten; no effect on the other species. Impacts would generally increase relative to alternative A, especially in GTNP.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement – no known effect on wolverine; adverse, negligible, short term on fishers, marten; no effect on otters, reptiles, amphibians, fish; adverse, minor, short term on swans. Impacts would increase relative to alternative A, especially in GTNP.
- Effects of plowed roads on animal movements – no known effect on wolverines, fishers, and martens; no effect on otters, swans, reptiles, amphibians, and fish. Slight increase in effects in YNP relative to alternative A, no change in GTNP relative to alternative A.
- Effects of motorized use of plowed roads on 1) displacement from preferred habitats – adverse, negligible, and short term on wolverines, fishers, and martens; no effect on otters, reptiles, amphibians, and fish; adverse, negligible, and short term on swans; and 2)

mortality from collisions — adverse, negligible, and short term on otters and martens; no effect to date on other species. Effects may increase slightly relative to alternative A in YNP.

- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – no effect on wolverines; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; adverse, negligible, and short term on sagebrush lizard; no effect on rubber boa, amphibians, and fish. Same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible, and short term on wolverines and sagebrush lizard; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; no effect on rubber boa, amphibians, and fish. Same as alternative A.
- Effects of the presence and use of winter support facilities on displacement of potential prey (carcass) availability – adverse, minor to moderate, and short term on wolverines, fishers, and martens; no effect on swans, rubber boa, amphibians, and fish; no known effect on otters; adverse, minor, and short term on sagebrush lizard. May slightly increase relative to alternative A because more huts are proposed.

Mitigation

- In YNP campground use season should not be extended, and backcountry permits should not be issued to mitigate any possible impacts on grizzly bears due to the extended winter use season on the West Entrance to Old Faithful road.
- The implementation of current Bear Management Area (BMA) human use restrictions would help alleviate the risks of bear-human confrontations in spring habitats.
- Where motorized use occurs near active trumpeter swan habitats (i.e., open water), the route would be signed or plowed to prevent vehicles from stopping.
- Backcountry monitoring and administration should be implemented in GTNP. Additional area closures could be imposed if monitoring indicates such a closure was warranted for the protection of wintering bighorn sheep and moose.
- The effects of winter use on resident wolves should be monitored. Areas would be closed as necessary to protect winter and denning habitats.
- The entire length of the trail from Jackson to Moran Junction and from Moran Junction to Flagg Ranch should be patrolled to ensure that snowmobilers remain on the trail and do not illegally enter areas that are important winter range.
- The effects of the warming hut in the Two Ocean Lakes area would be monitored. If human-bear conflicts arise, close the facility.
- The use of groomed and plowed surfaces by bison and other ungulates would continue to be monitored.
- Snow track surveys for carnivores, including lynx, on both groomed and ungroomed routes would be conducted.

Effects on Natural Soundscape

Audibility Analysis — Combined Effects of All Wheeled and Oversnow Vehicles

Table 95 presents the acres of park land by road segment where any wheeled or oversnow vehicle noise would be audible under the two background conditions, “average” and “quiet,” as defined in the *Assumptions and Methodologies* section of this chapter. For each background condition, acreage is presented for three categories of audibility: 1) audible for any amount of time (labeled “audible at all”); 2) audible for 10% of the time or more; and 3) audible for 50% of the time or more. Appendix M contains tables with distances to audibility for each segment for each alternative.

Alternative C features the plowed road from the West Entrance of YNP to Old Faithful, plowing from Mammoth to Madison for part of the season, snowcoach-only use from Canyon Village to Fishing Bridge for part of the season, and the addition of a new snowmobile trail in Antelope Flats in GTNP. It also requires that all snowplanes on Jackson Lake meet the current limit of 86 dBA at 50 feet.

The results for alternative C show that for the "average" background conditions, wheeled and oversnow vehicles would be audible to some degree for over 188,000 acres in the three park units. For over 80,000 of those acres, wheeled or oversnow vehicles would be audible for at least 10% of the time during the day. For over 27,000 of those acres, they would be audible for at least half of the time during the day. These acreage totals increase by 9%, 14%, and 20% for the "quiet" background conditions for the three audibility categories, respectively.

The segment from Moran Junction to the South Entrance of GTNP carries a great deal of wheeled-vehicle traffic unrelated to the alternatives and contributes the greatest to the total acreage values for all three audibility categories. These amounts remain almost constant for all the alternatives.

The plowed road from Mammoth to the Northeast Entrance is a major contributor to the "audible at all" acreage (and to a lesser extent "audible 10% or more"), which remains virtually unchanged across all the alternatives.

Other key segments for all three audibility categories are from West Thumb to Flagg Ranch, from Fishing Bridge to West Thumb, from Old Faithful to West Thumb, and from Canyon Village to Fishing Bridge, all of which increase compared to the no action alternative.

Other major segments for the "audible at all" categories are the Antelope Flats snowmobile route and Jackson Lake with its snowplanes and snowmobiles. Snowplanes and snowmobiles on Jackson Lake are also major contributors to the "audible at all" categories, although the acreage is greatly reduced over the no action alternative because of the 86 dBA limit on snowplane sound levels.

The audibility acreage is greatly reduced for the West Entrance to Madison and Madison to Old Faithful segments due to the replacement of oversnow vehicles with wheeled-vehicles on the plowed road. For YNP the 50% time audible average increases by 29% over the no action alternative for average background conditions, due largely to increased snowmobile volumes on other road segments.

Table 95. Acres of park land affected by vehicle audibility for alternative C.

Road Segment	Miles	With Average Background Conditions			With Quiet Background Conditions		
		Audible at all	Audible 10% of the time or more	Audible 50% of the time or more	Audible at all	Audible 10% of the time or more	Audible 50% of the time or more
1. Mammoth to Northeast Entrance	47	16,126	5,445	0	16,822	6,342	0
2. Mammoth to Norris	21	11,400	761	0	12,372	1,043	0
3. West Entrance to Madison	14	5,260	78	0	5,555	91	0
4. Madison to Norris	14	6,748	268	0	7,142	296	0
5. Norris to Canyon Village	12	5,434	1,677	0	5,672	2,318	0
6. Canyon Village to Fishing Bridge	16	10,504	8,092	2,200	11,432	8,896	2,637
7. Fishing Bridge to East Entrance	27	12,692	5,268	0	13,744	6,588	0
8. Fishing Bridge to West Thumb	21	16,888	12,886	5,153	18,687	14,183	6,249
9. Madison to Old Faithful	16	6,157	1,660	0	6,521	1,927	0
10. Old Faithful to West Thumb	17	8,012	6,595	2,814	9,513	7,232	4,029
11. West Thumb to Flagg Ranch	24	13,788	10,767	5,133	16,018	11,989	6,931
12. Grassy Lake Road	7.6	3,033	0	0	3,303	0	0
13. Flagg Ranch to Colter Bay	15.6	7,731	3,453	0	8,443	3,859	0
14. Colter Bay to Moran Junction	10.2	4,647	2,460	0	5,040	2,694	0
15. Moran Junction to East Entrance	2	1,226	765	497	1,320	876	542
16. Moran Junction to South Entrance	26	21,714	14,812	11,293	23,842	17,207	11,996
17. Teton Park Road	15	7,805	0	0	8,512	0	0
18. Moose-Wilson Road	2.5	672	0	0	708	0	0
19. Antelope Flats Snowmobile Route	30	17,429	0	0	19,016	0	0
20. Jackson Lake	9.7	10,980	5,577	0	12,300	6,420	0
TOTAL		188,245	80,564	27,091	205,961	91,959	32,385

Average sound level analysis

To give a sense of the effect of the number of oversnow or wheeled-vehicles on a road segment, and their speed and sound level, Table 96 shows the computed hourly equivalent or "average" sound level (L_{eq}) over the daytime period. Levels are shown for each road segment at two distances, 100 feet and 4,000 feet, and for both open and forested terrain. These hourly L_{eq} values do not have the background sound level added in. Also, they cannot be compared against the background levels to assess audibility, since L_{eq} represents a long-term average of both quiet and loud moments.

The hourly L_{eq} at 100 feet are highest for the segment representing Jackson Lake, plus the YNP segments of West Thumb to Flagg Ranch, Fishing Bridge to West Thumb, Old Faithful to West Thumb, and Canyon Village to Fishing Bridge. At a distance of 4,000

feet away, these latter four segments along with the GTNP segments from Moran Junction to both the East and South Entrances have the highest L_{eq}.

There are major 16 dB to 18 dB reductions in the L_{eq} for the West Entrance to Madison and Madison to Old Faithful segments that would be plowed.

Table 96. Average hourly L_{eq} from wheeled and oversnow vehicle noise at two distances to each road segment for alternative C.

	L_{eq} at Distance (dBA)			
	Open Terrain		Forested Terrain	
Road Segment	100 feet	4,000 feet	100 feet	4,000 feet
1. Mammoth to Northeast Entrance	35	2	33	0
2. Mammoth to Norris	46	7	45	0
3. West Entrance to Madison	36	4	34	0
4. Madison to Norris	45	6	44	0
5. Norris to Canyon Village	46	7	45	0
6. Canyon Village to Fishing Bridge	53	13	51	5
7. Fishing Bridge to East Entrance	47	7	45	0
8. Fishing Bridge to West Thumb	53	13	51	5
9. Madison to Old Faithful	38	5	36	0
10. Old Faithful to West Thumb	54	14	52	6
11. West Thumb to Flagg Ranch	54	14	52	6
12. Grassy Lake Road	42	2	41	0
13. Flagg Ranch to Colter Bay	44	7	42	0
14. Colter Bay to Moran Junction	45	9	43	1
15. Moran Junction to East Entrance	47	13	45	5
16. Moran Junction to South Entrance	46	14	44	6
17. Teton Park Road	39	0	37	0
18. Moose-Wilson Road	27	0	25	0
19. Antelope Flats Snowmobile Route	39	0	37	0
20. Jackson Lake	54	8	52	0

Conclusion

Alternative C impacts about 104% of the acreage impacted by the no action alternative for the “audible at all” categories. The alternative impacts about 86% for the “audible 10% of the time or more” categories. For the “audible 50% or more” categories, the acreage are 115% and 122% higher than for the no action alternative (for the “average” and “quiet” backgrounds, respectively)

The increase in acreage for the “audible 50% of the time or more” categories relative to the no action alternative come from increases on the YNP segments of West Thumb to Flagg Ranch, Fishing Bridge to West Thumb, Old Faithful to West Thumb, and Canyon

Village to Fishing Bridge. These increases override the decreases on the plowed road segments from the West Entrance of YNP to Old Faithful.

Effects on Cultural Resources

The effects on cultural resources would be the same as those described in alternative B.

Conclusion

None of the actions described would adversely affect cultural resources.

Effects on Visitor Access and Circulation

Access

This alternative is similar to alternative B, except that the shuttle system is not a feature. Without the shuttle system, this alternative substantially reduces access to the park from 840 daily weekend visitors in February to about 220 given the same private vehicle access to Old Faithful described in alternative B. Roadway segments between Mammoth and Madison would be plowed from mid-February to mid-March, providing private vehicle access to the Norris destination area. Travel on these segments would be limited to traffic passing through the park, as private vehicle parking at Norris would be limited to 120 spaces (about 50% of summer season capacity).

Actions associated with this alternative that affect GTNP access include plowing the Moose-Wilson Road and maintaining a continuous snowmobile trail parallel to roadways on the eastern edge of the park between Jackson and Moran Junction, providing a connection to the CDST. Demand estimates are not available for this new snowmobile trail, but it is believed that many snowmobile enthusiasts would take advantage of this new regional access route to GTNP and the CDST. This alternative would not alter current park circulation patterns. Wheeled-vehicle circulation also would be enhanced through this alternative by providing continuous access along Moose-Wilson Road.

Closing YNP's West Entrance to oversnow access could enhance the importance of access for snowmobiles through GTNP and the Parkway to YNP. Winter scenery and wildlife in YNP will continue to attract potential visitors. Access for the number of snowmobile and snowcoach visitors currently using the West Entrance could shift to the South Entrance. The staging for oversnow opportunities from these routes could increase use at Flagg Ranch. Table 97 depicts reasonably foreseeable distribution of vehicle use under alternative C. It shows a loss of 554 snowmobile trips from West Yellowstone to Madison and 489 from Madison to Old Faithful. There would be a net decrease of 20% in snowmobile vehicle-miles traveled in the three park units and a net increase of 17% wheeled-vehicle-miles traveled. Snowcoach miles traveled would decrease by 42%.

Table 97. Alternative C motorized use.

Road Segment	Average Daily Vehicle Use January-February				
	Autos	Vans	Snowcoaches	Snowmobiles	Buses
Mammoth to Northeast Entrance	No change from current condition				
Mammoth to Norris until 2/29[38]	0	0	4	56	0
West Entrance to Madison	60	10	0	0	2
Madison to Norris	0	0	4	42	0
Norris to Canyon Village until 2/29	0	0	4	56	0
Canyon Village to Fishing Bridge before 2/29	0	0	3	242	0
Fishing Bridge to East Entrance	0	0	0	67	0
Fishing Bridge to West Thumb	0	0	3	248	0
Madison to Old Faithful	91	14	0	0	2
Old Faithful to West Thumb	0	0	4	338	0
West Thumb to Flagg Ranch	0	0	4	322	0
Grassy Lake Road	No change from current condition				
Flagg Ranch to Colter Bay	No change from current condition				
Colter Bay to Moran Junction	No change from current condition				
Moran Junction to East Entrance	No change from current condition				
Moran Junction to South Entrance	No change from current condition				
Teton Park Road	No change from current condition				
Moose-Wilson Road	10	0	0	0	0
Antelope Flats Snowmobile Route	0	0	0	25	0

Concession Services

Impacts on concessions would be the same as those described in alternative B, although the late season plowing would make access from Mammoth to Madison, thence to West Yellowstone and Old Faithful, easier for concessioners and more attractive to visitors.

Conclusion

This alternative would result in major adverse impacts by closing visitor access to about 74% of the average daily weekend visitors currently entering the park through the West Entrance and West Yellowstone; a reduction from 840 daily weekend visitors currently to 220. Although plowed roads would allow for wheeled-vehicle access, the lack of available parking at Old Faithful would result in an overall reduction in daily winter visitor use. There would be minor to moderate beneficial impacts on snowmobile access (depending upon actual use) from Jackson and Dubois to GTNP and the Parkway, and north into YNP.

[38] After February 29 snowcoach only from Norris to Canyon and Fishing Bridge; road plowed from Mammoth to Madison Junction.

Effects on Visitor Experience — Yellowstone National Park

The amount and type of winter visitor opportunities offered in YNP under alternative C are provided in Table 98.

Table 98. YNP Visitor opportunities available under alternative C.

Opportunities	Miles or Areas	Increase/ Decrease	Late Season	Increase/ Decrease	Length of Season
Groomed motorized route	154	-30	111	-35.3	South Entrance Mid-December to April + 2 weeks
Groomed motorized route snowcoach only	0	0	28.8	+28.8	Mid-December to Mid-March
Groomed motorized trail	10	+10	10	+10	Mid-December to Mid-March
Plowed route	106	+30	65.3	+35.3	No fall closure + 6 weeks
Groomed nonmotorized	47	+10	55	+8	Mid-December to Mid-March
Warming huts	9	3	9	3	Mid-December to Mid-March
Backcountry	2.2 million acres	0	2.2 million acres	0	Contingent on snowfall in northern portion of park

Visitor Satisfaction and Experience

Opportunities to view wildlife. The impacts associated with this topic would be the same as alternative B, except that visitors traveling from West Yellowstone to Old Faithful would have the ability to stop at their own discretion to view wildlife.

Opportunities to view scenery. From mid-February to mid-March snow would obstruct some views along the road segments from to Mammoth to Norris, Norris to Madison, and from Madison to Old Faithful. These impacts would occur primarily in areas where steep up-slopes occur adjacent to roadways. This type of terrain occurs intermittently and generally on one side of the road for about 5 miles along the road segment from Mammoth to Norris Junction. It also occurs intermittently for about 4 miles along the road segment from Norris Junction to Madison Junction. Snow berms in this type of terrain could exceed 12 feet and would obstruct views. In areas where the terrain is open and flat, snow berms generally would be less than 6 feet (assuming an accumulation of 95 inches). Snow blowing and removal could mitigate these impacts in some areas. These impacts would vary with the time of year, the type of vehicle used and the amount of snowfall received. The impacts to viewing opportunities on the road segments from West Entrance to Madison and Madison to Old Faithful would be the same as alternative B.

Safety (the safe behavior of others). Same as alternative B, except the use of private vehicles on the roads from West Entrance to Old Faithful could increase safety problems associated with winter driving.

The late season snowcoach-only travel zone would lessen the chance for snowmobile and skier conflict resulting in fewer motor vehicle accidents in that area.

The multiple transportation modes and seasons offered in this alternative make it very complex. Visitors traveling in private cars could be unprepared to handle the harsh winter environment. Drivers could be inexperienced in winter driving or automobiles not equipped to handle winter driving conditions.

Quality of the groomed surface. Same as alternative B.

The availability of winter activities or experiences. This alternative would provide wheeled-vehicle access from West Yellowstone to Old Faithful. Unlike the shuttle system described in alternative B, this alternative allows access by private vehicle. Because the parking at Old Faithful is very limited, the actions described under this alternative would substantially limit the number of winter visitors to that area. This alternative would afford a longer use season for travelers from the West Entrance to Old Faithful by eliminating the current fall road closure.

Under this alternative, the road north of Colter Bay in GTNP would be not be plowed. This would increase the one-way, oversnow distance to Old Faithful by 20 miles. This action could make the trip to Old Faithful via the South Entrance more difficult for oversnow vehicle travelers.

In mid- to late February, the road would be plowed from Mammoth to Norris Junction and from Norris Junction to Madison Junction. Concurrent with the road plowing would be a snowcoach-only travel zone from Norris Junction to Canyon and south to Fishing Bridge. This option would provide skiers with additional winter recreation opportunities. However, one month of snowmobiling opportunities would be lost to this user group.

Although this alternative affords new opportunities, logistically there would be negative effect on the overall visitor experience. Because of the different modes of transportation required, visitors, particularly from the North Entrance, would find trip planning and implementation complex. Parking and staging area limitations at Madison and Norris Junction could further limit visitor opportunities.

Additional winter experiences would be offered by increasing the number of groomed motorized and nonmotorized trail opportunities, and by providing winter camping opportunities at Old Faithful.

Availability of information. Same as in alternative B.

Quiet and Solitude. Opportunities for quiet and solitude would increase for skiers and snowcoach riders during the late season on the road segments from Norris to Canyon and south to Fishing Bridge. If snowmachine use of the West Entrance to Madison to Old Faithful roads were to be displaced to the remainder of the park, opportunities for quiet and solitude on the east side of YNP could decrease.

Clean air. Same as no action, except on plowed road sections. Visitors to these areas would encounter improved air quality because of reduced traffic volumes and the elimination of snowmobiles on these road segments.

Conclusion

The plowing of roads proposed under this alternative would eliminate or detract from several characteristics of the winter experience for many snowmobile and snowcoach riders (about 48% of all winter visitors in 1999-2000). This would result in major adverse impacts on this user group. The creation of snow berms along plowed roadways would cause moderate adverse impacts on scenery viewing opportunities along some roadways.

The addition of motorized and nonmotorized trails would increase available winter experiences for many visitors and result in direct moderate beneficial impacts. This alternative would have moderate adverse effects on opportunities to experience solitude and quiet (except during the late season) in most of the park areas. Because of the late season and “clean and quiet” snowcoach only zone, visitors to the Canyon area would experience moderate to major beneficial improvements in opportunities to experience clean air and solitude. Opportunities to experience clean air would also improve on the roads from West Entrance to Old Faithful.

Visitors who are unable, cannot afford, or do not wish to ride a snowmobile or snowcoach would have access via private automobile to Old Faithful. Because this type of winter experience at Old Faithful has not previously been available, alternative C would result in an increase in winter opportunities for visitors in this user group (as compared to alternative A). Moderate adverse impacts would occur due to the complexity of the alternative actions and the limited parking available at Madison, Norris, and Old Faithful. Overall, few improvements to visitor experience are expected under this alternative.

Effects on Visitor Experience — Grand Teton National Park and the Parkway

The amount and type of winter visitor opportunities offered in GTNP under alternative C are provided in Table 99.

Table 99. GTNP Visitor opportunities available under alternative C.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season†
Groomed motorized route	2.1	0	December to April
Groomed motorized route, snowcoach	2.1	0	December to April
Groomed motorized trail	64.4	30.4	December to April
Plowed road	104	4	December to April
Ungroomed motorized trail or area	24	-11.6	December to April
Groomed nonmotorized	4	4	December to April
Ungroomed nonmotorized trail or area	28.4	2	December to April
Warming huts/interpretive centers	5	3	December to April

†Variable, dependent on snow conditions

Visitor Satisfaction and Experience

Opportunities to view wildlife and scenery. There would be increased opportunities to view wildlife and scenery on routes other than plowed roads for both nonmotorized users and oversnow vehicle users. Opportunities for views from plowed roads are the same as alternative A.

Safety (the safe behavior of others). The placement of the CDST on a widened highway shoulder would separate auto from snowmobile traffic and improve safety. The co-location of motorized oversnow vehicles and nonmotorized users on the same ungroomed trail corridor (Teton Park Road) would create additional problems, especially with increased use.

Quality of the groomed surface. There would be an increased number of miles of motorized groomed trails.

The availability of access to winter activities or experiences. There would be an increased number of miles of motorized and nonmotorized groomed trails, as well as additional support facilities. This would result in moderate to major beneficial improvements for persons who wish to snowmobile and snowplane.

Availability of information. The availability of information would be improved by adding new trails and warming hut facilities.

Quiet and Solitude. Opportunities for solitude and quiet forms of winter recreation would be decreased. There would be a lack of separation between motorized and nonmotorized trails throughout the park, which would affect skiers and snowshoers.

Clean air. This experiential value would be decreased from alternative A because of the co-location of motorized and nonmotorized trails, and a lack of emphasis on "clean" motorized technology. The availability of bio-based fuels and lubricants could mitigate the impact.

Conclusion

There would be major beneficial changes for visitor experience for wildlife and scenery viewing, assuming there would be no significant displacement of animals by humans. There would be minor beneficial to minor adverse changes relating to safety due to improvement of the CDST, while co-locating motorized and nonmotorized uses elsewhere. The increased availability of information and trailside facilities would result in moderate beneficial improvements to visitor experience. Opportunities to appreciate clean air would be adversely affected. Increased visitor access and improved developments under this alternative would result in a major adverse impact on opportunities to experience quiet and solitude.

IMPACTS OF IMPLEMENTING ALTERNATIVE D

Effects on the Socioeconomic Environment

Alternative D contains several provisions for relatively minor changes in trail management and grooming within YNP and GTNP. Most of these changes are unlikely to significantly impact visitor decisions on whether to visit the parks for recreation. For example, the impact on visitor expenditures from closing the Teton Park Road to motorized use would be minor since other opportunities will be made available for oversnow motorized travel. Two proposed management changes, however, have the potential to significantly impact visitation levels to the GYA and, therefore, visitor expenditures and the overall level of economic activity within the GYA. These are proposals to close the road north of Colter Bay to wheeled-vehicles and open it to snowmobiles, and to close the East Entrance access to YNP.

Regional Economy. The 1999 GYA winter visitor survey asked respondents how their visitation would be affected if the road from Colter Bay to YNP's South Entrance was not plowed, and instead was open and groomed for snowmobiles and snowcoaches. Based on analysis of the survey responses, GYA visitation by winter visitors who live outside the five-county area would be reduced by 4.4% if the road from Colter Bay to YNP's South Entrance was not plowed, and instead was open and groomed for snowmobiles and snowcoaches. Park visitors who reside outside of the five counties made up 85.9% of total sampled visitors. This estimated reduction in visitation is a net change that considers the responses of those current winter visitors who said they would visit more often if the change occurred. Also considered in the calculation were those respondents who said they would visit, but would shift their use to other areas of the GYA (for example, from park lands to national forest lands).

In addition to anticipated winter visitation reductions resulting from the proposed management change for the Colter to South Yellowstone road segment, it is assumed that the visitors who currently use the East Entrance to YNP also would no longer do so. The East Entrance to YNP is the least used winter entrance to the park. During the 1998-99 winter season, 2,955 visitors passed through the East Entrance. These visitors accounted for about 2.5% of the total winter visitation to the park. While the 1999 GYA winter visitor survey did not ask respondents how they would respond to such an East Entrance closure, it can be assumed that a 2.5% reduction in park visitation would result. The regional economic impacts of an East Entrance closure likely would be concentrated in communities nearest the East Entrance to the park, primarily Cody, Wyoming.

Using the winter survey responses and the IMPLAN input/output model, it is estimated that total economic output in the five-county area would be reduced by $1.3 million as a result of the Colter to South Yellowstone road change, and winter closure of the East Entrance to the park in alternative D. In addition it is estimated that 32 jobs within the GYA would be lost due to reduced nonresident expenditures. This is a minor negative impact in the context of the five-county economy.

Three-State Regional Economy. Overall, 65.5% of winter visitors in the GYA winter visitor survey came from outside the three-state area of Montana, Idaho, and Wyoming. Responses from this group of winter visitors indicate that there would likely be no measurable change in winter trips to the region under the alternative D closure of the Colter Bay to South Entrance road.

Minority and Low-Income Populations. It is not expected that the changes proposed under alternative D would make the park more accessible to low-income visitors. The closure of the road from Colter Bay to the South Entrance of YNP to wheeled-vehicles has the potential to limit access by lower income groups. The impact is likely to be negligible since the South Entrance itself is not a major destination.

Social Values. Most winter visitors support mechanized access to the parks. In the context of overall park access, the changes proposed in alternative D are likely to result in minor adverse impacts.

Nonmarket Values. Alternative D actions potentially would impact nonmarket values of winter visitors by reducing the number of trips taken to the parks. The estimated reduction in current winter user visitation resulting from the change in road management from Colter Bay to YNP's South Entrance and the closure of the East Entrance would reduce total net economic value associated with visitor trips to the parks.

Based on the winter visitor survey, the nonmarket value of a trip to the parks of the GYA is $91. It is estimated that park visitation would be reduced by 4.4% as a result of the change in management of the road from Colter Bay to YNP's South Entrance. Based on current winter visitation levels, a 4.4% reduction in visitation would translate into a $350,000 reduction in the aggregate nonmarket value of winter trips to the parks. In

addition a 2.5% reduction in winter trips associated with the closure of the East Entrance to YNP would lead to a $200,000 reduction in the aggregate nonmarket value of winter trips to the parks. The combined estimated loss in winter visitor net economic value is $550,000. These are minor negative impacts in the context of overall trip benefits for park visitors.

Conclusions

The alternative D management actions would have a negligible to minor impact on the five-county and three-state economies through reduced visitation and nonresident visitor expenditures. The alternative D actions would also have a minor negative impact on current total trip nonmarket visitor benefits (through reduced visitation). The changes proposed in alternative D are likely to result in minor adverse impacts on current visitors' social values.

Effects on Air Quality and Public Health

In alternative D only 10% ethanol-blend fuels and bio-based lubricants would be sold in the parks. By winter 2008-2009, only snowmachines that have been certified to meet stricter emissions standards would be allowed in the parks. Oversnow vehicle emission rates would be 40% of the baseline CO emission rate, 75% of the baseline PM_{10} rate, and 70% of the baseline hydrocarbon emission rate. Only bio-based lubricants and 10 percent ethanol fuel blends would be sold in the park.

Table 100, Table 101, and Table 102 summarize the results of CO modeling for six locations in the three parks for alternative D. Table 100 and Table 101 show the predicted maximum 1-hour average CO concentrations and the calculated maximum 8-hour average CO concentrations, respectively. The percent contribution of each vehicle type to the maximum CO concentrations also is provided in Table 102 for the six locations. Table 103 and Table 104 provide corresponding model results for PM_{10} for the same locations and conditions as CO.

Table 100. Maximum 1-hour average CO concentrations for alternative D.

Location	1-hr Maximum Concentration (w/o Background) (ppm)	1-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	17.60	20.60	39.7
West Entrance to Madison Roadway	7.10	10.10	39.8
Old Faithful Staging Area	0.78	3.78	39.6
Flagg Ranch Staging Area	1.08	4.08	36.9
Flagg Ranch to Colter Bay Roadway	2.60	5.60	-136.4
Mammoth to NE Entrance Roadway	0.30	3.30	0

Table 101. Maximum 8-hour average CO concentrations for alternative D.

Location	8-hr Maximum Concentration (w/o Background) (ppm)	8-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	8.28†	9.69†	39.7
West Entrance to Madison Roadway	3.34†	4.75†	39.8
Old Faithful Staging Area	0.13	1.53	39.6
Flagg Ranch Staging Area	0.18	1.59	36.9
Flagg Ranch to Colter Bay Roadway	1.22†	2.64†	-136.4
Mammoth to NE Entrance Roadway	0.14†	1.55†	0

†Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)^{0.365}$ (Cooper and Alley 1990).

Table 102. Vehicle contribution to CO concentrations for alternative D.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	97.2	2.6	0	0	0.2	0	0
West Entrance to Madison Roadway	98.1	1.9	0	0	0.1	0	0
Old Faithful Staging Area	97.5	2.5	0	0	0.1	0	0
Flagg Ranch Staging Area	97.3	2.6	0	0	0.1	0	0
Flagg Ranch to Colter Bay Roadway	98.0	1.9	0	0	0.1	0	0
Mammoth to NE Entrance Roadway	0	0	26.5	66.9	0.5	0	6.1

SM=snowmobile, SC=snowcoach, AM=automobile, LT=light truck, HT=heavy truck, TB=tour bus, SV=shuttle van.

Table 103. Maximum 24-hour average PM_{10} concentrations for alternative D.

Location	24-hr Maximum Concentration (w/o Background) (µg/m³)	24-hr Maximum Concentration (w/ Background) (µg/m³)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	11.69†	34.69	74.1
West Entrance to Madison Roadway	2.84†	25.84	73.5
Old Faithful Staging Area	0.16	5.16	75.1
Flagg Ranch Staging Area	0.22	5.22	64.6
Flagg Ranch to Colter Bay Roadway	0.95†	5.95	0
Mammoth to NE Entrance Roadway	0.32†	5.32	0

† Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)^{0.365}$ (Cooper and Alley 1990).

Table 104. Vehicle contribution to PM_{10} concentrations for alternative D.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	97.3	0.8	0	0	1.8	0	0
West Entrance to Madison Roadway	91.1	4.1	0	0	4.7	0	0
Old Faithful Staging Area	99.3	0	0	0	0.7	0	0
Flagg Ranch Staging Area	98.9	0	0	0	1.1	0	0
Flagg Ranch to Colter Bay Roadway	90.7	4.3	0	0	5.0	0	0
Mammoth to NE Entrance Roadway	0	0	22.5	46.6	26.7	0	4.2

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Visibility

The visibility assessment indicates that under this alternative, vehicular emissions would cause localized, perceptible, visibility impairment near the West Entrance and in the area around Old Faithful and Flagg Ranch. The emissions along roadway segments would not lead to perceptible visibility impairment.

Conclusion

As noted in Table 100, Table 101, and Table 103, the model predicts moderate and major beneficial impacts on CO and PM_{10} levels, respectively, relative to alternative A at the West Entrance, along the West Entrance to Madison roadway, and at the two staging areas. However, these major and moderate beneficial impacts would not be realized until winter 2008-2009 winter, except for minor benefits attributable to bio-based lubricants and ethanol fuel blends. A major adverse impact on CO concentration is predicted along the Flagg Ranch to Colter Bay roadway. This increase in CO concentration is attributable to large assumed increases in snowmobiles using this roadway; for PM_{10}, a major beneficial impact would be realized.

Effects on Public Safety

Closing the YNP East Entrance would eliminate all risks associated with avalanches and future avalanche control on Sylvan Pass to employees and the 3% of snowmachine riders who use the East Entrance each winter. More frequent grooming of the route from West Yellowstone to Old Faithful would reduce the potential for accidents that result from poor road conditions. The geographic separation of uses by area under this alternative would reduce user conflict along the roadways that provide access to different types of activities.

In GTNP and the Parkway, the development of additional ski and snowshoe trails would increase nonmotorized recreation opportunities and decrease the potential for conflicts between different types of users. Closing the road between Colter Bay and Flagg Ranch to wheeled-vehicles and allowing snowmobile use on this segment would eliminate the potential for inter-modal conflict along this stretch of the CDST. It would eliminate a

major source of winter vehicle accidents, vehicle-wildlife accidents and unsafe vehicular activity. Limiting oversnow vehicle use of Jackson Lake to snowplanes would similarly eradicate the current low potential for inter-modal conflicts on the lake. Eliminating snowmobile use of ungroomed trails would improve safety.

Conclusion

Implementation of this alternative would result in moderate beneficial short-term improvements to public safety in the three park units due to the introduction of several positive safety measures. This assumes that no additional safety risks are associated with this alternative. Impacts would affect employees and visitors.

Effects on Geothermal Features

The effect of this alternative on YNP geothermal features would be the same as described in alternative B, except for local impacts associated with Fountain Flats and Mammoth.

Grooming the Fountain Flats road for motorized use may increase the quantity of adverse impacts on geothermal resources found along this road. There may be more off-road snowmobiling in this area, which may lead to moderate long-term impacts on geothermal features. Similar impacts may occur on this area as those described under the groomed road segments of alternative A.

The effects of unrestricted backcountry use in the Mammoth area would have the same effects as alternative A.

Conclusion

Overall, there would be more benefits under this alternative as compared to alternative A, since there will be no new winter support facilities near geothermal areas. Minor adverse impacts may continue on geothermal features located along groomed roads, with minor effects on features along the Fountain Flats road and near Mammoth.

Effects on Water and Aquatic Resources

Potential pollution sources are the same as alternative A. The potential impacts along “high” risk road segments are the same as alternative A. The exception is a decrease in risk on the Canyon Village to Fishing Bridge “high” risk segment as the projected number of snowmobiles on that segment decreases.

The elimination of all vehicles would decrease the risk of water pollution along the “medium” risk Fishing Bridge to East Entrance road segment.

Increased snowmobile usage would increase the risk of water pollution along the “low” risk Flagg Ranch to Colter Bay segment. On the Teton Park Road with the elimination of all vehicles and on the Moose-Wilson Road with the prohibition of snowmobiles the risk of water pollution would decrease.

Table 105[39]. Snowmachines and associated risk levels for alternative D.

Road Segment	Risk ± Rating	Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. A*		Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. D*	
		SM	SC	SM	SC
Mammoth to Norris	Medium	641	69	641	69
West Entrance to Madison	Medium	7759	127	7759	127
Madison to Norris	High	3458	73	3458	73
Norris to Canyon Village	Low	2214	47	2214	47
Canyon Village to Fishing Bridge	High	2370	50	148	3
Fishing Bridge to East Entrance	Medium	983	0	0	0
Fishing Bridge to West Thumb	Medium	2627	55	2627	55
Madison to Old Faithful	High	7818	165	7840	160
Old Faithful to West Thumb	Medium	3560	73	3560	73
West Thumb to Flagg Ranch	Medium	4219	103	4219	103
Grassy Lake Road	High	184	0	200	0
Flagg Ranch to Colter Bay	Low	379	0	2816	64
Colter Bay to Moran Junction	High	248	0	250	0
Moran Junction to East Entrance	Medium	49	0	50	0
Teton Park Road	Low	156	0	0	0
Moose-Wilson Road	Low	6	0	0	0

Conclusion

Two stroke engines would continue to deposit pollutants into snowpack along groomed park roads in YNP and GTNP. The effect of this deposition on water quality is undetermined, but there is currently no evidence of measurable changes in water quality or effects on aquatic resources. It is possible that accumulations of pollutants in aquatic systems may have adverse impacts on wetlands and aquatic resources downstream from high risk road segments. Oversnow vehicle use in this alternative would involve localized high risk to surface water quality, but reduced oversnow vehicle-miles traveled along high risk road segments in the three park units by about 14%. Discontinuing snowmobile use on Jackson Lake would reduce pollution sources by half into Jackson Lake. Minor to moderate long-term adverse impacts to water resources throughout GTNP and the Parkway could occur related to the increased number of winter use opportunities. Minor short-term water quality and wetland impacts could occur in streams along the eastern side of US 89/287 as a result of CDST construction.

[39] *SM = Snowmobile, SC = Snowcoach The source of pollutants is emissions from snowmobiles, which produce (conservatively) 10 times as many emissions per mile as most wheeled vehicles. Single snowcoaches produce fewer emissions then single snowmobiles.
±High = within 100 meters of aquatic system on 76% to 100% of the road segment; Medium = within 100 meters on 51% to 75% of the road segment; Low risk segments are within 100 meters of rivers less than 50%.

Mitigation

The portions of the CDST that would deviate from the road shoulder would be designed and sited to minimize impacts on all park resources including wildlife, vegetation, and wetlands. Focused water monitoring programs should be designed and implemented to determine whether there are specific aquatic resource effects from winter recreational use. The use of bio-based fuels by NPS and the availability of fuels in gateway communities may result in a minor decrease in pollutant deposition into snow. Best management practices would be used during the construction, reconstruction, or winter plowing of trails and roads to prevent unnecessary vegetation removal, erosion, and sedimentation. The release of snowpack contaminants into surface water could be mitigated by disconnecting snowmelt drainages from trails used by snowmobiles. Any new or reconstructed winter use sanitary facilities would be constructed in locations and use advanced technologies to protect water resources. A focused program of monitoring would reduce the uncertainty of impacts from oversnow vehicles, and if necessary, indicate best management practices.

Effects on Wildlife

Ungulates

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative D YNP would groom about 217 miles, about 4 miles less than under current management. GTNP and the Parkway would groom about 36 miles, the same as current management.

In YNP closure of the East Entrance road may affect bison movements from the Pelican Valley wintering area to the Mary Mountain wintering area, and movements outside the park's east boundary. The level of effect depends on winter snow conditions and how bison maintain traditional travel routes without groomed road surfaces. In the parks as a whole, the effects are the same as those under alternative A.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause injury and death to wildlife, especially in poor lighting conditions and during snowfall, and can cause displacement from preferred habitats.

From 1989 to 1998 only one large mammal was killed by a snowmobile between Fishing Bridge and the East Entrance (Gunther et al. 1998). Collisions would decrease under alternative D because the East Entrance road in YNP would be closed, and snowmobiles would be eliminated from the 21-mile segment of GTNP Teton Park Road and from 11 miles of the Antelope Flats area, and late night motorized travel would be prohibited.

Overall, displacement resulting from these actions would be slightly lower than in alternative A for YNP and lower than in alternative B for GTNP.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to ungulate movements (Aune 1981). In addition plowed roads, like groomed roads, may also provide an energy efficient mechanism for wildlife movements, including bison, elk, and moose. Under alternative D YNP would plow 76 miles of road for wheeled-vehicle access in the winter, the same as now. GTNP and the Parkway would plow 83 miles, a decrease of 17 miles from current management.

Effects of plowed roads would be essentially the same as alternative A for YNP, and would decrease from alternative A in GTNP.

Effects of motorized use of plowed roads. The effects of plowed roads are similar to those of groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause displacement from preferred habitats and injury and death to wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall.

Effects of plowed roads would be essentially the same as alternative A for YNP, and would decrease from alternative A in GTNP.

Effects of nonmotorized use of groomed and designated ungroomed routes. The primary effects of nonmotorized use on ungulates are displacement from preferred habitats, especially geothermal areas that are important for winter survival in YNP, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative D these opportunities increase in YNP from 37 miles to 43 miles of groomed nonmotorized routes, and increase from 26 miles to 37 miles of ungroomed routes GTNP and the Parkway. Increasing these opportunities increases the potential for adverse impacts associated with them. However, the potential for impact is relatively low since most trails and routes are located in areas not presently used or preferred by ungulates. The exception to this would be short trail segments in YNP near and through geothermal areas, such as at Mammoth Hot Springs.

For all parks the level of impact is similar to alternative A.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and ungulates may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. This alternative mitigates potential effects associated with these activities in YNP by eliminating unregulated backcountry use in winter range. Use would be limited to designated routes, and routes would only be designated in areas where ungulate needs are not of concern.

Impacts from this use in GTNP likely would increase relative to alternative A. Increased cross-country skiing and snowshoeing use would be anticipated along the Teton Park

Road, in backcountry areas west of the road, and throughout Antelope Flats because of the elimination of snowmobiles. This increased use could adversely impact ungulates and their movement, and may result in higher energy expenditures as they attempt to move away or avoid such use. Moderate to major adverse impacts on bighorn sheep would continue, as well as potential impacts on moose, elk, and bison on Blacktail Butte and Wolff Ridge.

Effects of the presence and use of winter support facilities. Increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. This alternative proposes to add warming hut facilities at Jenny Lake.

Overall effects would be the same as alternative A because Jenny Lake is not considered ungulate winter range.

Federally Protected Species

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative D YNP would groom about 217 miles of road surface, about 4 miles less than under current management. GTNP and the Parkway would groom about 36 miles, the same as current management.

Impacts are generally as stated in alternative A. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of motorized use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats. No collisions have occurred between oversnow motorized vehicles and federally protected species in the parks.

Closure of the East Entrance road, and elimination of 25 miles of snowmobile route would eliminate fragmentation over the entire eastern portion of YNP, allowing free movement for species that are active in the winter. Bald eagle use along the north shore of Yellowstone Lake would be undisturbed as well.

In GTNP the types of impacts for alternative D would be similar to alternatives A and B. However, snowmobiling would be eliminated in all parts of the park except along the CDST and on Grassy Lake Road west of Flagg Ranch. Any potential adverse effects associated with motorized oversnow use would decrease because of decreased opportunities. Where snowmobiling now occurs in the Antelope Flats area and along the Moose-Wilson Road southwest of Moose Junction, cross-country skiing and snowshoeing would occur. Snowmobiles would not be allowed on Jackson Lake. Current snowmobile use is low because snowmobiles tend to bog down in the snow on the lake; however, snowplanes are and would continue to be the predominant use.

Disturbance caused by snowplanes on the frozen surface of Jackson Lake would continue to cause only negligible impacts on eagles because foraging and nesting activities would be minimal before the breakup of the ice. In all park units, if monitoring indicates disturbance to bald eagles, additional closures may be enacted. Effects on federally protected species would remain at the level of negligible to minor.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to wildlife movements (Aune 1981). In addition similar to groomed roads, plowed roads may influence wildlife movements and distributions by facilitating travel for wildlife into areas that would normally be inaccessible due to deep snow. Under alternative D YNP would plow 76 miles of road for wheeled-vehicle access in the winter. GTNP and the Parkway would plow 83 miles, a decrease of 17 miles from current management.

Impacts are generally as stated in alternative A. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of motorized use of plowed roads. The effects of traffic on plowed roads are similar to those of traffic on groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause displacement from preferred habitats and injury and death to wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall.

Impacts are generally as stated in alternative A — none to minor. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of nonmotorized use on groomed and designated ungroomed routes. The primary effects of nonmotorized use on wildlife are displacement from preferred habitats and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative D these opportunities increase in YNP from 37 miles to 43 miles of groomed nonmotorized routes, and increase from 26 miles to 37 miles of ungroomed routes in GTNP and the Parkway.

Potential impacts are generally as stated in alternative A — none to negligible. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and federally protected wildlife species may only occur sporadically, they may cause displacement and additional energy expenditure and stress that reduces animals' chances of survival and reproduction. This alternative mitigates potential effects associated with

these activities in YNP by eliminating unregulated backcountry use in winter range. Use would be limited to designated routes.

Effects associated with backcountry use would decrease from alternative A in YNP and in GTNP and the Parkway. Impacts are generally as stated in alternative A.

Presence and use of winter support facilities. Warming huts and campgrounds can cause habituation in some wildlife species to the presence of human food and garbage, and lead to human-wildlife conflicts. In addition increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. This alternative proposes to add warming hut facilities at Jenny Lake.

Impacts are generally as stated in alternative A — negligible to minor. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance. Impacts to bears associated with habituation to human developments and food are negligible. Under all alternatives winter wildlife-proof garbage facilities will be constructed.

Species of Special Concern

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow, inhibiting foraging activities of carnivores that tunnel beneath the snow to hunt subnivian prey, and reducing subnivian prey availability by increasing mortality of these small mammals. Under alternative D YNP would groom about 217 miles of road surface, about 4 miles less than under current management. GTNP and the Parkway would groom about 36 miles, the same as current management.

Impacts are generally as stated in alternative A — none to minor.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The most likely impacts to species of special concern are displacement from preferred habitats, and degradation of the aquatic environment from pollutants in the snowpack. Documented mortality caused by collisions with oversnow vehicles in the parks is rare. In 10 years only one of these species (a marten) was reportedly killed by a snowmobile in YNP (Gunther et al. 1998).

Impacts are generally as stated in alternative A — none to minor. If species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance. For YNP closure of the East Entrance road and elimination of 25 miles of snowmobile route would eliminate fragmentation and displacement over the entire eastern portion of YNP, allowing free movement for species that are active in the winter such as wolverines and fishers. Closure of the road will also eliminate the need for avalanche control, thus removing any potential adverse effects to wolverines. Trumpeter swan use along the north shore of Yellowstone Lake would be undisturbed as well.

See *Water and Aquatic Resources*, Chapter IV for an assessment of the impacts of exhaust on water quality in the parks.

Effects of plowed roads. Similar to groomed roads, plowed roads also provide an energy efficient mechanism for wildlife movements. Under alternative D YNP would plow 76 miles of road for wheeled-vehicle access in the winter, a decrease of 20 miles over current management. GTNP and the Parkway would plow 83 miles, a decrease of 17 miles from current management.

Impacts are generally as stated in alternative A. If species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of motorized use of plowed roads. The most likely impact to species of special concern is displacement from preferred habitats and mortality caused by collisions with wheeled-vehicles.

Impacts are generally as stated in alternative A — none to negligible. If species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of nonmotorized use on groomed and ungroomed designated routes. The primary effects of nonmotorized use are displacement from preferred habitats, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative D, YNP increases these opportunities from 37 miles to 43 miles of groomed nonmotorized routes, and GTNP and the Parkway increase from 26 miles to 37 miles of ungroomed routes.

Impacts are as stated generally in alternative A — none to minor. Groomed trails are not in known swan habitat; therefore, no effects on swans would occur.

Unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Although encounters between backcountry users and species of special management concern may occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. This alternative mitigates potential effects associated with these activities in YNP by eliminating unregulated backcountry use in winter range. Use would be limited to designated routes where wildlife concerns are minimal.

Effects associated with backcountry use would decrease from alternative A in YNP, and in GTNP and the Parkway, impacts are generally as stated in alternative A.

Presence and use of winter support facilities. The primary effects of warming huts and campgrounds on species of special concern are associated with increases in human activity and the subsequent disturbance and displacement of species or their prey. This alternative proposes to add warming hut facilities at Jenny Lake.

Specifically, huts located in thermally influenced ungulate winter range could displace ungulates, and thus affect bison and elk carcass availability for wolverines, fishers, and marten. Because the huts at Jenny Lake would not be located in ungulate winter range, they would not affect the availability of carrion for these species. Therefore, impacts to other species of special concern would be the same as those under alternative A.

Conclusion

Overall effects of this alternative are similar to alternative A. Reductions in oversnow travel opportunities benefit ungulates by eliminating use on the east side of YNP, and restricting oversnow travel in GTNP to groomed routes in the northern part of the park. Elimination of access from the East Entrance to Fishing Bridge eliminates other effects associated with groomed routes, including fragmentation, and displacement. Restricted backcountry travel in YNP reduces effects associated with off-trail travel. Nonmotorized opportunities would be increased and may affect ungulates in GTNP. Increased interpretive opportunities and augmented enforcement capabilities would mitigate any other impacts.

Although impacts to populations resulting from winter recreation are neither long term nor significant, impacts to individual members of the population can be important, leading to death either directly from collisions or continued harassment, or indirectly through management actions taken as a response to habituation to human presence and food. Although concerned about impacts to individuals, the NPS primarily provides for the protection of native animal populations from management actions (with the exception of federally protected species). For example, see Chapter II, NPS 77, Natural Resources Management.

Ungulates

- Effects of groomed roads and trails on animal movements — unknown if and to what extent beneficial effects outweigh negative effects. Any effects would decrease from alternative A in YNP because the East Entrance road would be closed. Otherwise same as alternative A.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on: 1) mortality caused by collisions – adverse, negligible, and short term, and 2) displacement from preferred habitats – adverse, minor to moderate, and short term. Impacts would decrease over current management due to restrictions on late night travel, the closure of the East Entrance road in YNP, and the elimination of some motorized oversnow routes in GTNP.
- Effects of plowed roads on: 1) habitat fragmentation – adverse, minor, and short term; and 2) animal movements – unknown if and to what extent beneficial effects outweigh negative effects. Effects would be the same as alternative A for YNP and less than alternative A for GTNP.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, minor, and short term; and 2) displacement from preferred habitats – adverse, moderate, and long term. Effects would be the same as alternative A for YNP and less than alternative A for GTNP.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, minor, and short term. Same as alternative A for all parks.

- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible to minor, and short term in YNP (a decrease from alternative A due to the elimination of unregulated backcountry use), and adverse, minor, and short term in GTNP (an increase over alternative A). Impacts on bighorn sheep in GTNP would remain moderate to major and long term if no mitigation is applied.
- Effects of the presence and use of winter support facilities on displacement – adverse, minor, and short term. Same as alternative A.

Federally Protected Species

- Effects of groomed roads and trails on animal movements: 1) bald eagles, grizzly bears, and wolves — no effect; and 2) lynx – adverse, negligible to major, and short term, depending upon lynx distribution and abundance in the parks. Same as alternative A.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement from preferred habitats – adverse, negligible, and short term for all species excluding the grizzly bear, which will not be active during the winter use season. Slight decrease in impact over alternative A, especially for YNP.
- Effects of plowed roads on: 1) habitat fragmentation – no effect on any of the listed species; and 2) animal movements – no known effect on any of the listed species. Same as alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, negligible, and short term on bald eagles and grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx; and 2) displacement from preferred habitats – adverse, negligible, and short term on bald eagles, no effect on grizzly bears; no known effect to date on wolves and lynx. Same as alternative A.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, negligible, and short term on bald eagles; no effect on grizzly bears; no known effect to date on wolves and lynx. Same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, minor, and short term on bald eagles; adverse, negligible, and short term on grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx. In YNP effects would decrease over alternative A because of the elimination of unregulated backcountry use; in GTNP impacts would remain the same as alternative A.
- Effects of the presence and use of winter support facilities on displacement – no affect on bald eagles; adverse, negligible, and short term on grizzly bears, with mitigation; adverse, minor, and short term on wolves; lynx – adverse, negligible to major, and short term, (huts in the Jenny Lake area are in potential Canada lynx habitat). Other than lynx, effects are generally the same as alternative A.

Species of Special Concern

- Effects of groomed roads and trails on: 1) animal movements – no known effect on wolverines; adverse, negligible, and short term on fishers and martens; no effect on otters, swans, reptiles, amphibians, and fish; 2) foraging activities – adverse, negligible, and short term on marten; no effect on the other species; and 3) subnivian prey availability — adverse, negligible, and short term on marten, no effect on the other species. Same as alternative A.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement – no known effect on wolverine; adverse, negligible, and short term on fishers and marten; no effect on otters, reptiles, amphibians, and fish; adverse, minor, and short term on swans. Generally the same as alternative A. The closure of the East Entrance road eliminates the need for avalanche control, which may benefit wolverines.
- Effects of plowed roads on animal movements – no known effect on wolverines, fishers, and martens; no effect on otters, swans, reptiles, amphibians, and fish. Same as alternative A.
- Effects of motorized use of plowed roads on displacement from preferred habitats – 1) adverse, negligible, and short term on wolverines, fishers, and martens; no effect on otters,

swans, reptiles, amphibians, and fish; and 2) mortality from collisions — adverse, negligible, short term on otters and martens; no effect to date on other species. Same as alternative A.

- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – no effect (wolverines); no known effect (fishers, martens, and otters); adverse, minor, and short term (swans); adverse, negligible, short term (sagebrush lizard) no effect (rubber boa, amphibians, and fish). Same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible, and short term on wolverines and sagebrush lizard; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; no effect on rubber boa, amphibians, and fish. Effects would decrease from alternative A in YNP, and would remain the same in GTNP.
- Effects of the presence and use of winter support facilities on displacement of potential prey (carcass) availability – adverse, minor, and short term on wolverines, fishers, and martens; no effect on swans, rubber boa, amphibians, and fish; no known effect on otters; adverse, minor, and short term on (sagebrush lizard). Same as alternative A.

Mitigation

- Backcountry monitoring and administration should be implemented in GTNP. Additional area closures could be imposed if monitoring indicates such a closure is warranted for the protection of wintering bighorn sheep and moose.
- Creating wildlife escape routes along winter roads may mitigate some of the impacts due to groomed road surfaces.
- Use of groomed and plowed surfaces by bison and other ungulates would continue to be monitored.
- Snow track surveys for carnivores, including lynx, on both groomed and ungroomed routes would be conducted.

Effects on Natural Soundscape

Audibility analysis — combined effects of all wheeled and oversnow vehicles

Table 106 presents the acres of park land by road segment where any wheeled or oversnow vehicle noise would be audible under the two background conditions, "average" and "quiet," as defined in the A*ssumptions and Methodologies* section of this chapter. For each background condition, acreage is presented for three categories of audibility: 1) audible for any amount of time (labeled "audible at all"); 2) audible for 10% of the time or more; and 3) audible for 50% of the time or more. Appendix M contains tables with distances to audibility for each segment for each alternative.

Alternative D features no oversnow vehicles on the road segment from Fishing Bridge to the YNP East Entrance. It eliminates snowmobiles from Teton Park Road and Jackson Lake, and eliminates wheeled-vehicles from Colter Bay to Flagg Ranch. It includes the "clean and quiet" snowmobile and snowcoach requirements based on a 60 dBA noise emission level at 50 feet (compared to 70 dBA for alternative B). It requires that all snowplanes on Jackson Lake meet the current limit of 86 dBA at 50 feet.

The results for alternative D show that for the "average" background condition, wheeled or oversnow vehicles would be audible to some degree for over 110,000 acres in the three park units. For over 52,000 of those acres, wheeled or oversnow vehicles would be

audible for at least 10% the time during the day. For over 13,000 of those acres, they would be audible for at least half of the time during the day. These acreage totals increase by 8%, 19%, and 11% for the "quiet" background conditions for the three audibility categories, respectively.

The 60-dB "clean and quiet" requirement results in major reductions in audibility acreage over all segments that carry oversnow vehicles. These reductions are less evident when looking at the totals because of large contribution from wheeled-vehicle use on the segment from Moran Junction to the South Entrance of GTNP for all three audibility categories. This contribution is almost constant for all of the alternatives. For example, over 80% of the acreage for the "audible 50% or more" categories is along this segment.

The plowed road from Mammoth to the YNP Northeast Entrance is a major contributor to the "audible at all" acreage (and to a lesser extent "audible 10% or more"), which remains virtually unchanged across all alternatives.

The other key segments for the "audible 50% or more" categories are from the YNP West Entrance to Madison; from Madison to Old Faithful; and from Moran Junction to GTNP's East Entrance. However, the acreage amounts are significantly lower than for the no action alternative. The acreage along the segments from West Entrance to Old Faithful is higher than for alternative B because of the use of wheeled-vehicles only for alternative B.

Snowplanes on Jackson Lake are also major contributors to the "audible at all" categories, although the acreage is greatly reduced over the no action alternative because of the sound level restriction.

The audibility acreage is reduced to zero for Teton Park Road, but is only slightly reduced along the Flagg Ranch-Colter Bay segment.

Table 106. Acres of park land affected by vehicle audibility for alternative D.

Road Segment	(Miles)	With Average Background Conditions			With Quiet Background Conditions		
		Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More	Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More
1. Mammoth to Northeast Entrance	47	16,126	5,445	0	16,822	6,342	0
2. Mammoth to Norris	21	6,302	0	0	6,733	0	0
3. West Entrance to Madison	14	4,598	3,290	1,493	5,040	3,811	2,006
4. Madison to Norris	14	4,103	2,647	0	4,447	3,128	0
5. Norris to Canyon Village	12	3,419	1,437	0	3,719	1,905	0
6. Canyon Village to Fishing Bridge	16	5,181	2,558	0	5,568	3,033	0
7. Fishing Bridge to East Entrance	27	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
8. Fishing Bridge to West Thumb	21	7,454	4,186	0	7,931	4,731	0
9. Madison to Old Faithful	16	5,211	3,576	305	5,719	4,182	563
10. Old Faithful to West Thumb	17	4,844	2,796	0	5,268	3,322	0
11. West Thumb to Flagg Ranch	24	7,263	3,089	0	7,839	3,923	0
12. Grassy Lake Road	7.6	1,649	0	0	1,860	0	0
13. Flagg Ranch to Colter Bay	15.6	5,450	3,018	0	5,784	3,490	0
14. Colter Bay to Moran Junction	10.2	4,582	2,236	0	4,929	2,431	0
15. Moran Junction to East Entrance	2	1,193	707	474	1,294	774	517
16. Moran Junction to South Entrance	26	21,714	14,462	11,120	23,842	16,827	11,823
17. Teton Park Road	15	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	2.5	672	0	0	708	0	0
19. Antelope Flats Snowmobile Route	--	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	9.7	10,963	3,326	0	12,280	4,905	0
TOTAL		110,723	52,772	13,392	119,781	62,803	14,910

Average sound level analysis

To give a sense of the effect of the number of oversnow or wheeled-vehicles on a road segment, and their speed and sound level, Table 107 shows the computed hourly equivalent or "average" sound level (L_{eq}) over the daytime period. Levels are shown for each road segment at two distances, 100 feet and 4,000 feet, and for both open and forested terrain. These hourly L_{eq} values do not have the background sound level added in to them. Also they cannot be compared against the background levels to assess audibility, since L_{eq} represents a long-term average of both quiet and loud moments.

The hourly L_{eq} values at 100 feet are highest for Jackson Lake and from Moran Junction to the South Entrance of GTNP. These segments also have the highest L_{eq} at a distance of 4,000 feet away. However, all segments with oversnow vehicles other than Jackson Lake have a major 12 dB to 13 dB reduction in the hourly L_{eq} compared to the no action

alternative. This is due to the 60 dBA limit on the snowmobile and snowcoach noise emission levels.

Table 107. Average hourly L_{eq} from wheeled and oversnow vehicle noise at two distances to each road segment for alternative D.

Road Segment	L_{eq} at Distance (dBA)			
	Open Terrain		Forested Terrain	
	100 feet	4,000 feet	100 feet	4,000 feet
1. Mammoth to Northeast Entrance	35	2	33	0
2. Mammoth to Norris	31	0	29	0
3. West Entrance to Madison	43	9	42	1
4. Madison to Norris	39	6	38	0
5. Norris to Canyon Village	38	4	37	0
6. Canyon Village to Fishing Bridge	37	3	36	0
7. Fishing Bridge to East Entrance	No Veh.	No Veh.	No Veh.	No Veh.
8. Fishing Bridge to West Thumb	37	3	35	0
9. Madison to Old Faithful	42	9	41	1
10. Old Faithful to West Thumb	39	5	37	0
11. West Thumb to Flagg Ranch	38	4	37	0
12. Grassy Lake Road	29	0	28	0
13. Flagg Ranch to Colter Bay	38	4	37	0
14. Colter Bay to Moran Junction	40	8	39	0
15. Moran Junction to East Entrance	45	12	43	4
16. Moran Junction to South Entrance	46	14	44	6
17. Teton Park Road	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	28	0	26	0
19. Antelope Flats Snowmobile Route	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	54	7	52	0

Conclusion

Alternative D impacts about 57% to 61% of the acreage impacted by the no action alternative for the three audibility categories. These percentages are the smallest of all alternatives for the “audible at all” and “audible 10% or more” categories. For the “audible 50% or more” category, they are the second smallest, being just slightly greater than alternative G.

These large reductions are due to the required use of “clean and quiet” snowmobiles and snowcoaches on all oversnow routes, and also due to the closing of the Fishing Bridge to East Entrance and Teton Park Road segments. The reductions occur despite very little change for the main contributor to the total acreage – the through traffic on US 26 the Moran Junction to GTNP South Entrance segment.

The contribution to the L_{eq} is also reduced significantly due to 60-dB "clean and quiet" snowmobiles and snowcoaches. It is reduced to zero decibels for those road segments where all vehicular travel would be eliminated.

Effects on Cultural Resources

The effects on cultural resources would be the same as described in alternative B.

Conclusion

None of the actions described would adversely impact cultural resources.

Effects on Visitor Access and Circulation

Yellowstone National Park. Visitor access to park resources would be changed by closing roadway segment 8 between Fishing Bridge and the East Entrance. Average winter season activity at the East Entrance is about 4,100 winter use visitors. Snowmobile passengers account for 85% of this use while almost all the remaining winter use visitors entering the park through the East Entrance enjoy cross-country skiing. Of the winter season average park visitation, activity at the East Entrance Station accounts for about 3%. It is likely that these 4,100 visitors would use other recreation areas outside the park, and would not travel to other park entrances.

Grand Teton National Park and the Parkway. Under this alternative Highway 89/287, which currently provides wheeled-vehicle access to Flagg Ranch from both the south and east, would be closed to wheeled-vehicles north of Colter Bay Village. As a mitigating action, staging facilities at Flagg Ranch would be shifted to Colter Bay, providing the same services at the new location. Lodging facilities and recreation at the Flagg Ranch area would be maintained. Parking availability at Colter Bay exceeds that at Flagg Ranch, resulting in no restrictions on current activity levels or in access to park resources in YNP or GTNP. However, additional oversnow travel time would be required from Colter Bay to the South Entrance of YNP.

Oversnow motorized opportunities would be limited to the CDST, Grassy Lake Road, and the frozen surface of Jackson Lake. Alternative oversnow motorized opportunities would not be provided in other areas of the park. Wheeled-vehicles access would be eliminated between Colter Bay and Flagg Ranch. Nonmotorized circulation would be enhanced along Teton Park Road between Jenny Lake and Signal Mountain. Overall access would not be restricted by this alternative, as all areas of the park would remain accessible through alternative modes of transportation.

A reasonably foreseeable distribution of vehicle use under this alternative is depicted in the following table. It shows an average loss of 36.4 snowmobile trips daily from Fishing Bridge to the East Entrance. There would be a net decrease of 2% in snowmobile vehicle-miles traveled in the three park units and a net decrease of 2% wheeled-vehicle-miles traveled. Snowcoach miles traveled would increase by less than 2%.

Table 108. Alternative D motorized use.

Road Segment	*Average Daily Vehicle Use January-February*				
	Autos	**Vans**	**Snowcoaches**	**Snowmobiles**	**Buses**
Mammoth to Northeast Entrance	No change from current condition				
Mammoth to Norris	No change from current condition				
West Entrance to Madison	No change from current condition				
Madison to Norris	No change from current condition				
Norris to Canyon Village	No change from current condition				
Canyon Village to Fishing Bridge	No change from current condition				
Fishing Bridge to East Entrance	0	0	0	0	0
Fishing Bridge to West Thumb	No change from current condition				
Madison to Old Faithful	No change from current condition				
Old Faithful to West Thumb	No change from current condition				
West Thumb to Flagg Ranch	No change from current condition				
Grassy Lake Road	No change from current condition				
Flagg Ranch to Colter Bay	0	0	4	176	1
Colter Bay to Moran Junction	No change from current condition				
Moran Junction to East Entrance	No change from current condition				
Moran Junction to South Entrance	No change from current condition				
Teton Park Road	0	0	0	0	0
Moose-Wilson Road	10	2	0	0	0
Antelope Flats Snowmobile Route	No change from current condition				

Concession Services

Impacts would be the same as those described in alternative A. However, Pahaska Teepee, a concessioner permitted to provide guided tours into the park, would no longer be able to offer this service.

Concessions and services offered at Flagg Ranch in the Parkway, would be affected by not plowing the highway north of Colter Bay. The segment connecting Colter Bay and Flagg Ranch would be accessible via oversnow means only. Instead of wheeled-vehicle access, most employees and clients would need to travel to and from the ranch by snowmobile or snowcoach. Flagg Ranch would be snowbound, offering a more specialized experience – similar to Old Faithful. This change represents a positive effect on visitor experience or opportunities for visitors, but it would entail operational changes and higher expenses for the concession owner.

Jackson-based tour operators would need to change their operations to accommodate staging at Colter Bay, and a lengthened trip to Old Faithful. The change shortens the van trip from Jackson by 32 miles (round trip) and lengthens the snowmobile round trip by

the same distance. Some operators believe that this would make the snowmobile trip to Old Faithful too long for some clients. However, the overall length of the trip from Jackson does not change, so the van portion of the trip would be shorter and safer and the snowmobile portion would begin earlier.

The implementation of any alternative that might make substantial changes affecting a concessioner would require negotiation between the NPS and the concessioner or be deferred until a new concessions contract is awarded.

Conclusion

Winter use visitors accessing the East Entrance of YNP would experience adverse impacts with the closing of road segment 8 between the East Entrance and Fishing Bridge. However, only minor adverse impacts would occur to overall park access because the 4,100 winter visitors using the East Entrance represent only 3% of winter visitation. Most winter visitors would continue to access YNP through the entrances they currently use. Negligible adverse impacts on park access would be expected at GTNP and the Parkway because access to park resources would remain open, although the mode of transportation or time allotted for travel would change.

Effects on Visitor Experience — Yellowstone National Park

The amount and type of winter visitor opportunities offered in YNP under alternative D are provided in Table 109.

Table 109. YNP Visitor opportunities available under alternative D.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	158.6	-25.4	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Groomed motorized route snowcoach only	0	0	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Groomed motorized trail	15	+15	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Plowed route	76	0	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Groomed nonmotorized	43	+6	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Warming huts	6	0	Mid-December to Mid-March	Late night closure 11 P.M. to 5 A.M.
Backcountry	2.2 mm acres	Use restricted in 700,000 acres	Travel restricted to trails in important wildlife winter range	None

Visitor Satisfaction and Experience

Opportunities to view wildlife. The East Entrance road closure would eliminate wildlife viewing along that road segment, affecting the opportunities of 3% of all users.

Opportunities to view scenery. Same as no action alternative except that the East Entrance closure eliminates scenery viewing along that road segment.

Safety (the safe behavior of others). Separation of groomed ski and snowmobile trails would improve safety by decreasing user conflicts. An aggressive enforcement and information program would result in an improved understanding of appropriate winter recreation etiquette and behavior.

Quality of the groomed surface. The groomed routes from West Entrance to Madison Junction to Old Faithful would be groomed more frequently and to a higher standard under this alternative. Nighttime closure would increase the quality of the groomed surface throughout the park.

The availability of access to winter activities or experiences. This alternative provides an increase in motorized and nonmotorized trail opportunities throughout the park. Nonmotorized activities are emphasized in the north and northeast sections of the park, and motorized activities are emphasized in the west and southwest portions of the park. Separation of these uses will enhance the winter quality of the experience for both user groups.

Under alternative D the East Entrance road would be closed. This would eliminate the oversnow motorized experience for 3% of snowmobile riders who use this entrance to access the park.

Backcountry users would be restricted to designated routes in important winter range. This action would result in a higher rate of skier encounters in these areas, and limit the range of opportunities currently available to skiers.

Availability of information. This alternative would increase the number of warming huts and interpretive programs offered in the park. By providing more information about the attributes of the park that visitors value most, the winter visitor experience will be enhanced. Increased warming huts and interpretive programs would afford visitors better access to this information.

Quiet and Solitude. Because use in important wildlife winter range is restricted to designated trails, skiers may find fewer opportunities to experience solitude.

Under alternative D all oversnow vehicles would be required to meet strict sound standards. These standards would be implemented at various levels over the next 10 years. While the short-term changes in visitor experience would be minor, the long-term

goal of reducing snowmobile sound emissions to 60 dbA would moderately improve opportunities to experience quiet in YNP.

Clean air. Under alternative D all oversnow vehicles would be required to meet strict emissions standards. These standards would be implemented at various levels over the next nine years. While the short-term changes in visitor experience would be minor, the long-term goal of reducing snowmobile emissions would moderately enhance the ability to experience clean air in YNP and particularly at the West Entrance and Old Faithful.

Conclusion

Under alternative D the availability of information and safety programs would provide moderate beneficial improvements to the visitor experience. The increase in trail opportunities would provide moderate beneficial effects on all user groups.

The reduction of snowmobile emissions and sound levels would, over time, provide moderate beneficial improvements in opportunities for solitude, clean air, and natural quiet.

Effects on Visitor Experience — Grand Teton National Park and the Parkway

The amount and type of winter visitor opportunities offered in GTNP under alternative D are provided in Table 110.

Table 110. GTNP Visitor opportunities available under alternative D.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	20.3	18.2	December to April†	Late night closure
Groomed motorized route, snowcoach	20.3	18.2	December to April†	Late night closure
Groomed motorized trail	15.7	-21	December to April†	Late night closure
Plowed road	83.4	-16.6	December to April†	Late night closure
Ungroomed motorized trail or area	0	-35.6	December to April†	Late night closure
Groomed nonmotorized	0	0	December to April†	Late night closure
Ungroomed nonmotorized trail or area	37.1	10.7	December to April†	Late night closure
Warming huts/interpretive centers	5	3	December to April†	Late night closure

† Variable, dependent on snow conditions

Visitor Satisfaction and Experience

Opportunities to view wildlife. Same as in alternative B.

Opportunities to view scenery. Fewer opportunities would be provided to view scenery by auto since there would be no wheeled-vehicle access north of Colter Bay.

Safety (the safe behavior of others). Motorized and nonmotorized uses would be almost entirely separated in this alternative. The separation of snowmobiles and autos on the CDST and elimination of auto traffic north of Colter Bay on the CDST would greatly decrease the risk of motor vehicle accidents.

Quality of the groomed surface. Grooming would be enhanced on the Grassy Lake Trail. The CDST north of Colter Bay would become a highly groomed route.

The availability of access to winter activities or experiences. There would be a mixed impact under this alternative. Opportunities for use of ungroomed motor trails and open use by snowmobiles on Jackson Lake would decrease. Angling opportunities by snowmobilers would be lost. Counter to this loss would be increased opportunities for nonmotorized activities on ungroomed trails.

Availability of information. There would be increased and enhanced visitor programs, facilities, and interpretive opportunities to better meet the expectation and need for information.

Quiet and Solitude. Same as in alternative B; however, opportunities for solitude via motor access would be decreased, and opportunities for solitude via nonmotorized access would be increased.

Clean air. Same as in alternative B.

Conclusion

Alternative E would have minor to negligible adverse impacts on opportunities for visitor experience relating to wildlife and scenery viewing. There would be major beneficial changes relating to safety by separating user groups entirely within the park. Improving groomed surfaces on the CDST and Grassy Lake Road would result in a moderate beneficial effect. Under alternative D visitor access to motorized activities would decrease in the park's interior. This action would result in moderate adverse effects on users from this group. There would be a moderate beneficial impact to visitor experience due to greatly increased availability of information, interpretation, and winter programs. There would be a moderate beneficial impact relative to opportunities for quiet and solitude. Opportunities to appreciate clean air would be moderately improved. Where oversnow motorized use occurs, quiet and clean air would be facilitated by improved motorized technology.

IMPACTS OF IMPLEMENTING ALTERNATIVE E

Effects on the Socioeconomic Environment

In general alternative E is an adaptive management plan that offers no concrete policy change proposals at present. It defers any possible changes to a future time when scientific data is available upon which to base policy decisions. However, alternative E does call for the cessation of most snowmobile use in GTNP and the Parkway, except for access from Flagg Ranch on the Grassy Lake Road and towards YNP's South Entrance. The effects of these changes on the visitor expenditures are not quantifiable. In recent years about 3,600 snowmobiles used the CDST and Teton Park Road. They would be displaced, and a moderate reduction in visitor expenditures would occur. Lacking any other specific changes in park management, estimated socioeconomic impacts are the same as in alternative A, the no action alternative.

Regional Economy. No estimated impacts until future, unspecified policy changes are implemented.

Minority and Low-Income Populations. No estimated impacts until future, unspecified policy changes are implemented.

Social Values. No estimated impacts until future, unspecified policy changes are implemented.

Nonmarket Values. No estimated impacts until future, unspecified policy changes are implemented.

Conclusion

Alternative E is an adaptive management option. As such, no specific management actions are proposed at this time, and no impacts are estimated.

Air Quality and Public Health

This alternative emphasizes the protection of wildlife and other natural resources while allowing park visitors continued access to a range of winter recreation experiences. The alternative also would create an advisory committee of federal and state governmental representatives, environmental groups, and snowmobile industry experts to recommend emission and sound standards for snowmobiles and the implementation of those standards. This alternative is essentially the same as alternative A with respect to vehicle operating activities, except that snowmobiles would not operate on the Flagg Ranch to Colter Bay roadway, and bio-based lubricants and ethanol blend fuels would be sold in the park. Table 111, Table 112, and Table 113 summarize the results of CO modeling for six locations in the three parks for alternative E. Table 111 and Table 112 show the predicted maximum 1-hour average CO concentrations and the calculated maximum 8-hour average CO concentrations. The percent contribution of each vehicle type to the maximum CO concentrations also is provided in Table 113 for the six locations. Table

114 and Table 115 provide corresponding model results for PM_{10} for the same locations and conditions as those for CO.

Table 111. Maximum 1-hour average CO concentrations for alternative E.

Location	1-hr Maximum Concentration (w/o Background) (ppm)	1-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	29.20	32.20	0
West Entrance to Madison Roadway	11.80	14.80	0
Old Faithful Staging Area	1.29	4.29	0
Flagg Ranch Staging Area	1.71	4.71	0.4
Flagg Ranch to Colter Bay Roadway	0.60	3.60	45.5
Mammoth to NE Entrance Roadway	0.30	3.30	0

Table 112. Maximum 8-hour average CO concentrations for alternative E.

Location	8-hr Maximum Concentration (w/o Background) (ppm)	8-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	13.74†	15.15†	0
West Entrance to Madison Roadway	5.55†	6.96†	0
Old Faithful Staging Area	0.21	1.62	0
Flagg Ranch Staging Area	0.29	1.69	0.4
Flagg Ranch to Colter Bay Roadway	0.28†	1.69†	45.5
Mammoth to NE Entrance Roadway	0.14†	1.55†	0

† Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

Table 113. Vehicle contribution to CO concentrations for alternative E.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	97.9	2.0	0	0	0.1	0	0
West Entrance to Madison Roadway	98.6	1.4	0	0	0	0	0
Old Faithful Staging Area	98.1	1.9	0	0	0	0.1	0
Flagg Ranch Staging Area	68.6	1.3	8.3	16.8	0.1	0.1	4.8
Flagg Ranch to Colter Bay Roadway	0	0	23.6	58.8	0.4	0.3	17.1
Mammoth to NE Entrance Roadway	0	0	26.5	66.9	0.6	0	6.1

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van

Table 114. Maximum 24-hour average PM_{10} concentrations for alternative E.

Location	24-hr Maximum Concentration (w/o Background) (µg/m^3)	24-hr Maximum Concentration (w/Background) (µg/m^3)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	45.19†	68.19	0
West Entrance to Madison Roadway	10.74†	33.74	0
Old Faithful Staging Area	0.64	5.64	0
Flagg Ranch Staging Area	0.60	5.60	5.1
Flagg Ranch to Colter Bay Roadway	0.32†	5.32	66.7
Mammoth to NE Entrance Roadway	0.32†	5.32	0

†Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

Table 115. Vehicle contribution to PM_{10} concentrations for alternative E.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	99.3	0.2	0	0	0.5	0	0
West Entrance to Madison Roadway	97.6	1.1	0	0	1.3	0	0
Old Faithful Staging Area	99.8	0	0	0	0.2	0	0
Flagg Ranch Staging Area	99.2	0	0	0	0.5	0.3	0
Flagg Ranch to Colter Bay Roadway	0	0	19.3	39.6	16.1	13.4	11.5
Mammoth to NE Entrance Roadway	0	0	22.5	46.6	26.7	0	4.2

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Visibility

The visibility assessment indicates that under this alternative, vehicular emissions would cause localized, perceptible, visibility impairment near in the vicinity of the West Entrance and in the area around Old Faithful and Flagg Ranch. The emissions along heavily used roadway segments may also lead to localized, perceptible, visibility impairment under certain viewing conditions.

Conclusion

As noted in Table 112, Table 113, and Table 114 the model predicts negligible, minor, and moderate beneficial impacts on CO and PM_{10} levels relative to alternative A at the West Entrance, along the West Entrance to Madison roadway, and at the two staging areas, respectively. Along the Flagg Ranch to Colter Bay roadway, moderate, and major beneficial impacts on CO and PM_{10} concentrations are predicted. These decreased concentrations are attributable to the prohibition of snowmobiles on this roadway.

Effects on Public Safety

Reducing the nighttime speed limit for oversnow travel in both parks between sunset and sunrise from 45 mph to 35 mph would reduce the potential for oversnow accidents. In the last three years in YNP, about 11% of the oversnow accidents occurred at night; 40% of these accidents involved wildlife-vehicle collisions.

This alternative allows for the closure of certain road segments if scientific study indicates that human presence or activities have detrimental effects on wildlife that cannot otherwise be mitigated. Should such closures be implemented, the potential for safety conflicts in these areas would be eliminated.

Within GTNP and the Parkway, oversnow motorized travel would be restricted to Grassy Lake Road and north of Flagg Ranch to the southern boundary of YNP. This would result in a substantial reduction of the present inter-modal accident potential within the park. Elimination of both snowmobiles and snowplanes from the surface of Jackson Lake would also eliminate the potential for inter-modal conflicts and accidents involving the failure of ice.

Conclusion

The effects of reducing oversnow nighttime speed limits would be negligible to minor in all three park units. Should roads be closed to oversnow travel because of demonstrated wildlife disturbance, the result also would be a major beneficial improvement to public safety in those areas. An overall decrease in oversnow motorized travel would result in moderate beneficial improvements in public safety in GTNP. These impacts would affect employees and visitors.

Effects on Geothermal Features

Under alternative E park roads and nonmotorized trails at Mammoth Terraces and the Lone Star Geyser Basin would be groomed. The effects of these actions on the geothermal features associated with roads and trails near destination areas would have the same impacts as those described in alternative A.

The beneficial impacts (relative to alternative A) on geothermal features from restricted backcountry use and the adaptive management provisions would be the same as those described in alternative B.

Conclusion

Under this alternative there would be major benefits to the geothermal resources in YNP as compared to no action alternative. Increased benefits would result from restricted backcountry use, scientific studies and monitoring leading to mitigation or possible closures where adverse impacts occur, and no new developments. Overall, this alternative would have a major beneficial effect on the protection of geothermal features.

Effects on Water and Aquatic Resources

Potential pollution sources are the same as described in alternative A. The potential impacts along “high” risk road segments are the same as described in alternative A, with the following exceptions. Risks of water pollution along the Canyon Village to Fishing Bridge and Colter Bay to Moran Junction “high-risk” road segments would decrease as snowmobiles decrease or are prohibited. Risk of water pollution along the “low-risk”

road segments would be decreased with the prohibition of snowmobiles (Flagg Ranch to Colter Bay Road) or elimination of all vehicles (Teton Park Road and Moose-Wilson Road).

Table 116[40]. Snowmachines and associated risk levels for alternative E.

Road Segment	Risk ± Rating	Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. A*		Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. E*	
		SM	SC	SM	SC
Mammoth to Norris	Medium	641	69	641	69
West Entrance to Madison	Medium	7,759	127	7,759	127
Madison to Norris	High	3,458	73	3,458	73
Norris to Canyon Village	Low	2,214	47	2,214	47
Canyon Village to Fishing Bridge	High	2,370	50	2,370	50
Fishing Bridge to East Entrance	Medium	983	0	983	0
Fishing Bridge to West Thumb	Medium	2,627	55	2,627	55
Madison to Old Faithful	High	7,818	165	7,818	165
Old Faithful to West Thumb	Medium	3,560	73	3,560	73
West Thumb to Flagg Ranch	Medium	4,219	103	4,219	103
Grassy Lake Road	High	184	0	200	0
Flagg Ranch to Colter Bay	Low	379	0	400	0
Colter Bay to Moran Junction	High	248	0	0	0
Moran Junction to East Entrance	Medium	49	0	0	0
Teton Park Road	Low	156	0	0	0
Moose-Wilson Road	Low	6	0	0	0

Conclusion

Two-stroke engine emissions would continue to deposit pollution into snowpack along groomed park roads in YNP and GTNP. The effect of this deposition on water quality is undetermined, but there is currently no evidence of measurable changes in water quality or effects on aquatic resources. It is possible that accumulations of pollutants in aquatic systems may have adverse impacts on wetlands and aquatic resources downstream from high risk road segments. Continued oversnow vehicle use at current levels in YNP involves localized high risk to surface water quality along 22% of the road segments in the three park units, with the exception of the Colter Bay to Flagg Ranch segment. The risk of moderate to major adverse impacts on water quality in Jackson Lake would be eliminated. The continued use of bio-based fuels by the NPS and the availability of fuels in gateway communities may result in a minor decrease in pollutant deposition into snow.

[40] *SM = Snowmobile, SC = Snowcoach. The source of pollutants is emissions from snowmobiles, which produce (conservatively) ten times as many emissions per mile as most wheeled vehicles. Single snowcoaches produce fewer emissions then single snowmobiles.
±High = within 100 meters of aquatic system on 76% to 100% of the road segment; Medium = within 100 meters on 51% to 75% of the road segment; Low risk segments are within 100 meters of rivers less than 50%.

Mitigation

Best management practices would be used during the construction, reconstruction, or winter plowing of trails and roads to prevent unnecessary vegetation removal, erosion, and sedimentation. The release of snowpack contaminants into surface water could be mitigated by disconnecting snowmelt drainages from trails used by oversnow vehicles. Any new or reconstructed winter use sanitary facilities would be constructed in locations and using advanced technologies that would protect water resources. A focused program of monitoring would reduce the uncertainty of impacts from oversnow vehicles, and if necessary, indicate best management practices.

Effects on Wildlife

Ungulates

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative E in GTNP, the only oversnow motorized use would occur on 8 miles of the Grassy Lake Road and 2 miles of the groomed route north of Flagg Ranch (a decrease of 26 miles). YNP would groom 221 miles, the same as under current management.

Relative to alternative A, the effects associated with packed routes would be nearly eliminated in GTNP. Effects in YNP would be the same as alternative A.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats and injury and death to wildlife, especially in poor lighting conditions and during snowfall.

Relative to alternative A, the effects associated with oversnow motorized use would be nearly eliminated in GTNP. Effects in YNP would be the same as alternative A.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to ungulate movements (Aune 1981). In addition plowed roads, like groomed roads, may also provide an energy efficient mechanism for wildlife movements, including bison, elk, and moose. Under alternative E GTNP would plow 94 miles (6 less than currently) and YNP would plow 76 (the same as now).

Effects associated with plowed roads would be the same as in alternative A. In GTNP, highway 89/287 would continue to intersect and parallel riparian habitat between the Buffalo Fork, Snake River, and Willow Flats, although the CDST would no longer exist through the park. Moose-vehicle collisions would continue to occur each year, but would represent a negligible impact as compared to the total population in GTNP.

Effects of motorized use of plowed roads. The effects of plowed roads are similar to those of groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause displacement from preferred

habitats and injury and death to wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall.

Effects of plowed roads would be essentially the same as alternative A.

Effects of nonmotorized use of groomed and designated ungroomed routes. The primary effects of nonmotorized use on ungulates are displacement from preferred habitats, especially geothermal areas that are important for winter survival in YNP, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative E GTNP would establish 8 new miles of new nonmotorized routes, and YNP would offer 37 miles, the same as now.

In GTNP the types of impact in this alternative are similar to those described in alternative B, but at a lower magnitude. The elimination of nonmotorized routes in the Antelope Flats area would eliminate impacts on wintering elk, moose, and deer around Blacktail Butte.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry, nonmotorized use is more random and infrequent compared to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and ungulates may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Alternative E minimizes the potential for these effects in YNP by eliminating or restricting backcountry use in important winter habitats (e.g., thermally influenced areas). Use, where permitted, would be limited to designated routes. Because winter habitats in GTNP are already closed to public access in several areas, no new restrictions on use in this park are proposed under alternative E.

Impacts related to backcountry use in alternative E would be reduced compared to current management in YNP. In GTNP moderate to major adverse impacts on bighorn sheep would continue, as well as potential impacts to moose, elk, and bison on Blacktail Butte and Wolff Ridge.

Effects of the presence and use of winter support facilities. Increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. There are no new warming facilities proposed in this alternative.

Potential impacts are generally as stated in alternative A — minor.

Federally Protected Species

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative E in GTNP, the only oversnow motorized use would occur on 8 miles of the Grassy Lake Road and on 2 miles of the groomed route north of

Flagg Ranch (a decrease of 26 miles). YNP would groom 221 miles, the same as under current management.

Relative to alternative A, the effects associated with packed routes would be nearly eliminated in GTNP. Effects in YNP would be the same as alternative A.

Effects of motorized use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats. No collisions have occurred between oversnow motorized vehicles and federally protected species in the parks.

Relative to alternative A, the effects associated with motorized use would be nearly eliminated in GTNP. Effects in YNP would be the same as alternative A.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to wildlife movements (Aune 1981). In addition like groomed roads, plowed roads may influence wildlife movements and distributions by facilitating travel for wildlife into areas that would normally be inaccessible due to deep snow. Under alternative E, GTNP would plow 94 miles (6 less than currently) and YNP would plow 76 (the same as currently).

Impacts are generally as stated in alternative A.

Effects of motorized use of plowed roads. The effects of traffic on plowed roads are similar to those on groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause displacement from preferred habitats and injury and death to wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall.

Impacts are generally as stated in alternative A — none to minor. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of nonmotorized use on groomed and designated ungroomed routes. The primary effects of nonmotorized use on wildlife are displacement from preferred habitats and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative E, GTNP would establish 8 miles of new nonmotorized routes, and YNP would offer 37 miles, the same as currently.

Potential impacts are generally as stated in alternative A — none to negligible. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and

federally protected wildlife species may only occur sporadically, they may cause displacement and additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Alternative E minimizes the potential for these effects in YNP by eliminating or restricting backcountry use in important winter habitats (e.g., thermally influenced areas). Use, where permitted, would be limited to designated routes. Because winter habitats in GTNP are already closed to public access in several areas, no new restrictions on use in this park are proposed under this alternative.

Impacts related to backcountry use in alternative E would be reduced compared to current management in YNP. Impacts in GTNP would remain the same — negligible to minor.

Presence and use of winter support facilities. Warming huts and campgrounds can cause habituation in some wildlife species by the presence of human food and garbage, and can lead to human-wildlife conflicts. In addition increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. There are no new warming facilities proposed in this alternative.

Potential impacts are generally as stated in alternative A — negligible to minor. If protected species activity is detected, park managers can close the area to human activity to mitigate disturbance.

Species of Special Concern

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow; inhibit foraging activities of carnivores that tunnel beneath the snow to hunt subnivian prey; and reduce subnivian prey availability by increasing mortality of these small mammals. Under alternative E in GTNP, the only oversnow motorized use would occur on 8 miles of the Grassy Lake Road and on 2 miles of the groomed route north of Flagg Ranch, and YNP would groom the same amount as currently (221 miles).

For YNP effects are generally as stated in alternative A — none to negligible. In GTNP effects associated with groomed routes would be nearly eliminated due to the closure of most packed surfaces in GTNP.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The most likely impacts to species of special concern are displacement from preferred habitats, and degradation of the aquatic environment from pollutants in the snowpack. Documented mortality caused by collisions with oversnow vehicles in the parks is rare. In 10 years only one of these species (a marten) was reportedly killed by a snowmobile in YNP (Gunther et al. 1998).

For YNP effects are generally as stated in alternative A — none to minor. In GTNP effects associated with groomed routes would be nearly eliminated due to the closure of

most of motorized trails in GTNP. If species activity is detected, park managers can close the area to human activity to prevent disturbance.

See *Water and Aquatic Resources,* Chapter IV for an assessment of the impacts of exhaust on water quality in the parks.

Effects of plowed roads. Similar to groomed roads, plowed roads also provide an energy efficient mechanism for wildlife movements. Under alternative E, GTNP would plow 94 miles (6 less than alternative A) and YNP would plow 76 (the same as alternative A).

Impacts are generally as stated in alternative A. If species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of motorized use of plowed roads. The most likely impact to park species of special concern is displacement from preferred habitats and mortality caused by collisions with wheeled-vehicles.

Impacts are generally as stated in alternative A. If species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of nonmotorized use on groomed and ungroomed designated routes. The primary effects of nonmotorized use are displacement from preferred habitats, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. Under alternative E, GTNP would establish 8 new miles of new nonmotorized routes, and YNP would offer 37 miles, the same as now.

Impacts are as stated generally in alternative A — none to minor.

Unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent than nonmotorized use on designated routes. Consequently, although encounters between backcountry users and species of special management concern may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. This alternative mitigates potential effects associated with these activities in YNP by eliminating unregulated backcountry use in winter range. Use would be limited to designated routes, and routes would only be designated in areas where species' needs are not of concern.

Effects associated with backcountry use would decrease from alternative A in YNP and in GTNP and the Parkway. Impacts are generally as stated in alternative A.

Presence and use of winter support facilities. The primary effects of warming huts and campgrounds on park species of special concern are associated with increases in human activity, and the subsequent disturbance and displacement of species or their prey. There are no new warming facilities proposed in this alternative. Potential impacts are

generally as stated in alternative A — none to minor. If species activity is detected, park managers can close the area to human activity to mitigate disturbance.

Conclusion

This alternative emphasizes the protection of wildlife while allowing park visitors access to a range of winter recreation opportunities. For YNP with the exception of regulated backcountry use, the effects of this alternative are generally the same as for alternative A. In GTNP all impacts associated with oversnow motorized use greatly decrease. Adaptive management requires a proactive approach to monitoring impacts on wildlife. Should it be determined that impacts are occurring contrary to regulations or management objectives, use would be restricted or eliminated. Implementation of this feature would distinguish this alternative from alternative A for YNP, by eliminating long-term effects.

Impacts to populations resulting from winter recreation are neither long-term nor significant. However, impacts to individual members of the population can lead to death, either directly from collisions or continued harassment, or indirectly through management actions taken as a response to habituation to human presence and food. Although concerned about impacts on individuals, the NPS primarily provides for the protection of native animals populations from management actions (with the exception of federally protected species). For example, see Chapter II, NPS 77, Natural Resources Management.

Ungulates

- Effects of groomed roads and trails on animal movements — unknown if and to what extent beneficial effects outweigh negative effects. Any effects associated with groomed trails would be greatly decreased in GTNP as compared to alternative A; effects in YNP would remain the same as alternative A.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on: 1) mortality caused by collisions – adverse, negligible, and short term and 2) displacement from preferred habitats – adverse, moderate, and short term. Described effects apply to YNP and are the same as alternative A; in GTNP effects would be greatly reduced as compared to alternative A.
- Effects of plowed roads on: 1) habitat fragmentation – adverse, minor, and short term; and 2) animal movements – unknown if and to what extent beneficial effects outweigh negative effects. Same as alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, minor, and short term; and 2) displacement from preferred habitats – adverse, moderate, and long-term. Same as alternative A.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, minor, and short term. In GTNP effects would be slightly greater than alternative A, although the elimination of nonmotorized use in the Antelope Flats area would reduce disturbance to wintering ungulates. Effects in YNP would be the same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible to minor, and short term in YNP (a decrease from alternative A due to the elimination of unregulated backcountry use); and adverse, moderate, and short term in GTNP (the same as alternative A). Impacts to bighorn sheep in GTNP would remain moderate to major and long-term if no mitigation is applied.
- Effects of the presence and use of winter support facilities on displacement – adverse, minor, and short term. Same as alternative A.

Federally Protected Species

- Effects of groomed roads and trails on animal movements: 1) bald eagles, grizzly bears, and wolves — no effect; and 2) lynx – adverse, negligible to major, and short term, depending upon lynx distribution and abundance in the parks. Described effects apply to YNP, and effects would be greatly decreased in GTNP as compared to alternative A.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement from preferred habitats – adverse, negligible, and short term for all species excluding the grizzly bear, which, for the most part, will not be active during the winter use season. Described effects apply to YNP; effects would be greatly decreased in GTNP as compared to alternative A.
- Effects of plowed roads on: 1) habitat fragmentation – no effect on any of the listed species; and 2) animal movements – no known effect on any of the listed species. Same as alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, negligible, and short term on bald eagles and grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx; and 2) displacement from preferred habitats – adverse, negligible, and short term on bald eagles, no effect on grizzly bears; no known effect to date on wolves and lynx. Same as alternative A.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, negligible, and short term on bald eagles; no effect on grizzly bears; and no known effect to date on wolves and lynx. Same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, minor, and short term on bald eagles; adverse, negligible, and short term on grizzly bears; adverse, minor, and short term on wolves; and no known effect to date on lynx. Described effects apply to GTNP and are the same as alternative A; effects would decrease in YNP because of the elimination of unregulated backcountry use.
- Effects of the presence and use of winter support facilities on displacement – no affect on bald eagles; adverse, negligible, and short term on grizzly bears, with mitigation; adverse, minor, and short term on wolves; and no effect on lynx. Same as alternative A.

Species of Special Concern

- Effects of groomed roads and trails on 1) animal movements – no known effect on wolverines; adverse, negligible, and short term on fishers and martens; no effect on otters, swans, reptiles, amphibians, and fish; 2) foraging activities – adverse, negligible, and short term on marten; no effect on the other species; and 3) subnivian prey availability — adverse, negligible, and short term on marten; and no effect on the other species. Described effects apply to YNP; effects may greatly decrease relative to alternative A in GTNP.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement – no known effect on wolverine; adverse, negligible, and short term on fishers, marten; no effect on otters, reptiles, amphibians, and fish; and adverse, minor, and short term on swans. Described effects apply to YNP; effects may greatly decrease relative to alternative A in GTNP.
- Effects of plowed roads on animal movements – no known effect on wolverines, fishers, and martens; and no effect on otters, swans, reptiles, amphibians, and fish. Same as alternative A.
- Effects of motorized use of plowed roads on displacement from preferred habitats: 1) adverse, negligible, and short term on wolverines, fishers, and martens; no effect on otters, swans, reptiles, amphibians, and fish; and 2) mortality from collisions — adverse, negligible, and short term on otters, martens; and no effect to date on other species. Same as alternative A.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – no effect on wolverines; no known effect on fishers, martens, and

otters; adverse, minor, and short term on swans; adverse, negligible, and short term on sagebrush lizard; and no effect on rubber boa, amphibians, and fish. Same as alternative A.

- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible, and short term on wolverines and sagebrush lizard; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; and no effect on rubber boa, amphibians, and fish. Described effects apply to GTNP and are the same as alternative A; effects would decrease in YNP because of the elimination of unregulated backcountry use.
- Effects of the presence and use of winter support facilities on displacement of potential prey (carcass) availability – adverse, minor, and short term on wolverines, fishers, and martens; no effect on swans, rubber boa, amphibians, and fish; no known effect on otters; and adverse, minor, and short term on sagebrush lizard. Same as alternative A.

Mitigation

- Backcountry monitoring and administration should be implemented in GTNP. Additional area closures could be imposed if monitoring indicates such a closure is warranted for the protection of wintering ungulates.
- Use of groomed and plowed surfaces by bison and other ungulates would continue to be monitored.
- Snow track surveys for carnivores, including lynx, on both groomed and ungroomed routes would be conducted.

Effects on Natural Soundscape

Audibility analysis — combined effects of all wheeled and oversnow vehicles

Table 117 presents the acres of park land by road segment where any wheeled or oversnow vehicle noise would be audible under the two background conditions, "average" and "quiet," as defined in the *Assumptions and Methodologies* section of this chapter. For each background condition, acreage is presented for three categories of audibility: 1) audible for any amount of time (labeled "audible at all"); 2) audible for 10% of the time or more; and 3) audible for 50% of the time or more. Appendix M contains tables with distances to audibility for each segment for each alternative.

Alternative E features no snowplanes or snowmobiles on Jackson Lake, and no oversnow vehicles elsewhere in GTNP except from Flagg Ranch to YNP and on Grassy Lake Road. The results for alternative E show that for the "average" background conditions, wheeled or oversnow vehicles would be audible to some degree for over 152,000 acres in the three park units. For nearly 82,000 of those acres, wheeled or oversnow vehicles would be audible for at least 10% of the time during the day. For over 23,000 of those acres, they would be audible for at least half of the time during the day. These acreages increase by 10% to 13% for the "quiet" background conditions for the three audibility categories.

Table 117. Acres of park land affected by vehicle audibility for alternative E.

Road Segment	Miles	With Average Background Conditions			With Quiet Background Conditions		
		Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More	Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More

1. Mammoth to Northeast Entrance	47	16,126	5,445	0	16,822	6,342	0
2. Mammoth to Norris	21	11,400	761	0	12,372	1,043	0
3. West Entrance to Madison	14	8,032	6,482	5,282	10,090	7,060	6,032
4. Madison to Norris	14	6,853	5,505	347	7,249	6,029	419
5. Norris to Canyon Village	12	5,443	3,955	0	5,683	4,420	0
6. Canyon Village to Fishing Bridge	16	9,999	6,559	0	11,173	7,426	166
7. Fishing Bridge to East Entrance	27	10,760	1,381	0	11,762	1,582	0
8. Fishing Bridge to West Thumb	21	15,645	9,490	0	17,785	10,884	0
9. Madison to Old Faithful	16	8,781	7,583	5,546	11,064	8,324	6,604
10. Old Faithful to West Thumb	17	7,713	6,057	0	8,053	6,647	0
11. West Thumb to Flagg Ranch	24	12,716	8,780	664	13,577	9,884	933
12. Grassy Lake Road	7.6	3,033	0	0	3,303	0	0
13. Flagg Ranch to Colter Bay	15.6	7,532	2,761	0	8,183	3,037	0
14. Colter Bay to Moran Junction	10.2	4,605	1,884	0	4,953	2,098	0
15. Moran Junction to East Entrance	2	1,193	709	476	1,294	781	519
16. Moran Junction to South Entrance	26	21,714	14,462	11,120	23,842	16,827	11,823
17. Teton Park Road	15	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	2.5	659	0	0	695	0	0
19. Antelope Flats Snowmobile Route	--	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	9.7	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
TOTAL		152,203	81,815	23,436	167,899	92,382	26,497

The segment from Moran Junction to the South Entrance of GTNP, which carries a great deal of wheeled-vehicle traffic unrelated to the alternatives, contributes the greatest to the total acreage values for all three audibility categories. These amounts remain almost constant for all the alternatives.

The plowed road from Mammoth to the YNP Northeast Entrance is a major contributor to the “audible at all” acreage (and, to a lesser extent, “audible 10% or more”), which remains virtually unchanged across all the alternatives.

The other major road segments for the “audible 50% or more” categories are from the West Entrance of YNP to Madison and from Madison to Old Faithful.

The audibility acreage is reduced to zero for Jackson Lake and Teton Park Road. There are only slight reductions for the Colter Bay to Moran Junction and Flagg Ranch to Colter Bay segments compared to the no action alternative.

Average Sound Level Analysis

To give a sense of the effect of the number of oversnow or wheeled-vehicles on a road segment, and their speed and sound level, Table 118 shows the computed hourly equivalent or “average” sound level (L_{eq}) over the daytime period. Levels are shown for each road segment at two distances, 100 feet and 4,000 feet, and for both open and

forested terrain. These hourly L_{eq} values do not have the background sound level added in to them. Also they cannot be compared against the background levels to assess audibility, since L_{eq} represents a long-term average of both quiet and loud moments.

The hourly L_{eq} values at 100 feet are highest for West Entrance to Madison, and Madison to Old Faithful segments mentioned above. At 4,000 feet away, the L_{eq} are highest for these two segments, followed by all the YNP inner loop segments, and the segments from Moran Junction to both the East Entrance and the South Entrance of GTNP. The oversnow vehicle contributions to the L_{eq} are reduced to zero for Jackson Lake, Teton Park Road, and Antelope Flats, and there is a 7 dB reduction along the Flagg Ranch to Colter Bay segment.

Conclusion

Alternative E impacts about 84% to 86% of the acreage impacted by the no action alternative for the “audible at all” and “audible 10% of the time or more” categories. It impacts the same total acreage as the no action alternative for the “audible 50% or more” categories. The reason for the decreases in the first two categories is the elimination of oversnow vehicles on Jackson Lake and Teton Park Road in GTNP.

The contribution to the L_{eq} is reduced to zero for those road segments where vehicular travel of all types is eliminated, as well as Jackson Lake.

Table 118. Average hourly L_{eq} from wheeled and oversnow vehicle noise at two distances to each road segment for alternative E.

Road Segment	L_{eq} at Distance (dBA)			
	Open Terrain		Forested Terrain	
	100 feet	4,000 feet	100 feet	4,000 feet
1. Mammoth to Northeast Entrance	35	2	33	0
2. Mammoth to Norris	44	4	42	0
3. West Entrance to Madison	56	16	54	8
4. Madison to Norris	53	13	51	5
5. Norris to Canyon Village	51	12	50	4
6. Canyon Village to Fishing Bridge	50	10	49	2
7. Fishing Bridge to East Entrance	44	4	43	0
8. Fishing Bridge to West Thumb	50	10	48	2
9. Madison to Old Faithful	56	16	54	8
10. Old Faithful to West Thumb	52	12	50	4
11. West Thumb to Flagg Ranch	51	11	50	3
12. Grassy Lake Road	42	2	41	0
13. Flagg Ranch to Colter Bay	37	5	36	0
14. Colter Bay to Moran Junction	40	8	38	0
15. Moran Junction to East Entrance	45	12	43	4
16. Moran Junction to South Entrance	46	14	44	6
17. Teton Park Road	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	34	0	32	0
19. Antelope Flats Snowmobile Route	No. Veh	No. Veh	No. Veh	No Veh.
20. Jackson Lake	No. Veh	No. Veh	No. Veh	No Veh.

Effects on Cultural Resources

The effects on cultural resources would be the same as described in alternative B.

Conclusion

None of the actions described would adversely impact cultural resources.

Effects on Visitor Access and Circulation

Yellowstone National Park. Under alternative E access to park resources would not change unless area closures occur within the park to protect resources such as water quality, air quality, or wildlife. The effects of area closures on access would have to be evaluated in future environmental compliance documents as the closures were proposed.

Grand Teton National Park and the Parkway. The only measurable or perceptible change to access would be the elimination of the CDST along Highway 89/287 between the east park boundary and Flagg Ranch. CDST users would be shuttled from the end of

the trail to Flagg Ranch. A relatively small number of winter use visitors who use the CDST would be affected. Access to Flagg Ranch would continue. However, other modes of travel (such as wheeled-vehicles) would be used, in addition to continued oversnow access via the Grassy Lake Trail. Under alternative E, overall visitor access to park resources would not be expected to change.

Table 119 depicts reasonably foreseeable distribution of vehicle use as a consequence of this alternative. It shows a loss of 87 snowmobile trips daily from the Teton Park Road and the CDST from GTNP's East Entrance to Flagg Ranch. There would be a decrease of 2% in snowmobile vehicle-miles traveled in the three park units and a net increase of 4% wheeled-vehicle-miles traveled. Snowcoach travel would remain the same as in alternative A.

Table 119. Alternative E motorized use.

Road Segment	*Average Daily Vehicle Use January-February*				
	Autos	**Vans**	**Snowcoaches**	**Snowmobiles**	**Buses**
Mammoth to Northeast Entrance	No change from current condition				
Mammoth to Norris	No change from current condition				
West Entrance to Madison	No change from current condition				
Madison to Norris	No change from current condition				
Norris to Canyon Village	No change from current condition				
Canyon Village to Fishing Bridge	No change from current condition				
Fishing Bridge to East Entrance	No change from current condition				
Fishing Bridge to West Thumb	No change from current condition				
Madison to Old Faithful	No change from current condition				
Old Faithful to West Thumb	No change from current condition				
West Thumb to Flagg Ranch	No change from current condition				
Grassy Lake Road	No change from current condition				
Flagg Ranch to Colter Bay	86	15	0	0	1
Colter Bay to Moran Junction	192	15	0	0	1
Moran Junction to East Entrance	560	35	0	0	2
Moran Junction to South Entrance	No change from current condition				
Teton Park Road	0	0	0	0	0
Moose-Wilson Road	5	0	0	0	0
Antelope Flats Snowmobile Route	No change from current condition				

Concession Services

Impacts would essentially be the same as those described in alternative A for all three park units.

The CDST would be discontinued at the east boundary of GTNP, so snowmobilers would no longer be able to come into Flagg Ranch over the snow and from the east. The

amount of business actually provided by Flagg Ranch to such users (fuel, lodging, and groceries) is unknown, but those users are relatively few. Those snowmobilers who presently engage in this activity would have a shuttle system available to them in this alternative for transport from the east boundary to Flagg Ranch. A concession provided shuttle service may create jobs and generate some income for existing or new concessioners.

Conclusion

The short-term impact to access is negligible in YNP. However, impacts are unknown and would depend on future management decisions related to area closures. Access to resources in GTNP and the Parkway would not be expected to change, although modes of travel to those resources would change.

Effects on Visitor Experience — Yellowstone National Park

The amount and type of winter visitor opportunities offered in the YNP under alternative E are provided in Table 120.

Table 120. YNP Visitor opportunities available under alternative E.

Opportunities	Miles or Areas	Increase/ Decrease†	Length of Season	Other
Groomed motorized route	184	0	Mid-December to Mid-March	If scientific studies and monitoring of winter visitor use and wildlife indicate that human use or activities have a detrimental effect on wildlife that cannot be mitigated, sections of road and/or trails could be closed.
Groomed motorized route, snowcoach only	0	0	Mid-December to Mid-March	
Groomed motorized trail	0	0	Mid-December to Mid-March	
Plowed route	76	0	Mid-December to Mid-March	
Groomed nonmotorized	37	0	Mid-December to Mid-March	
Warming huts	6	0	Mid-December to Mid-March	
Backcountry	2.2 million acres	Restricted access in ~700,000 acres	Travel restricted to trails in important wildlife winter range	

†If scientific studies and monitoring of winter visitor use and wildlife indicate that human use or activities have a detrimental effect on wildlife that cannot be mitigated, sections of road and/or trails could be closed.

Visitor Satisfaction and Experience

Opportunities to view wildlife. Same as alternative D, except if scientific studies and monitoring related to winter wildlife and winter visitor use indicate that human presence or activities have a detrimental effect on wildlife or other park values that could not otherwise be mitigated, certain sections of roads or trails would be closed. The opportunity to view wildlife would be eliminated in areas recommended for closure.

Opportunities to view scenery. Same as alternative D, except if scientific studies and monitoring related to winter wildlife or other park values indicate that human presence or activities have a detrimental effect on wildlife that could not otherwise be mitigated, certain sections of roads or trails would be closed. The opportunity to view scenery would be eliminated in areas recommended for closure.

Safety (the safe behavior of others). Same as alternative A.

Quality of the groomed surface. Same as alternative A

The availability of access to winter activities or experiences. Backcountry users are restricted to designated routes in important winter range. This action would limit the range of opportunities currently available to skiers.

If scientific studies and monitoring related to winter wildlife and other park values indicate that human presence or activities have a detrimental effect on wildlife that could not otherwise be mitigated, certain sections of roads or trails would be closed. Recommended closures would, in the short term, eliminate access to the winter experience in those areas.

Availability of information. Same as alternative A.

Quiet and Solitude. Because use in important wildlife winter range is restricted to designated trails, skiers may find fewer opportunities to experience solitude.

Under alternative E oversnow vehicle sound standards would be established by an advisory committee. These standards would be implemented at various levels over the next 10 years. While the short-term beneficial changes in visitor experience would be minor, the long-term goal of reducing snowmobile emissions would enhance the ability to experience quiet in YNP.

Clean air. Under alternative E oversnow vehicle emission standards would be established by an advisory committee. These standards would be implemented at various levels over the next 10 years. While the short-term beneficial changes in visitor experience would be minor, the long-term goal of reducing snowmobile sound emissions would moderately enhance the ability to experience clean air in YNP.

Conclusion

The adaptive management provisions of this alternative require that if scientific studies on winter visitor use, natural resources, and other park values indicate that sections of the park must be closed to protect those values. All visitor experiences currently afforded in the closure area would be eliminated. These closure areas would result in direct major adverse impacts on desired winter visitor experience. However, long-term resource protection would provide major benefits to the protection of these experiences park-wide.

Negligible to moderate beneficial short-term improvements in opportunities to appreciate clean air, quiet, and solitude are expected from the implementation of the standards set by the advisory committee.

Effects on Visitor Experience — Grand Teton National Park and the Parkway

The amount and type of winter visitor opportunities offered in GTNP under alternative E are provided in Table 121.

Table 121. GTNP Visitor opportunities available under alternative E.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	2.1	0	December to April†	Nighttime speed limit 35 mph
Groomed motorized route, snowcoach	2.1	0	December to April†	Nighttime speed limit 35 mph
Groomed motorized trail	8	-26	December to April†	Nighttime speed limit 35 mph
Plowed road	94.4	-5.6	December to April†	Nighttime speed limit 35 mph
Ungroomed motorized trail or area	0	-35.6	December to April†	Nighttime speed limit 35 mph
Groomed nonmotorized	0	0	December to April†	Nighttime speed limit 35 mph
Ungroomed nonmotorized trail or area	35	8.6	December to April†	Nighttime speed limit 35 mph
Warming huts/interpretive centers	2	0	December to April†	

† Variable, dependent on snow conditions.

Visitor Satisfaction and Experience

Opportunities to view wildlife and scenery. There would be decreased opportunities to view wildlife and scenery via snowmobile. Opportunities would be available in the same areas by auto.

Safety (the safe behavior of others). Since the CDST would be eliminated through GTNP, any potential for motor vehicle accidents involving oversnow use of this route

also would be eliminated. The nighttime speed limit would improve safety where motorized oversnow use occurs.

Quality of the groomed surface. Grassy Lake Trail would be groomed at its present level. There would be no nonmotorized trail grooming.

The availability of access to winter activities or experiences. There would be decreased oversnow motorized access, and no oversnow linkage via CDST between trail systems to the east and YNP. Elimination of motorized use on the frozen surface of Jackson Lake would decrease the range of experiences available. A secondary impact would be loss of motorized access onto Jackson Lake for ice fishing. This opportunity would remain available for those who would use the lake surface via nonmotorized means. The loss of motorized experience on the lake would be countered by a gain in nonmotorized opportunities free of any use conflict that might ordinarily occur.

Availability of information. Same as in alternative A.

Quiet and Solitude. With the elimination of motorized use, except for Grassy Lake Trail and access north from Flagg Ranch, opportunities for quiet and solitude would be moderately enhanced for nonmotorized uses.

Clean air. With the decrease in motorized use, except for Grassy Lake Road, the major source of pollution would be eliminated.

Conclusion

Minor adverse impacts to visitor experience would occur due to fewer opportunities to view wildlife and scenery by snowmobile. The same opportunity remains for nonmotorized users and automobile occupants. There would be major beneficial changes relating to safety by eliminating snowmachines as a source of motor vehicle accidents, except on Grassy Lake Road. There would be a major adverse impact on the availability of groomed surfaces for snow-related recreation, and consequently a major adverse impact on access for a range of winter use experiences. The level and availability of winter information would not be improved from the existing condition. There would be a moderate beneficial impact relative to opportunities for quiet and solitude, other than for those who use motorized means. Opportunities to appreciate clean air would be moderately improved due to the elimination of the major source of pollution. Where oversnow motorized use remains, opportunities to experience quiet and clean air would be afforded by use of improved motorized technology.

IMPACTS OF IMPLEMENTING ALTERNATIVE F

Unless otherwise indicated, the effects of this alternative for GTNP and the Parkway are the same as indicated in alternative E. The actions proposed for GTNP and the Parkway are the same in alternatives E and F. Because YNP actions differ between these alternatives, some effects on GTNP may be different as noted in the following analysis.

Effects on the Socioeconomic Environment

GYA Regional Economy. Alternative F contains several provisions for relatively minor changes in trails management within YNP. Most of these changes are unlikely to significantly impact visitor decisions on whether to visit the parks for recreation. One proposed management change, however, has the potential to significantly impact visitation levels to the GYA and consequently, visitor expenditures and the overall level of economic activity within the GYA. Alternative F contains a proposal to close the western side of YNP to all winter travel.

The 1999 GYA winter visitor survey asked respondents how their visitation would be affected if the roads from Mammoth to Madison, West Yellowstone to Madison, and Madison to Old Faithful were closed to all vehicular travel from November 1 to April 30, and other roads were groomed for snowmobiles as they are now. Based on the responses to this survey question, visitation to the GYA by winter visitors who live outside the five counties would be reduced by 24.6% if the roads from Mammoth to West Yellowstone and to Old Faithful were closed for winter travel. It is likely that this estimate of use reduction is conservative since the question in the winter survey specified a road closure for vehicles only. To the extent that skiers and snowshoe visitors would also reduce their park visitation under this alternative, these estimates of impacts are conservative. This estimated reduction in visitation is a net change that considers the responses of those current winter visitors who said they would visit more often if the change occurred. Also considered in the calculation were those respondents who said they would visit the same, but would shift their use to other areas of the GYA (for example, from park lands to national forest lands).

Park visitors who reside outside the five counties made up 85.9% of total sampled visitors. If 24.6% of these visitors decided not to recreate within the GYA because of the west side road closure within the park, the local GYA economy would lose these potential visitors' local-area expenditures.

Based on the winter survey responses and the IMPLAN input/output model, these travel restrictions would reduce the total economic output in the five-county GYA area by an estimated $14.4 million. In addition it is estimated that 340 jobs within the five-county area would be lost due to reduced nonresident expenditures in the area.

A $14.4 million loss in output is a minor impact on the overall $5.7 billion economic output of the GYA. This impact, however, likely will be concentrated in small communities such as West Yellowstone and Gardiner, Montana. Because of the small size their economies, and proximity to the affected road segments, it can be assumed that these towns will bear a disproportionately large share of the nonresident expenditure reductions. This could have a moderate to major negative impact on the West Yellowstone and Gardiner winter economies.

The socioeconomic effects of alternative F for GTNP and the Parkway generally would be the same as alternative E. With the closure of the west side roads in YNP, some use

could shift to the Flagg Ranch area. The amount of such a shift is not quantifiable; however, visitor expenditures also would shift with use. Use levels would be limited at both these locations because of the amount of parking that is available. A moderate increase in visitor expenditures in the Jackson area may result from this shift. At other entrances, such as East and Mammoth in YNP, minor increases in use also may occur, bringing commensurate increases in visitor expenditures to communities such as Cody, Wyoming and Gardiner and Cooke City, Montana.

Three-State Regional Economy. Overall, 65.5% of winter visitors in the GYA winter visitor survey came from outside the three-state area. Responses from nonresidents indicate that there would be a 20.2% drop of nonresident winter trips to the GYA under alternative F.

A loss of the regional expenditures by these nonresidents would lead to an overall reduction of $13.7 million in total economic output and 334 jobs in the three-state area. This is a negligible to minor negative impact in the context of the regional three-state economy. This estimated reduction would be lessened if nonresidents chose to recreate at other locations within the three-state region instead of in the GYA. The extent of any such substitution behavior is unknown.

Minority and Low-Income Populations. To the extent that convenient, low-cost access is reduced by the closure of west side roads within YNP, populations living near West or East Entrances to YNP would be adversely impacted. The degree of this impact, if any, is not known at this time.

Social Values. Most current winter visitors surveyed support mechanized access to the parks. In the context of overall park access, the changes proposed in alternative F are likely to result in major adverse impacts by eliminating some of the most heavily used winter motorized routes within the parks. Conversely, a substantial portion of winter park users favor reductions in motorized use within the park. For this group the alternative F travel restrictions would have a positive impact.

Nonmarket Values. The proposed alternative F actions potentially would impact winter visitors' nonmarket values through a reduction in current winter user visitation, resulting from the closure of the west side roads.

The nonmarket value of a trip to the parks, based on the winter visitor survey is $91. It is estimated that park visitation would drop by 24.6% resulting from the park closure. Based on current winter visitation levels, a 24.6% reduction in visitation would translate into a $2 million reduction the aggregate nonmarket value of winter trips to the parks. This is a moderate negative impact.

Conclusion

Alternative F management actions would have a negligible to minor impact on the five-county and three-state economies through reduced visitation and nonresident visitor

expenditures. The reduced visitor expenditures under this alternative could have a larger, moderate to major adverse impact on the economies of small communities within the GYA such as West Yellowstone or Gardiner, Montana. The alternative F actions would also have a moderate negative impact on total current trip nonmarket visitor benefits (through reduced visitation).

Effects on Air Quality and Public Health

In alternative F the roads from the West Entrance to Madison to Old Faithful would be closed to emphasize the protection of wildlife. Winter recreation activities would focus on scenic areas in the eastern and southern portions of YNP.

Table 122, Table 123, and Table 124 summarize the results of CO modeling for six locations in the three parks for alternative F. Table 122 and Table 123 show the predicted maximum 1-hour average CO concentrations and the calculated maximum 8-hour average CO concentrations, respectively. The percent contribution of each vehicle type to the maximum CO concentrations also is provided in Table 124 for the six locations. Table 125 and Table 126 provide corresponding model results for PM_{10} for the same locations and conditions as those for CO.

Table 122. Maximum 1-hour average CO concentrations for alternative F.

Location	1-hr Maximum Concentration (w/o Background) (ppm)	1-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	No Vehicular Traffic		
West Entrance to Madison Roadway			
Old Faithful Staging Area	1.28	4.28	0.2
Flagg Ranch Staging Area	1.74	4.74	-1.4
Flagg Ranch to Colter Bay Roadway	0.60	3.60	45.5
Mammoth to NE Entrance Roadway	0.30	3.30	0

Table 123. Maximum 8-hour average CO concentrations for alternative F.

Location	8-hr Maximum Concentration (w/o Background) (ppm)	8-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	No Vehicular Traffic		
West Entrance to Madison Roadway			
Old Faithful Staging Area	0.21	1.62	0.2
Flagg Ranch Staging Area	0.29	1.69	-1.4
Flagg Ranch to Colter Bay Roadway	0.28†	1.69†	45.5
Mammoth to NE Entrance Roadway	0.14†	1.55†	0

† Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)^{0.365}$ (Cooper and Alley 1990).

Table 124. Vehicle contribution to CO concentrations for alternative F.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	No Vehicular Traffic						
West Entrance to Madison Roadway							
Old Faithful Staging Area	98.8	1.1	0	0	0.1	0	0
Flagg Ranch Staging Area	79.4	0.8	5.7	11.3	0.1	0	2.8
Flagg Ranch to Colter Bay Roadway	0	0	25.2	59.1	0.3	0.3	15.2
Mammoth to NE Entrance Roadway	0	0	26.5	66.9	0.5	0	6.1

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Table 125. Maximum 24-hour average PM_{10} concentrations for alternative F.

Location	24-hr Maximum Concentration (w/o Background) (µg/m^3)	24-hr Maximum Concentration (w/Background) (µg/m^3)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	No Vehicular Traffic		
West Entrance to Madison Roadway			
Old Faithful Staging Area	0.64	5.64	0
Flagg Ranch Staging Area	0.71	5.71	-11.6
Flagg Ranch to Colter Bay Roadway	0.32†	5.32	66.7
Mammoth to NE Entrance Roadway	0.32†	5.32	0

† Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)^{0.365}$ (Cooper and Alley 1990).

Table 126. Vehicle contribution to PM_{10} concentrations for alternative F.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	No Vehicular Traffic						
West Entrance to Madison Roadway							
Old Faithful Staging Area	99.6	0	0	0	0.4	0	0
Flagg Ranch Staging Area	99.6	0	0	0	0.3	0.2	0
Flagg Ranch to Colter Bay Roadway	0	0	21.3	41.0	14.8	12.3	10.6
Mammoth to NE Entrance Roadway	0	0	22.5	46.6	26.7	0	4.2

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Visibility

The visibility assessment indicates that under this alternative, vehicular emissions would not cause any perceptible visibility impairment near the West Entrance or along the roadways. Perceptible visibility degradation could occur near Old Faithful and Flagg Ranch when vehicles idle for extended periods.

Conclusion

As noted in Table 122, Table 123, and Table 125, the model predicts negligible beneficial and adverse impacts on CO and PM_{10}levels relative to alternative A at the Old Faithful staging area and the Flagg Ranch staging area, respectively. No results were generated for the West Entrance and along the West Entrance to Madison roadway since there would be no vehicular traffic at these locations. Relative to alternative A, this represents a major beneficial impact on CO and PM_{10} concentrations. Moderate and major beneficial impacts on CO and PM_{10} concentrations are predicted along the Flagg Ranch to Colter Bay roadway. These decreased concentrations are attributable to the prohibition of snowmobiles on this roadway.

Effects on Public Safety

Eliminating oversnow travel from sunset to sunrise would eliminate vehicular incidents during these times. Within YNP, roadway segments between West Yellowstone and Madison, Madison and Old Faithful, Madison and Norris, and Norris and Mammoth would be closed to all vehicle travel from November 1 to April 30. Closing these heavily used road segments would eliminate the potential for visitor conflicts in these areas. In the winters of 1995-1999, 71% of all reported snowmobile accidents occurred on these road segments.

Current road conditions are cited as a contributing factor in about 16% of all reported snowmobile accidents in YNP. Improved road conditions would thus be expected to decrease accident rates. Eliminating travel on a freshly groomed route allows the surface to harden and so improve its quality. Since most road grooming in YNP is performed in

the early evening, the sunset to sunrise closure would provide moderate improvements to the groomed surface quality.

Restricting all skiing activities to groomed front country trails would eliminate the risk of visitor injury or death from avalanche or exposure in backcountry areas in YNP.

Conclusion

Oversnow travel closures at night and on the most congested road segments would result in major beneficial improvements to public safety in YNP. If these closures should increase visitation to other areas of the parks, such as the Flagg Ranch to South Entrance segment (where most snowmobile accidents occur in the parkway at present), then a corresponding adverse effect on public safety would occur.

In GTNP all alternative F actions are the same as alternative E, with a negligible increase in beneficial impact due to the overall elimination of nighttime travel.

Effects on Geothermal Features

Under this alternative roads on the east side would be groomed near the following geothermal areas: West Thumb Geyser Basin, Mud Volcano, and Norris Geyser Basin. The impacts on these areas from groomed roads would be the same as described in alternative A.

Constructing a warming hut at Norris Geyser Basin would have similar impacts on this geothermal area as discussed under alternatives A and B.

There would be minor beneficial impacts on the geothermal resources with a shorter winter season (mid-December to early March) and a later spring opening in late April, since there would be less time for visitors to access geothermal features.

Visitors would not be able to access many geothermal areas due to the closures of west side park roads and the backcountry. These closures would cause major beneficial improvements to the protection of geothermal features by eliminating human access.

Conclusion

Overall human access would decrease in geothermal areas parkwide due to closures and shortened winter and spring seasons. This decrease would have major benefits to the protection of geothermal features in areas where use is eliminated, and minor benefits in areas with continued use. There may be a minor increase of visitor use to the Norris Geyser Basin because of a new warming hut. This would cause minor adverse impacts on the geothermal basin.

Effects on Water and Aquatic Resources

Potential pollution sources are the same as described in alternative A. The potential impacts along three “high” risk road segments would decrease with the elimination of all

vehicles: Madison to Norris, Madison to Old Faithful, and Colter Bay to Moran Junction road segments.

Potential impacts along the Canyon Village to Fishing Bridge "high" risk segment are expected to increase with the projected increase in snowmobile traffic.

Risks along three "medium" risk segments, Mammoth to Norris, West Entrance to Madison, and Moran Junction to East Entrance, would decrease with the prohibition of snowmobiles or all vehicles. Risks would increase along four "medium" risk segments: Fishing Bridge to East Entrance, Fishing Bridge to West Thumb, Old Faithful to West Thumb, and West Thumb to Flagg Ranch.

Risk to the "low" risk segment Norris to Canyon and Flagg Ranch would be decreased with the prohibition of snowmobiles. Risk to the "low" risk segment Flagg Ranch to Colter Bay, Teton Park Road, and Moose-Wilson Road, would be decreased with the elimination of all vehicles.

There would be no change along all other road segments.

Conclusion

Two-stroke engine emissions would continue to deposit pollution into snowpack along groomed park roads in YNP and GTNP. The effect of this deposition on water quality is undetermined, but there is currently no evidence of measurable changes in water quality or effects on aquatic resources. It is possible that accumulations of pollutants in aquatic systems may have adverse impacts on wetlands and aquatic resources downstream from high risk road segments. Oversnow vehicle use in this alternative involves localized high risk to surface water quality. However, it reduces oversnow vehicle-miles traveled along high risk road segments in the three park units by about 74%. The risk of moderate to major adverse impacts on water quality in Jackson Lake would be eliminated.

Table 127[41]. Snowmachines and associated risk levels for alternative F.

Road Segment	Risk ± Rating	Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. A†		Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. F†	
		SM	SC	SM	SC
Mammoth to Norris	Medium	641	69	0	0
West Entrance to Madison	Medium	7759	127	0	0
Madison to Norris	High	3458	73	0	0
Norris to Canyon Village	Low	2214	47	1200	36
Canyon Village to Fishing Bridge	High	2370	50	3472	48
Fishing Bridge to East Entrance	Medium	983	0	2079	0
Fishing Bridge to West Thumb	Medium	2627	55	5019	63
Madison to Old Faithful	High	7818	165	0	0
Old Faithful to West Thumb	Medium	3560	73	5831	68
West Thumb to Flagg Ranch	Medium	4219	103	8976	96
Grassy Lake Road	High	184	0	200	0
Flagg Ranch to Colter Bay	Low	379	0	0	0
Colter Bay to Moran Junction	High	248	0	0	0
Moran Junction to East Entrance	Medium	49	0	0	0
Teton Park Road	Low	156	0	0	0
Moose-Wilson Road	Low	6	0	6	0

Mitigation

Best management practices would be used during the construction, reconstruction, or winter plowing of trails and roads to prevent unnecessary vegetation removal, erosion, and sedimentation. The release of snowpack contaminants into surface water could be mitigated by disconnecting snowmelt drainages from trails used by oversnow vehicles. Any new or reconstructed winter use sanitary facilities would be constructed in locations and use advanced technologies that would protect water resources. A focused program of monitoring would reduce the uncertainty of impacts from oversnow vehicles, and if necessary, indicate best management practices that might be implemented.

Effects on Wildlife

The impacts disclosed below apply to YNP. For GTNP and the Parkway, all actions and impacts associated with this alternative are the same as in alternative E, with the exception of recommended mitigation that closes Blacktail Butte and Wolff Ridge to protect moose, bison, and elk in important winter range in the park.

[41] *SM = Snowmobile, SC = Snowcoach; The source of pollutants is emissions from snowmobiles, which produce (conservatively) 10 times as many emissions per mile as most wheeled vehicles. Single snowcoaches produce fewer emissions than single snowmobiles.
±High = within 100 meters of aquatic system on 76-100% of the road segment; Medium = within 100 on 51-75% of the road segment; Low risk segments are within 100 meters of rivers less than 50%.

Ungulates

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under this alternative YNP would maintain 119 miles of groomed oversnow motorized routes (a decrease of 65 miles over alternative A), and 27 miles of groomed nonmotorized routes (a decrease of 10 miles over alternative A). In addition use of the remaining available surfaces would be discontinued two weeks earlier than under current management, and oversnow travel would be prohibited from sunset to sunrise. GTNP would groom 10 miles of oversnow motorized routes (a decrease of 26 miles from alternative A).

In YNP road closure from West Entrance to Old Faithful and Mammoth to Madison Junction would eliminate all motorized use along those segments and all impacts associated with those uses. An energy efficient means for bison to move within their primary habitat and to other locations in and out of the park would be eliminated. Resulting distribution would depend on snow conditions and how bison naturally maintain traditional travel routes. Motorized use and its impacts would be eliminated in the most important ungulate habitats within YNP. The impact reduction would be proportionately greater than the reduction in miles. Consequently, the potential effects associated with this use, compared to those in alternative A, would decrease greatly.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats and injury and death for wildlife, especially in poor lighting conditions and during snowfall.

Fewer wildlife-snowmobile collisions would occur because there would be 65 fewer miles of travel surface in YNP and 62 fewer in GTNP. Closures would occur where most collisions presently occur (Gunther et al. 1998), and there would be a prohibition on travel during times when most collisions occur (dusk to dawn). The potential for impacts on ungulates would be eliminated throughout the entire western portion of the park, including the elimination of barriers to movement (fragmentation) and displacement effects. If significant numbers of snowmobiles were displaced to the east side of YNP, there could potentially be more of an impact to bison that are wintering there.

With the closures in important habitat, shortening of the winter use season, and prohibition of oversnow travel from dusk to dawn, the overall effect in YNP would be reduced to negligible and short term in this alternative.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to ungulate movements (Aune 1981). In addition plowed roads, like groomed roads, may also provide an energy efficient mechanism for wildlife movements, including bison, elk, and moose. Under alternative F YNP would plow 76 miles of road for wheeled-vehicle access in the winter, the same as under current management. GTNP would plow 94 miles, 6 miles less than now.

For both parks, the effects associated with plowed roads would be the same as alternative A.

Effects of motorized use of plowed roads. The effects of plowed roads are similar to those of groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause displacement from preferred habitats and injury and death to wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall.

Effects of plowed roads would be essentially the same as alternative A.

Effects of nonmotorized use of groomed and designated ungroomed routes. The primary effects of nonmotorized use on ungulates are displacement from preferred habitats, especially geothermal areas that are important for winter survival in YNP, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. In this alternative YNP decreases these opportunities from 37 miles to 27 miles of groomed nonmotorized routes. GTNP adds 8 miles of nonmotorized route.

Overall, any adverse effect of this use is negligible. Minor site-specific impacts are possible where trails occur in or near thermal areas. Decreasing these opportunities decreases the potential for adverse impacts associated with them. However, the potential for impact is relatively low because most trails and routes are located in areas not presently used or preferred by ungulates.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent than nonmotorized use on designated routes. Although encounters between backcountry users and ungulates may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction.

For YNP this alternative restricts nonmotorized use to front country trails. All backcountry use is prohibited, thereby eliminating any potential effects associated with this activity and greatly decreasing effects relative to alternative A. In GTNP mitigation is recommended to prohibit public access to Blacktail Butte, Wolff Ridge, and bighorn sheep winter ranges.

Effects of the presence and use of winter support facilities. Increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. Alternative F proposes to increase the number and size of warming huts. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and areas where existing facility size is currently inadequate or nonexistent (e.g., Tower, Norris, and Canyon). Warming huts near ungulate winter range important to elk, deer, and bison would potentially increase human use and consequently reduce habitat effectiveness. However over time, the predictable nature of the recreation

expected to occur in the area may allow species to habituate to increased human activity. The effects of these huts on ungulates would be the same for all alternatives.

Federally Protected Species

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under this alternative YNP would maintain 119 miles of groomed oversnow motorized routes (a decrease of 65 miles over alternative A), and 27 miles of groomed nonmotorized routes (a decrease of 10 miles over alternative A). In addition use of the remaining available surfaces would be discontinued two weeks earlier than under current management, and oversnow travel would be prohibited from sunset to sunrise. GTNP would groom 10 miles of oversnow motorized routes (a decrease of 26 miles from alternative A).

Impacts are generally as stated in alternative A — none to negligible, but may be slightly reduced. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance.

Effects of motorized use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats. Collision impacts from snowmobiles and snowcoaches have not been documented for any of the federally protected species in the parks. Collisions would be even less likely under this alternative because there would be 65 fewer miles of travel surface in YNP and 62 fewer in GTNP. Also there would be a prohibition on travel during the times when animals are most active.

Road closure from the West Entrance to Old Faithful and Mammoth to Madison Junction would eliminate all motorized use along those segments and all impacts associated with them. The potential for impacts on federally protected species would be eliminated on the closed sections, including the elimination of barriers to movement (fragmentation) and displacement effects. Suitable habitat throughout the entire western portion of the park would be available for free movement of species active in the winter. The termination of the winter season after March 1 would minimize the potential for bear-human confrontations, and conflicts that could occur after grizzly bear emergence during spring.

Impacts are generally as stated in alternative A — none to negligible, but may be slightly reduced. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to wildlife movements (Aune 1981). In addition similar to groomed roads, plowed roads may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to

deep snow. Under alternative F YNP would plow 76 miles of road for wheeled-vehicle access in the winter, the same as under current management. GTNP would plow 94 miles, 6 less than currently.

For YNP the effects associated with plowed roads would be the same as alternative A. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance.

Effects of motorized use of plowed roads. The effects of traffic on plowed roads are similar to those of traffic on groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads could cause displacement from preferred habitats and injury and death to wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall.

Impacts are generally as stated in alternative A – none to minor. If threatened and endangered species activity is known to occur in an area, park managers can close the area to human activity to prevent disturbance.

Effects of nonmotorized use on groomed and designated ungroomed routes. The primary effects of nonmotorized use on wildlife are displacement from preferred habitats and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. In this alternative YNP decreases these opportunities from 37 miles to 27 miles of groomed nonmotorized routes. GTNP adds 8 miles over current management. Potential impacts are generally as stated in alternative A — none to negligible. If protected species activity is detected, park managers could close the area to human activity to mitigate disturbance.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Although encounters between backcountry users and federally protected wildlife species may occur sporadically, they may cause displacement and additional energy expenditure and stress that reduces animals' chances of survival and reproduction. For YNP this alternative restricts nonmotorized use to front country trails thereby eliminating any potential effects associated with this activity.

Presence and use of winter support facilities. Warming huts and campgrounds can cause habituation in some wildlife species by the presence of human food and garbage, and can lead to human-wildlife conflicts. In addition increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. Alternative F proposes to increase the number and size of warming huts in YNP. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and areas where existing facility size is currently inadequate or nonexistent (e.g., Tower, Norris, and Canyon).

Potential impacts are generally as stated in alternative A — none to minor. If federally protected species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance. Construction of winter wildlife-proof garbage facilities at all major winter destination areas (a feature of all alternatives) would mitigate problems associated with habituated wildlife, including grizzly bears.

Species of Special Concern

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow, inhibiting foraging activities of carnivores that tunnel beneath the snow to hunt subnivian prey, and reducing subnivian prey availability by increasing mortality of these small mammals. Under this alternative YNP would maintain 119 miles of groomed oversnow motorized routes (a decrease of 65 miles over alternative A) and 27 miles of groomed nonmotorized routes (a decrease of 10 miles over alternative A). In addition use of the remaining available surfaces would be discontinued two weeks earlier than under current management, and oversnow travel would be prohibited from sunset to sunrise. GTNP would groom 10 miles of oversnow motorized routes (a decrease of 26 miles from alternative A).

Impacts are generally as stated in alternative A — none to negligible, but may decrease slightly.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The most likely impacts to park species of special concern are displacement from preferred habitats, and degradation of the aquatic environment from pollutants in the snowpack. Documented mortality caused by collisions with oversnow vehicles in the parks is rare. In 10 years only one of these species (a marten) was reportedly killed by a snowmobile in YNP (Gunther et al. 1998). Collision impacts would be even less likely under this alternative because there would be 65 fewer miles of travel surface in YNP and 62 fewer in GTNP. Closures would occur where most of the collisions presently occur, and there would be a prohibition on travel during times that most collisions occur.

Impacts are generally as stated in alternative A — none to minor.

If species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance. In YNP prohibition of travel from sunset to sunrise would mitigate the possible impact of vehicle collisions during times when they are more likely to occur. Road closure from West Entrance to Old Faithful and Mammoth to Madison Junction would eliminate all motorized use along those segments and all impacts associated with those uses. The potential for impacts on species of special concern would be eliminated on the closed sections, including the elimination of barriers to movement (fragmentation) and displacement effects. Suitable and effective habitat throughout the entire western portion of the park would be available for species

active in the winter. Known habitat for trumpeter swans along the Madison River would not be subject to impacts of use along the corridor.

See *Water and Aquatic Resources,* Chapter IV for an assessment of the impacts of exhaust on aquatic resources in the parks.

Effects of plowed roads. Similar to groomed roads, plowed roads also provide an energy efficient mechanism for wildlife movements. Under alternative F, YNP would plow 76 miles of road for wheeled-vehicle access in the winter, the same as under current management. GTNP would plow 94 miles, 6 less than currently.

Impacts are generally as stated in alternative A.

Effects of motorized use of plowed roads. The most likely impact to species of special concern would be displacement from preferred habitats and mortality caused by collisions with wheeled-vehicles.

Impacts are generally as stated in alternative A — none to negligible. If species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance.

Effects of nonmotorized use on groomed and ungroomed designated routes. The primary effects of nonmotorized use are displacement from preferred habitats, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. In this alternative YNP decreases these opportunities from 37 miles to 27 miles of groomed nonmotorized routes. GTNP would add 8 miles over current management.

Potential impacts are generally as stated in alternative A — none to minor. If protected species activity is known to occur in an area, park managers can close the area to human activity to mitigate disturbance. Groomed trails are not located swan habitat; therefore, no effects on swans would occur.

Unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent than nonmotorized use on designated routes. Although encounters between backcountry users and species of special management concern may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. For YNP this alternative restricts nonmotorized use to front country trails thereby eliminating any potential effects associated with this activity.

Presence and use of winter support facilities. The primary effects of warming huts and campgrounds on park species of special concern are associated with increases in human activity and the subsequent disturbance and displacement of species or their prey. Alternative F proposes to increase the number and size of warming huts. Warming huts and restrooms would be located at popular ski trailheads, motorized staging areas, and

areas where existing facility size is currently inadequate or nonexistent (e.g., Tower, Norris, and Canyon).

Compared to current management, impacts related to displacement would be greater due to the increase in number of facilities. Specifically, huts located in thermally influenced ungulate winter range could displace ungulates, and thus affect bison and elk carcass availability for wolverines, fishers, and marten. Because ungulates have been known to habituate to predictable human activities, any displacement most likely would be short-term. There would be no support facilities in or near swan habitat.

Conclusion

Alternative F emphasizes wildlife protection. Consequently, many of the potential impacts to wildlife under this alternative are lower in magnitude than alternative A. Most important winter habitats are outside human-use areas, the winter use season is closed two weeks earlier than currently, and oversnow motorized travel is restricted from sunset to sunrise. Roads on the west side of YNP would not be groomed and would be closed to oversnow motorized use. Consequently, park managers could study how animals use these routes in the absence of human activity and intervention.

Impacts to populations resulting from winter recreation are neither long-term nor significant. However, impacts to individual members of the population can be important, leading to death either directly from collisions or continued harassment, or indirectly through management actions taken as a response to habituation to human presence and food. Although concerned about impacts on individuals, the NPS primarily provides for the protection of native animal populations from management actions (with the exception of federally protected species). For example, see Chapter II, NPS 77, Natural Resources Management.

Ungulates

- Effects of groomed roads and trails on animal movements — unknown if and to what extent beneficial effects outweigh negative effects. Any effects would be greatly decreased over alternative A due to the elimination of 65 miles of groomed roads in YNP and 26 miles in GTNP.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on: 1) mortality caused by collisions – adverse, negligible, and short term (collision impacts are less for snowmobiles as compared to wheeled-vehicles by a factor of 10, and snowcoach collisions are rare); and 2) displacement from preferred habitats – adverse, negligible, and short term. Effects would be greatly decreased over alternative A due to the elimination of 65 miles of groomed roads in YNP and 26 miles in GTNP and the prohibition on night-time travel.
- Effects of plowed roads on: 1) habitat fragmentation – adverse, minor, and short term; and 2) animal movements – unknown if and to what extent beneficial effects outweigh negative effects. Effects are generally the same as alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, minor, and short term; and 2) displacement from preferred habitats – adverse, moderate, and long term. Effects are generally the same as alternative A.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, negligible, and short term. Described effect applies to

YNP, and is decreased relative to alternative A; effects in GTNP would be the same as alternative E.

- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – no effect in YNP due to the elimination of backcountry use; in GTNP, effects would be adverse, moderate, and short term (the same as alternative A).
- Effects of the presence and use of winter support facilities on displacement – adverse, minor, and short term. Effects may be slightly increased over alternative A because there are more huts proposed.

Federally Protected Species

- Effects of groomed roads and trails on animal movements: 1) bald eagles, grizzly bears, and wolves — no effect; and 2) lynx – adverse, negligible to major, and short term, depending upon lynx distribution and abundance in the parks. Effect may decrease as compared to alternative A because the amount of groomed surface is reduced substantially.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement from preferred habitats – adverse, negligible, and short term for all species excluding the grizzly bear, which will not be active during the winter use season. Effects may decrease compared to alternative A because the amount of groomed surface use is substantially reduced, and the closure of the winter season on March 1 would help minimize potential conflicts with emerged grizzly bears.
- Effects of plowed roads on: 1) habitat fragmentation – no effect on any of the listed species; and 2) animal movements – no known effect on any of the listed species. Same as alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, negligible, and short term on bald eagles and grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx; and 2) displacement from preferred habitats – adverse, negligible, and short term on bald eagles, no effect on grizzly bears; no known effect to date on wolves and lynx. Same as alternative A. The closure of the winter season on March 1 would help to minimize potential conflicts with emerged grizzly bears.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, negligible, and short term on bald eagles; no effect on grizzly bears; no known effect to date on wolves and lynx. Generally the same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – no effect in YNP due to the elimination of backcountry use; in GTNP, effects would generally the same as alternative A — adverse, minor, and short term on bald eagles; adverse, negligible, and short term on grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx.
- Effects of the presence and use of winter support facilities on displacement – no affect on bald eagles; adverse, negligible, and short term on grizzly bears, with mitigation; adverse, minor, and short term on wolves); effects on lynx would depend on whether or not huts are located in lynx habitat. Effects may be slightly increased over alternative A because there are more huts proposed.

Species of Special Concern

- Effects of groomed roads and trails on 1) animal movements – no known effect on wolverines; adverse, negligible, and short term on fishers and martens; no effect on otters, swans, reptiles, amphibians, and fish; 2) foraging activities – adverse, negligible, and short term on marten; no effect on the other species; and 3) subnivian prey availability — adverse, negligible, and short term on marten; no effect on the other species. Effects may decrease as compared to alternative A because the amount of groomed surface is substantially reduced.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement – no known effect on wolverine; adverse, negligible, and short term on fishers and marten; no effect on otters, reptiles, amphibians, and fish; adverse, minor, and

short term on swans. Effect may decrease as compared to alternative A because the amount of groomed surface use is substantially reduced.

- Effects of plowed roads on animal movements – no known effect on wolverines, fishers, and martens; no effect on otters, swans, reptiles, amphibians, and fish. Same as alternative A.
- Effects of motorized use of plowed roads on displacement from preferred habitats: 1) adverse, negligible, and short term on wolverines, fishers, and martens; no effect on otters, swans, reptiles, amphibians, and fish; and 2) mortality from collisions — adverse, negligible, and short term on otters and martens; no effect to date on other species. Same as alternative A.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – no effect on wolverines; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; adverse, negligible, and short term on sagebrush lizard no effect on rubber boa, amphibians, and fish. Generally the same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – no effect in YNP due to the elimination of backcountry use; in GTNP, effects would generally the same as alternative A – adverse, negligible, short term on wolverines, sagebrush lizard; no known effect on fishers, martens, otters; adverse, minor, short term on swans; no effect on rubber boa, amphibians, fish.
- Effects of the presence and use of winter support facilities on displacement of potential prey (carcass) availability – adverse, minor, and short term on wolverines, fishers, and martens; no effect on swans, rubber boa, amphibians, and fish; no known effect on otters; adverse, minor, and short term on sagebrush lizard. Effects may be slightly increased over alternative A because there are more huts proposed.

Mitigation

- Backcountry monitoring and administration should be implemented in GTNP.
- Close the south and west-facing slopes of Blacktail Butte, from the valley floor to the summit, and close all aspects of Wolff Ridge. Additional closures could be imposed if monitoring indicates such a closure is warranted to protect wintering species.
- The monitoring and evaluation of backcountry nonmotorized use in GTNP should be enhanced and closures to use should be implemented as warranted.
- Ramps or pullouts where moose could exit plowed roads to reduce collisions between snowmobiles and moose along the CDST would be provided.
- Use of groomed and plowed surfaces by bison and other ungulates would continue to be monitored.
- Snow track surveys for carnivores (including lynx) on both groomed and ungroomed routes would be conducted.
- Close important bighorn winter range in the north and south Teton Range.[42]

[42] Southern Tetons: (1) in the Prospectors Mt. and Mt. Hunt areas (including peak 10988), all areas above 3000m (9,900 ft.), and south-facing slopes on Mt. Hunt above 2600m (8,580 ft.); (2) the slopes of Static Peak above 3300m (10,890 ft.) (does not affect Albright Peak); and (3) the south-facing slopes above 3000m (9900 ft.) along the north side of Avalanche Canyon and the north fork of Avalanche Canyon.
Northern Tetons: 1) in the Ranger-Doane-Eagles Rest area (including peaks 10,298; 10,881; 10,023; 10,686), all areas above 3,000 m (9,900 ft.), and south-facing slopes of Eagles Rest above 2,600m (8,580 ft.); 2) in the Elk Mt.-Owl Peak area, all areas above 3,000 m (9,900 ft.), and south-facing slopes above 2,600m (8,580 ft.); 3) on Forellen Peak, all areas above 2,800 m (9,240 ft.) and south-facing slopes above 2,500 m (8,250 ft.); and 4) the ridgecrest and south-facing slopes of the cliffs at the mouth of Moose Creek (also known as the "Lower Berry Cliffs") above 2,300 m (7,590 ft.).

Effects on Natural Soundscape

Audibility analysis — combined effects of all wheeled and oversnow vehicles

Table 128 presents the acres of park land by road segment where any wheeled or oversnow vehicle noise would be audible under the two background conditions, "average" and "quiet," as defined in the *Assumptions and Methodologies* section of this chapter. For each background condition, acreage is presented for three categories of audibility: 1) audible for any amount of time (labeled "audible at all"); 2) audible for 10% of the time or more; and 3) audible for 50% of the time or more. Appendix M contains tables with distances to audibility for each segment for each alternative.

Alternative F features no snowplanes or snowmobiles on Jackson Lake, and no oversnow vehicles elsewhere in GTNP except from Flagg Ranch to YNP and on Grassy Lake Road. It also features no vehicles of any type on the West Entrance to Madison, Madison to Norris, Mammoth to Norris, and Madison to Old Faithful segments in YNP.

The results for alternative F show that for the "average" background conditions, wheeled or oversnow vehicles would be audible to some degree for over 122,000 acres in the three park units. For over 73,000 of those acres, wheeled or oversnow vehicles would be audible for at least 10% of the time during the day. For over 27,000 of those acres, they would be audible for at least half of the time during the day. These acreage totals increase by 10%, 13%, and 18% for the "quiet" background conditions for the three audibility categories, respectively.

The segment from Moran Junction to the South Entrance of GTNP, which carries a great deal of wheeled-vehicle traffic unrelated to the alternatives, contributes the greatest to the total acreage values for all three audibility categories. These amounts remain almost constant for all of the alternatives.

The plowed road from Mammoth to the YNP Northeast Entrance is a major contributor to the "audible at all" acreage (and, to a lesser extent, "audible 10% or more"), which remains virtually unchanged across all of the alternatives.

The YNP segments from West Thumb to Flagg Ranch, Fishing Bridge to West Thumb, Old Faithful to West Thumb, and Canyon Village to Fishing Bridge are also major contributors to the total acreage for all three audibility categories. The audibility acreage is reduced to zero for the West Entrance to Madison, Madison to Norris, Mammoth to Norris, and Madison to Old Faithful segments in YNP. For YNP as a whole, the 50% time audible acreage increases by 35% over the no action alternative for average background conditions, due to increased snowmobile volumes on the segments where they are permitted.

The audibility acreage is reduced to zero for Jackson Lake and Teton Park Road in GTNP. There are only slight reductions for the Moran Junction to Colter Bay and Flagg Ranch to Colter Bay segments compared to the no action alternative.

Table 128. Acres of park land affected by vehicle audibility for alternative F.

Road Segment	Miles	With Average Background Conditions			With Quiet Background Conditions		
		Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More	Audible at All	Audible 10% of the Time or More	Audible 50% of the Time or More
1. Mammoth to Northeast Entrance	47	16,126	5,445	0	16,822	6,342	0
2. Mammoth to Norris	21	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
3. West Entrance to Madison	14	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
4. Madison to Norris	14	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
5. Norris to Canyon Village	12	5,425	3,410	0	5,662	3,828	0
6. Canyon Village to Fishing Bridge	16	10,462	7,726	1,983	11,377	8,525	2,301
7. Fishing Bridge to East Entrance	27	12,743	5,855	0	13,800	7,092	0
8. Fishing Bridge to West Thumb	21	16,888	12,666	4,944	18,687	13,960	5,908
9. Madison to Old Faithful	16	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
10. Old Faithful to West Thumb	17	8,012	6,616	2,856	9,513	7,252	4,083
11. West Thumb to Flagg Ranch	24	13,839	11,334	6,165	16,104	12,574	7,985
12. Grassy Lake Road	7.6	3,033	0	0	3,303	0	0
13. Flagg Ranch to Colter Bay	15.6	7,659	2,822	0	8,315	3,103	0
14. Colter Bay to Moran Junction	10.2	4,607	2,239	0	4,956	2,431	0
15. Moran Junction to East Entrance	2	1,199	714	481	1,300	795	525
16. Moran Junction to South Entrance	26	21,714	14,812	11,293	23,842	17,207	11,996
17. Teton Park Road	15	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	2.5	659	0	0	695	0	0
19. Antelope Flats Snowmobile Route	30	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	9.7	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
TOTAL		122,364	73,636	27,722	134,377	83,110	32,799

Average sound level analysis

To give a sense of the effect of the number of oversnow or wheeled-vehicles on a road segment, and their speed and sound level, Table 129 shows the computed hourly equivalent or "average" sound level (L_{eq}) over the daytime period. Levels are shown for each road segment at two distances, 100 feet and 4,000 feet, and for both open and forested terrain. These hourly L_{eq} values do not have the background sound level added in to them. Also they cannot be compared against the background levels to assess audibility, since L_{eq} represents a long-term average of both quiet and loud moments.

The hourly L_{eq} at 100 feet are highest for the four above-mentioned YNP road segments. At 4,000 feet away, the L_{eq} are highest for these four segments, as well as the segments from Moran Junction to both the East Entrance and the South Entrance of GTNP. The contribution to the L_{eq} is reduced to zero for the West Entrance to Madison, Madison to Norris, Mammoth to Norris, and Madison to Old Faithful segments in YNP, and Jackson

Lake and Teton Park Road in GTNP. There is also a 6 dB reduction along the Flagg Ranch to Colter Bay segment.

Table 129. Average hourly L_{eq} from wheeled and oversnow vehicle noise at two distances to each road segment for alternative F.

Road Segment	L_{eq} at distance (dBA)			
	Open Terrain		Forested Terrain	
	100 feet	4,000 feet	100 feet	4,000 feet
1. Mammoth to Northeast Entrance	35	2	33	0
2. Mammoth to Norris	No Veh.	No Veh.	No Veh.	No Veh.
3. West Entrance to Madison	No Veh.	No Veh.	No Veh.	No Veh.
4. Madison to Norris	No Veh.	No Veh.	No Veh.	No Veh.
5. Norris to Canyon Village	49	9	47	1
6. Canyon Village to Fishing Bridge	52	12	50	4
7. Fishing Bridge to East Entrance	48	7	46	0
8. Fishing Bridge to West Thumb	53	12	51	4
9. Madison to Old Faithful	No Veh.	No Veh.	No Veh.	No Veh.
10. Old Faithful to West Thumb	54	14	52	6
11. West Thumb to Flagg Ranch	54	14	53	6
12. Grassy Lake Road	42	2	41	0
13. Flagg Ranch to Colter Bay	38	5	36	0
14. Colter Bay to Moran Junction	40	8	39	0
15. Moran Junction to East Entrance	45	12	43	4
16. Moran Junction to South Entrance	46	14	44	6
17. Teton Park Road	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	24	0	22	0
19. Antelope Flats Snowmobile Route	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	No Veh.	No Veh.	No Veh.	No Veh.

Conclusion

Alternative F impacts only about 68% of the acreage impacted by the no action alternative for the “audible at all” categories, nearly as low as alternative D. Alternative F impacts about 78% of the no action acreage for the “audible 10% of the time or more” categories, which is the third lowest amount among the alternatives. The reason for the decreases for these two sets of categories is the elimination of oversnow vehicles on six road segments in YNP and GTNP, plus Jackson Lake.

However, for the “audible 50% or more” categories, alternative F impacts 118% and 124% of the acreage for the no action alternative for “average” and “quiet” backgrounds, respectively. These increases are the highest of any of the alternatives. They are due to large amounts of acreage being added for the West Thumb to Flagg Ranch, Fishing Bridge to West Thumb, Old Faithful to West Thumb, and Canyon Village to Fishing

Bridge segments, which more than compensate for the eliminated acreage for the segments on which vehicles would be banned.

The contribution to the L_{eq} is reduced to zero for those road segments where vehicular travel of all types is eliminated, as well as Jackson Lake.

Effects on Cultural Resources

The effects on cultural resources would be the same as described in alternative B.

Conclusion

None of the actions described would adversely impact cultural resources.

Effects on Visitor Access and Circulation

Access

Yellowstone National Park. Under this alternative roadway segments between Mammoth and Madison and West Entrance to Old Faithful would be closed. An average of about 105,500 annual winter use visitors would have to choose whether to use other entrances or recreate on adjacent federal lands. Current park circulation patterns and local area access are altered by this alternative. A small number of visitors would no longer be able to complete the Grand Loop. Snowcoach tours from Mammoth and West Yellowstone would be eliminated.

Grand Teton National Park and the Parkway. Access and circulation patterns under alternatives E and F are identical within GTNP and the Parkway. However, as discussed in alternatives B and C, the closure of YNP's North and West Entrances in alternative F may affect GTNP and the Parkway. Access for all types of winter users could shift from the north and west to the south. Access for the numbers of visitors currently using the West and North Entrances could greatly increase visitation from the Jackson and Dubois portals. The staging for oversnow opportunities from these routes would increase the use of Flagg Ranch or the demand for staging there.

Table 130 depicts a reasonably foreseeable distribution of vehicle use as a consequence of this alternative. It shows a loss of 87 snowmobile trips daily from the Teton Park Road and the CDST from GTNP's East Entrance to Flagg Ranch. There would be a net change of -35% in snowmobile vehicle-miles traveled in the three park units and a net increase of 7.6% wheeled-vehicle-miles traveled. Snowcoach miles traveled would decrease by about 60%.

Table 130. Alternative F motorized use.

Road Segment	*Average Daily Vehicle Use January-February*				
	Autos	**Vans**	**Snowcoaches**	**Snowmobiles**	**Buses**
Mammoth to Northeast Entrance	No change from current condition				
Mammoth to Norris	0	0	0	0	0
West Entrance to Madison	0	0	0	0	0
Madison to Norris	0	0	0	0	0

Norris to Canyon Village	0	0	3	100	0
Canyon Village to Fishing Bridge	0	0	3	217	0
Fishing Bridge to East Entrance	0	0	0	77	0
Fishing Bridge to West Thumb	0	0	3	239	0
Madison to Old Faithful	0	0	0	0	0
Old Faithful to West Thumb	0	0	4	343	0
West Thumb to Flagg Ranch	0	0	4	374	0
Grassy Lake Road	No change from current condition				
Flagg Ranch to Colter Bay	100	15	0	0	1
Colter Bay to Moran Junction	200	15	0	0	1
Moran Junction to East Entrance	580	30	0	0	2
Moran Junction to South Entrance	No change from current condition				
Teton Park Road	0	0	0	0	0
Moose-Wilson Road	5	0	0	0	0
Antelope Flats Snowmobile Route	No change from current condition				

Concession Services

Present concessions affected in this alternative would be those permitted to run oversnow guided services from West Yellowstone into the park, from Mammoth and Gardiner into the park, and at Old Faithful. Oversnow guided tours to Old Faithful from both West Yellowstone and Mammoth/Gardiner would no longer be able to operate because those entrances to the park interior would be closed. No winter use would be allowed. This represents the greatest adverse impact on concessions relative to lost business and the need to completely change the nature of the business or the area in which it operates.

From the perspective of the operation at Old Faithful, the logistics of moving people, fuel, supplies, or garbage would remain dependent on oversnow transport. Storage of material in the park's interior would be the same as now. The difference would be the need to focus transportation needs of clientele, employees, equipment and supplies during the winter primarily from the south. This could represent a greater expense for the concession owner (a service trip from Old Faithful to Jackson would be 93 miles, oversnow and on the highway, versus 30 oversnow miles to West Yellowstone). The NPS believes that the Old Faithful experience would be even more attractive under these circumstances, and that demand for overnight stays would not decline. The time available under this alternative for business adaptation is two years, when road grooming would be terminated (winter of 2002-2003).

The implementation of any alternative that might make substantial changes affecting a concessioner would require negotiation between the NPS and the concessioner or be deferred until a new concessions contract is pending.

Concessions or services operating at other locations in the parks or from other gateways would not be affected to any great degree. Current circumstances attractive to snowmobilers entering the East Entrance to Yellowstone would change in this alternative. Snowmobilers who enjoy traveling from West Yellowstone to Pahaska Teepee (or the reverse) to stay overnight would no longer be able to. Instead they would be able to travel to Old Faithful or Flagg Ranch. This affects a small percentage of use in the parks, most often on holiday weekends. Pahaska Teepee, permitted as a snowmobile rental provider, would only marginally be affected because the opportunity to access the park from this facility remains.

The CDST would be discontinued at the east boundary of GTNP, so snowmobilers coming into Flagg Ranch over the snow and from the east would no longer be able to do so. The amount of business actually provided by Flagg Ranch to such users (fuel, lodging, and groceries) is unknown, but those users are relatively few. Those who presently engage in this opportunity would have a shuttle system (which could be concession provided) available to them in this alternative for transport from the east boundary to Flagg Ranch.

Conclusion

Because two winter entrances into YNP would be eliminated, a substantial number of winter use visitors would no longer be able to access park resources unless they chose to travel to other park entrances. Such a decision would result in a major adverse impact to current visitor access patterns at YNP. As in alternative E, access to resources in GTNP and the Parkway would not be expected to change, although modes of travel and amounts of visitation to those resources could change.

Effects on Visitor Experience — Yellowstone National Park

The amount and type of winter visitor opportunities offered in YNP under alternative F are provided in Table 131.

Table 131. YNP Visitor opportunities available under alternative F.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	119	-65	Mid-December to Early March - 2 weeks	Night closure sunrise to sunset
Groomed motorized route, snowcoach only	0	0	Mid-December to Early March - 2 weeks	Night closure sunrise to sunset
Groomed motorized trail	0	0	Mid-December to Early March - 2 weeks	Night closure sunrise to sunset
Plowed route	76	0	Mid-December to Early March - 2 weeks	Night closure sunrise to sunset
Groomed nonmotorized	27	-10	Mid-December to Early March - 2 weeks	Night closure sunrise to sunset
Warming huts	+7	+1	Mid-December to Early March - 2 weeks	Night closure sunrise to sunset
Backcountry	2.2 million acres	-2 million acres of accessible area	Backcountry closed to visitation	

Visitor Satisfaction and Experience

Opportunities to view wildlife. Under alternative F opportunities to view wildlife would be eliminated from the following road sections: Mammoth to Norris Junction, Norris Junction to Madison Junction, Madison Junction to Old Faithful, and Madison Junction to West Entrance. Currently 105,500 winter visitors use these entrances annually.

Opportunities to view wildlife from the backcountry of YNP would be eliminated under this alternative because all nonmotorized activities would be limited to front country groomed routes. See *Access to winter activities* below.

All other wildlife viewing opportunities would be the same as in alternative A.

Opportunities to view scenery. Under alternative F opportunities to view wildlife would be eliminated from the following road sections: Mammoth to Norris Junction, Norris Junction to Madison Junction, Madison Junction to Old Faithful, and Madison Junction to West Entrance.

Opportunities to view scenery from the YNP backcountry would be eliminated under this alternative. See *The availability of access to winter activities or experiences* below.

All other scenery viewing opportunities would be the same as in alternative A.

Safety (the safe behavior of others). Same as alternative A for all open road segments.

Quality of the groomed surface. If winter use increases substantially in other areas of the park, the quality of the groomed surfaces there could decrease substantially. If grooming operations begin immediately after park closure, roads would have time to refreeze resulting in an improved visitor experience.

The availability of access to winter activities or experiences. Current winter visitors entering from the West and North Entrances account for about 73% of all winter visitors. Recent survey respondents indicated that about 25% would not visit the parks if the West and North Entrances were closed. Opportunities for these visitors would either be eliminated or available at another park entrance. The Grand Loop experience for oversnow transportation would be eliminated (affecting about 10% of current day users). Visitors wishing to access Old Faithful would be required to travel additional distances (an additional 15 miles from the South Entrance). Closure of YNP from sunset to sunrise would result in additional inconvenience to paid visitors and employees. Nighttime closures would also eliminate the opportunity to dine at the Snowlodge in the evening and then access lodging outside the park.

The elimination of backcountry skiing would result in major adverse impacts on the experience of viewing wildlife and scenery for visitors in this user group (About 10% of all winter visitors to YNP (Littlejohn 1996).)

Availability of information. Same as alternative A.

Quiet and Solitude. Some improvements in snowmobile sound emissions technologies are expected. For all open areas of the park, opportunities for quiet and solitude would be the same as described in alternative A.

Clean air. Some improvements in snowmobile emissions technologies are expected. For all open areas of the park, opportunities for clean air would be the same as described in alternative A.

Conclusion

The elimination of winter opportunities on the road segments connecting the West and North Entrances with Old Faithful would result in major adverse impacts on the desired experience for current winter visitors. Other areas of the park could receive an increase in use if mitigation strategies were not implemented. If winter use increases in other areas of the parks, the result would be an increase in snowmachine emissions and a periodic loss of a clean air environment. Moderate adverse impacts would be expected on visitor experiences in those areas.

The elimination of backcountry skiing in YNP would result in major adverse impacts on the experience of viewing wildlife and scenery for these users.

Effects on Visitor Experience — Grand Teton National Park and the Parkway

The amount and type of winter visitor opportunities offered in GTNP under alternative F are provided in Table 132.

Table 132. GTNP Visitor opportunities available under alternative F.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	2.1	0	December to April†	Nighttime closure – sunset to sunrise
Groomed motorized route, snowcoach	2.1	0	December to April†	Nighttime closure – sunset to sunrise
Groomed motorized trail	8	-26	December to April†	Nighttime closure – sunset to sunrise
Plowed road	94.4	-5.6	December to April†	Nighttime closure – sunset to sunrise
Ungroomed motorized trail or area	0	-35.6	December to April†	Nighttime closure – sunset to sunrise
Groomed nonmotorized	0	0	December to April†	Nighttime closure – sunset to sunrise
Ungroomed nonmotorized trail or area	35	8.6	December to April†	Nighttime closure – sunset to sunrise
Warming huts/interpretive centers	2	0	December to April†	Nighttime closure – sunset to sunrise

† Variable, dependent on snow conditions

Visitor Satisfaction and Experience

For all the factors that are important to the experience and satisfaction of the visitor, alternative F is very nearly the same as alternative E. The exception to this is the possible redistribution of oversnow motorized use from YNP's West and North Entrances to the South and East Entrances, as described in the *Access and Circulation* section. For most of the park this is of no consequence. For the north end of the park, where snowmobile access remains along the Grassy Lake Road to Flagg Ranch, use could greatly increase. If significant numbers of people wish to experience YNP using the South Entrance there could be a net increase in use or demand at Flagg Ranch where staging would occur. The result could be an increase in snowmachine emissions and periodic losses of a clean air environment.

IMPACTS OF IMPLEMENTING ALTERNATIVE G — THE PREFERRED ALTERNATIVE

Effects on the Socioeconomic Environment

GYA Regional Economy. As with several other alternatives, alternative G contains several provisions for relatively minor changes in trail management within YNP and GTNP. Most of these changes are unlikely to substantially impact visitor decisions on whether or not to visit the parks for recreation. One proposed management change, however, has the potential to substantially impact visitation levels to the GYA and, therefore, visitor expenditures and the overall level of economic activity within the GYA. Alternative G contains a proposal to allow only oversnow mass transit vehicles (snowcoaches) that can meet strict emissions and sound requirements.

The 1999 GYA winter visitor survey asked respondents how their visitation would be affected if both YNP and GTNP were open only to snowcoach, skiing, and snowshoeing. Based on the responses to this survey question, visitation to the GYA by winter visitors who live outside the five-county area would be reduced by 33.4% if winter travel were restricted to either snowcoach or nonmotorized travel. This estimated reduction in visitation is a net change that considers the responses of those current winter visitors who said they would visit more often if the change occurred. Also considered in the calculation were those respondents who said they would visit the same, but shift their use to other areas of the GYA (for example, from park lands to national forest lands). Table 133 shows that for the largest classes of winter user groups (snowmobilers, skiers, and snowcoach riders), anticipated changes in visitation under alternative G vary dramatically. While 59.6% of those who snowmobiled on their trip said that they would visit less frequently under the alternative G changes, only 12% of skiers and 14.1% of snowcoach riders said they would visit less frequently. Conversely, while only 5.6% of snowmobilers said they would visit more frequently under this alternative, 33.7% of skiers and 22.8% of snowcoach riders said they would increase their visitation. The estimate of a 33.4% decrease in visitation to the five-county area considers the anticipated changes in visitation by these diverse groups of winter park users.

Table 133. Visitation response to alternative G changes in winter park access: by visitor category.

If YNP were open only to snowcoach, skiing, and snowshoeing.			
Response	**Snowmobile**	**Cross-Country Skiers**	**Snowcoach**
No change	17.8%	37.2%	42.5%
Would visit less frequently	59.6%	12.0%	14.1%
Would visit more frequently	5.6%	33.7%	22.8%
Would visit the same amount	4.2%	6.5%	7.8%
Not Sure	12.8%	10.7%	12.8%
Sample Size	792	247	106

In the winter visitor survey, park visitors who live outside the five-county area made up 85.9% of total sampled. If 33.4% of these visitors decided not to recreate in the GYA

because of restrictions of mechanized travel, the local economy would lose these visitors' local-area expenditures.

Based on the winter survey responses and the IMPLAN input/output model, it is estimated that these travel restrictions under alternative G would reduce the total economic output in the five-county GYA area by $19.2 million. In addition it is estimated that 454 jobs within the GYA would be lost due to reduced nonresident expenditures in the area.

While a $19.2 million loss in output is a minor impact on the $5.7 billion economic output of the GYA, this impact likely would be concentrated in small communities near the three parks. The impacts of travel restrictions under alternative G on small local economies such as West Yellowstone could be more significant. However, the correlation between West Entrance visits and the West Yellowstone economy is not as close as expected (Chapter III). Thus it is difficult to predict the actual effect of a change in park visitation on the West Yellowstone economy.

The town of West Yellowstone levies a local option tax targeted at tourist spending. Tax records show that from 1989-1999, tourist expenditures have grown at a rate of 10% annually. Tourist spending in winter accounts for about 25% of year-round tourist spending in West Yellowstone. Given the relative size of the West Yellowstone winter economy to year-round totals and the recent growth trends for tourist spending, the estimated visitation reductions associated with alternative G likely would have a moderate to major short-term negative impact on the town's winter economy, but a minor impact on the year-round economy of the town. Assuming that West Yellowstone's economy and winter park visitation are closely related, West Yellowstone's winter economy would decline about 33%, while the year-round economy would decline 8%. This decline is less than the average one-year growth rate, so even under this assumption the impact is likely to be short term. These estimates likely overstate the impacts on West Yellowstone. The impact projections assume that the change in the West Yellowstone winter economy is proportional to change in park visitation. There is considerable evidence that historical declines in winter park visitation through the West Entrance have not resulted in proportional declines in the local economy. For example, in winter 1995-96, West Entrance visitation decreased by 13.4% over the previous year, but resort tax collection increased by 9.6%. This non-proportional relationship between park visitation and the local economy is probably due to extensive winter recreational opportunities near West Yellowstone, including 400 miles of snowmobile trails outside YNP. The average visitor to West Yellowstone spends only one day of a multi-day trip snowmobiling in the park. Other factors that might impact visitation levels include snow depth, pricing policies, and advertising efforts.

The estimates of reductions in GYA visitation and nonresident expenditures are based on survey responses of current winter visitors. The 1999 YNP summer visitor survey asked respondents who had not previously visited the park in the winter whether they would

visit the park next winter if a snowcoach, ski, and snowshoe only policy were adopted. Responses from this group indicate that new winter users could be attracted to YNP as a result of the alternative. Increased visitation could serve to offset a portion of estimated visitation losses. Rather than a 33% reduction in visitation, the reduction could be around 25%. As noted by some local businesses in DEIS comments, a policy change may lead to economic diversification. Firms that lost business when snowmobiles became the dominant use may benefit from a variety of users.

Three-State Regional Economy. Overall, 65.5% of winter visitors in the GYA winter visitor survey came from outside the three-state area of Montana, Idaho, and Wyoming. Responses from these visitors indicate that nonresident winter trips to the GYA would drop by 27.8% under alternative G.

A loss of regional expenditures by these nonresidents would lead to an overall reduction of $17.7 million in total economic output and 430 jobs in the three-state area. This is a negligible, negative impact in the context of the regional three-state economy. This estimated loss would be reduced if nonresidents choose to recreate at other locations within the three-state region instead of the GYA. The extent of this estimated loss, however, is unknown.

Responses from the summer YNP visitor population survey indicate that increased interest in visiting the park in the winter months under the alternative G management policies may lead to an approximate 11% increase in winter visitation. An active public education and awareness campaign, directed at the summer visitor population, which focuses on the parks' new winter use opportunities, may partially offset the expected loss of non-resident winter users. This education and awareness campaign can operate in partnership with the parks' gateway communities, state agency cooperators, and private businesses.

Minority and Low-Income Populations. Alternative G would eliminate the primary mode of current winter access to the parks — snowmobiling. To the extent that current snowmobile visitors to the park would now use snowcoach access under alternative G, the price of snowcoach access to the park could rise, impacting low-income winter visitor access to the park.

A portion of currently operated snowcoaches would not meet the emission and sound requirements of alternative G. These older snowcoaches would either need to be replaced or eliminated ,which likely would place further upward pressure on the price of snowcoach access to the park, and would negatively impact low-income visitors to the park.

Social Values. Most winter visitors surveyed support mechanized access to the parks. In the context of overall access to the park, the changes proposed in alternative G are likely to result in major adverse impacts by eliminating some of the most heavily used winter motorized routes within the parks. Conversely, a portion of winter users favor reductions

in motorized use within the park. For this group, the alternative G travel restrictions would have a positive impact.

Current winter visitors to YNP are attracted by the current set of recreation opportunities, which include snowmobiling. These visitors support current management. Among summer visitors (as detailed in Chapter III), there is less support for current management. Among the general public, local residents are evenly divided between support for current management versus alternative G. However, this probably varies by county. For example, the Teton County, Wyoming survey (discussed in Chapter III) found a much higher overall local participation in cross-country skiing (mostly in GTNP) than snowmobiling. A majority of local residents feel that snowmobiles negatively impact Yellowstone in the winter and that snowmobiles should be limited in YNP in winter. Among the regional and national populations, many respondents favor the snowcoach option over the existing policy. For this group, alternative G would have a positive impact.

The potential for a successful shift in the type of winter recreation activity in this alternative indicated by participation rates. For example, nationally, regionally, and locally, cross-country skiing is just as, or slightly more, popular than snowmobiling. A decrease in opportunities for snowmobiles in YNP may shift participation rates to other winter activities such as cross-country skiing. A shift would be assisted by increased awareness and education programs alerting a national population about changing opportunities (via state tourism programs, business marketing, and NPS visitor information services).

Nonmarket Values. Alternative G potentially would impact nonmarket values of winter visitors through a reduction in current winter user visitation resulting from the restriction of mechanized travel to clean, quiet snowcoaches.

Based on the winter visitor survey, the nonmarket value of a trip to GYA parks is $91. It is estimated that park visitation would be reduced by 33.4% resulting from the management change. Based on current winter visitation levels, a 33.4% reduction in visitation would translate into a $2.7 million reduction in the aggregate nonmarket value of winter trips to the parks. This is a moderate negative impact. These estimates are based on reduced use by current visitors.

Conclusion

Alternative G management actions would have a negligible to minor negative impact on the five-county economy and a negligible negative to positive effect on the three-state economy through changes in visitation and nonresident visitor expenditures. Given the historical lack of correlation between year-to-year changes in winter visitation to YNP and the West Yellowstone economy, the reduced visitor expenditures under this alternative could have a moderate to negligible short-term adverse impact on the winter economy of West Yellowstone, Montana. The impact on the year-round West

Yellowstone economy is, at worst, a moderate short-term negative impact. Alternative G also would have a minor negative impact on total current trip nonmarket visitor benefits (through reduced visitation). The changes proposed in alternative G are likely to result in moderate adverse impacts to some visitors' social values and a moderate positive impact on other users' social values. This alternative could have an unspecified adverse impact on low-income visitor access to the park.

Summary of Estimated Visitation Changes from Alternative Winter Management Options. Eight specific impact estimates were calculated for the Final Environmental Impact Statement (FEIS) corresponding to estimates for two analysis areas for each of four alternative management options. Table 134 details the changes in total economic output and employment associated with each of the estimates. In all four winter management options, the estimated output and employment impact for the two analysis areas are less than 0.5% baseline levels.

Table 134. Estimated economic output and employment impacts of alternative winter management options.

Management Change	Analysis Area	Change in Output (Million 1997 Dollars)	% Change in Output	Change in Employment	% Change in Employment
Alternative B — Plow road from West Yellowstone To Old Faithful	5-county	-13.2	-0.23%	-312	-0.32%
	3-state	-14.4	-0.01%	-351	-0.02%
Alternative G — Snowcoach, skiing, snowshoe access only†	5-county	-14.4 to –19.2	-0.34%	-340 to –454	-0.47%
	3-state	-17.7 to +7.0	-0.02%	-430 to +170	-0.03%
Alternative F — Westside closure to all vehicles in winter	5-county	-14.4	-0.25%	-340	-0.35%
	3-state	-13.7	-0.01%	-334	-0.02%
Alternative D — Stop plowing from Colter to South Entrance	5-county	-1.3	-0.02%	-32	-0.03%
	3-state	+0.2	0%	+4	0%

† Increased winter visitation from current summer visitors to the park under this management option could substantially offset the estimated output and employment reductions from current winter visitors. This would depend in part on marketing and education programs implemented through the Winter Use Plan in cooperation with states and gateway communities.

An analysis of the regional economic and nonmarket impacts of alternative G, prepared by the State of Wyoming, is as follows:

> "The Draft Winter Use Plan/Environmental Impact Statement for the Yellowstone and Grand Teton National Parks and John D. Rockefeller, Jr. Memorial Parkway states that:
>
> 'The direct, indirect and induced expenditures generated in the GYA by nonresidents visiting the parks in the winter months are estimated to be about $63 million.'
>
> Table 19 of the DEIS indicates that 61% of the winter visitors to YNP snowmobile. Table 28 indicates that 97% of the winter visitors to GTNP snowmobile. A weighted average of winter visitors to the two parks indicates that 67% of the combined YNP and GTNP winter visitors snowmobile. Based on the methodology in the Draft EIS it might be assumed that 67% of the $63 million of economic impact from winter visitors in the parks is associated with snowmobiling.
>
> However, previous research in YNP indicates that snowmobilers tend to spend more than other winter visitors. For example, Littlejohn (1996) indicates that snowmobilers in YNP spend almost twice as much as cross-country skiers ($224 vs. $116). If this pattern holds for other winter visitors it would mean that while snowmobilers represent 67% of winter visitors, they represent 80% of the total economic impact of winter visitors in the GYA or $48 million ($60 million x 0.80). This could be the potential loss to the GYA under alternative G from banning snowmobiles.
>
> Based on information for alternative G of the Draft EIS, it is estimated that the total nonmarket value of winter trips to the GYA parks was about $29 million. Again based on the methodology used in the Draft EIS, it might be assumed that 67% of the $29 million in nonmarket value of winter trips to GYA parks is associated with snowmobiling. However, previous research indicates that snowmobilers value their trips more than other winter visitors. For example, the value of snowmobiling of participants was 2.8 times that for cross-country skiing, sightseeing, or general recreation. If this pattern holds for winter visitors to GYA parks it would mean that while snowmobilers represent 67% of the winter visitors represent 85% of nonmarket value of winter trips to GYA parks or $24.65 million ($29 million x 0.85). This could be the potential loss to the GYA under alternative G from banning snowmobiles."

This analysis by the State of Wyoming is based on several assumptions about snowmobiler behavior that are not supported by the results of the 1999 GYA winter visitor study. Specifically it assumes that (1) all snowmobile use in the parks will be lost to the GYA; (2) that other types of users (snowcoach, skiers) will not increase use; and (3) that all park day entries actually count as multi-day trips (equivalent to assuming zero re-entry). Other things being equal, these assumptions may lead to overstating impacts by a factor of three to four.

Effects on Air Quality and Public Health

Alternative G emphasizes clean, quiet oversnow access to the parks by restricting travel only to oversnow mass transit vehicles that can meet strict emissions and sound requirements. For example, an estimated 80 to 90 snowcoaches per day would operate on the West Entrance to Old Faithful Road, replacing the current January-February average of 550 snowmobiles per day. Table 135, Table 136, and Table 137 summarize the results of CO modeling for six locations in the three parks for alternative G. Table 135 and

Table 136 show the predicted maximum 1-hour average CO concentrations and the calculated maximum 8-hour average CO concentrations, respectively. The percent contribution of each vehicle type to the maximum CO concentrations also is provided in Table 137 for the six locations. Table 138 and Table 139 provide corresponding model results for PM_{10} for the same locations and conditions as those for CO.

Table 135. Maximum 1-hour average CO concentrations for alternative G.

Location	1-hr Maximum Concentration (w/o Background) (ppm)	1-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	1.50	4.50	94.9
West Entrance to Madison Roadway	0.50	3.50	95.8
Old Faithful Staging Area	1.20	4.20	7.1
Flagg Ranch Staging Area	1.63	4.63	5.3
Flagg Ranch to Colter Bay Roadway	0.20	3.20	81.8
Mammoth to NE Entrance Roadway	0.30	3.30	0

Table 136. Maximum 8-hour average CO concentrations for alternative G.

Location	8-hr Maximum Concentration (w/o Background) (ppm)	8-hr Maximum Concentration (w/ Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	0.71†	2.12†	94.9
West Entrance to Madison Roadway	0.24†	1.65†	95.8
Old Faithful Staging Area	0.20	1.60	7.1
Flagg Ranch Staging Area	0.27	1.68	5.3
Flagg Ranch to Colter Bay Roadway	0.09†	1.51†	81.8
Mammoth to NE Entrance Roadway	0.14†	1.55†	0

†Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

Table 137. Vehicle contribution to CO concentrations for alternative G.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	0	98.6	0	0	1.4	0	0
West Entrance to Madison Roadway	0	99.1	0	0	0.9	0	0
Old Faithful Staging Area	0	99.5	0	0	0.5	0	0
Flagg Ranch Staging Area	0	98.9	0	0	1.1	0	0
Flagg Ranch to Colter Bay Roadway	0	99.1	0	0	0.9	0	0
Mammoth to NE Entrance Roadway	0	0	26.5	66.9	0.5	0	6.1

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Table 138. Maximum 24-hour average PM_{10} concentrations for alternative G.

Location	24-hr Maximum Concentration (w/o Background) (ppm)	24-hr Maximum Concentration (w/Background) (ppm)	Change Relative to Alternative A (w/o Background) (%)
West Yellowstone Entrance	0.32†	23.32	99.3
West Entrance to Madison Roadway	0.32†	23.32	97.1
Old Faithful Staging Area	0.01	5.01	98.3
Flagg Ranch Staging Area	0.03	5.03	94.9
Flagg Ranch to Colter Bay Roadway	0†	5.00	100.0
Mammoth to NE Entrance Roadway	0.32†	5.32	0

†Estimated from the modeled maximum 1-hour average concentration based on the persistence formula $C_{t2} = C_{t1}*(t1/t2)$^0.365 (Cooper and Alley 1990).

Table 139. Vehicle contribution to PM_{10} concentrations for alternative G.

Location	Contribution (%)						
	SM	SC	AM	LT	HT	TB	SV
West Yellowstone Entrance	0	28.9	0	0	71.1	0	0
West Entrance to Madison Roadway	0	50.1	0	0	49.9	0	0
Old Faithful Staging Area	0	1.6	0	0	98.4	0	0
Flagg Ranch Staging Area	0	0.7	0	0	99.3	0	0
Flagg Ranch to Colter Bay Roadway	0	50.1	0	0	49.9	0	0
Mammoth to NE Entrance Roadway	0	0	22.5	46.6	26.7	0	4.2

SM = snowmobile, SC = snowcoach, AM = automobile, LT = light truck, HT = heavy truck, TB = tour bus, SV = shuttle van.

Visibility

The visibility assessment indicates that under alternative G, vehicle emissions would not cause any perceptible visibility impairment in the vicinity of the West Entrance, along the roadways, or in the vicinity of Old Faithful and Flagg Ranch.

Conclusion

As noted in Table 135, Table 136, and Table 138, the model predicts major beneficial impacts on CO and PM_{10} levels, relative to alternative A at the West Entrance and along the West Entrance to Madison road. The Old Faithful and Flagg Ranch staging areas would see a minor beneficial impact on CO levels and a major beneficial impact on PM_{10} levels. Major beneficial impacts from reduced CO and PM_{10} concentrations are predicted along the Flagg Ranch to Colter Bay roadway. These decreased concentrations would result from elimination of snowmobiles.

Effects on Public Safety

Late night oversnow travel would be prohibited from 11:00 P.M. to 5:00 A.M. in all three parks. This action would eliminate any potential for nighttime collisions between

snowmachines and wildlife. The effect of this action would be negligible since less than 1% of recorded accidents during the last three years have occurred in this time period. The primary benefit to public safety would be that all potential for snowmobile accidents, as well as snowmobile snowcoach conflicts, would be removed. Also, because snowcoach drivers generally have more familiarity with the road and its wildlife patterns than the casual visitor, the elimination of private vehicles on this road would reduce the overall potential for motor vehicle accidents (snowcoaches are involved in less than 3% of accidents). In addition this alternative eliminates the potential for inter-modal conflicts between different types of snowmachines and facilitates nightly grooming, which is also a benefit to safety.

In GTNP closing the road between Colter Bay and Flagg Ranch to wheeled-vehicles would eliminate the potential for inter-modal conflict along this stretch of the CDST. It would eliminate a major source of winter vehicle accidents, vehicle-wildlife accidents and unsafe vehicular activity. Elimination of both snowmobiles and snowplanes from the surface of Jackson Lake would also eliminate the potential for user conflicts and accidents involving poor ice on the lake's frozen surface.

Conclusion

The benefits of implementing this alternative would be long term, major and beneficial due to the elimination of all potential snowmobile accidents in the three parks. These impacts would affect employees and visitors.

Effects on Geothermal Features

Under this alternative, roads would be groomed and access would be allowed only with mass transit vehicles. Using mass transit would allow park management some control over what stops along the roadway, thus increasing protection for geothermal features in areas where there are adverse levels of impact. The increase in opportunities to inform visitors of adverse impacts on geothermal resources would provide minor beneficial improvements to the protection of geothermal features.

The impacts of unrestricted backcountry use and the grooming of nonmotorized trails in Mammoth Terraces, Lone Star Geyser Basin, and Fountain Flats would be the same as those described under alternatives A and C.

Conclusion

Under this alternative the protection of geothermal features would be improved, although minor adverse impacts may occur to Fountain Flats and backcountry geothermal features.

Effects on Water and Aquatic Resources

Potential pollution sources are the same as described in alternative A. The potential impacts along all road segments would decrease with the prohibition of snowmobiles.

Table 140. Snowmachines and associated risk levels for alternative G.

Road Segment	Risk ± Rating‡	Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. A†		Impact: Daily Vehicle Miles Traveled Along the Segment in Alt. G†	
		SM‡	SC	SM	SC
Mammoth to Norris	Medium	641	69	0	168
West Entrance to Madison	Medium	7759	127	0	1232
Madison to Norris	High	3458	73	0	560
Norris to Canyon Village	Low	2214	47	0	360
Canyon Village to Fishing Bridge	High	2370	50	0	384
Fishing Bridge to East Entrance	Medium	983	0	0	135
Fishing Bridge to West Thumb	Medium	2627	55	0	420
Madison to Old Faithful	High	7818	165	0	1280
Old Faithful to West Thumb	Medium	3560	73	0	578
West Thumb to Flagg Ranch	Medium	4219	103	0	696
Grassy Lake Road	High	184	0	0	32
Flagg Ranch to Colter Bay	Low	379	0	0	464
Colter Bay to Moran Junction	High	248	0	0	0
Moran Junction to East Entrance	Medium	49	0	0	0
Teton Park Road	Low	156	0	0	0
Moose-Wilson Road	Low	6	0	0	0

†SM = Snowmobile, SC = Snowcoach; The source of pollutants is emissions from snowmobiles, which produce (conservatively) 10 times as many emissions per mile as most wheeled vehicles. Single snowcoaches produce fewer emissions than single snowmobiles.
‡±High = within 100 meters of aquatic system on 76% to 100% of the road segment; Medium = within 100 meters on 51% to 75% of the road segment; Low risk segments are within 100 meters of rivers less than 50%.

Conclusion

Deposition into snowpack from 2-stroke engine emissions along groomed park roads in YNP and GTNP would be eliminated. Emissions from snowcoaches, with improvements phased in, would continue to be deposited in snowpacks, at lower volumes over time. The effect of this deposition on water quality is undetermined but there is currently no evidence of measurable changes in water quality or effects on aquatic resources. It is possible that accumulations of pollutants in aquatic systems may have adverse impacts on wetlands and aquatic resources downstream from high risk road segments. Oversnow vehicle use in this alternative involves localized high risk to surface water quality, but reduces oversnow vehicle-miles traveled along high risk road segments in the three park units by about 84%. It would reduce oversnow vehicle-miles traveled along medium risk road segments by about 84%. The risk of moderate to major adverse impacts on water quality in Jackson Lake would be eliminated.

Mitigation

Best management practices would be utilized during the construction, reconstruction, or winter plowing of trails and roads to prevent unnecessary vegetation removal, erosion, and sedimentation. The release of snowpack contaminants into surface water could be

mitigated by disconnecting snowmelt drainages from trails by oversnow vehicles. Any new or reconstructed winter use sanitary facilities would be constructed in locations and use advanced technologies that would protect water resources. A focused program of monitoring would reduce the uncertainty of impacts from oversnow vehicles and, if necessary, indicate best management practices that might be implemented.

Effects on Wildlife

Ungulates

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative G, YNP would groom an additional 4 miles (of previously designated route) over alternative A for a total of 225 miles, and GTNP and the parkway would groom about 24 miles (12 miles less than alternative A due to the elimination of the CDST).

The impacts associated with groomed surfaces would decrease relative to alternative A for GTNP, and remain the same for YNP. Under this alternative, adaptive management could be employed to revise management of groomed roads should monitoring and research clearly indicate adverse effects to bison and other ungulates.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause injury and death for wildlife, especially in poor lighting conditions and during snowfall, and can cause displacement from preferred habitats.

This alternative reduces the potential effects on ungulates by eliminating snowmobile use. A minor risk of collision and short-term stress-induced movement would continue with the use of snowcoaches. However, compared to current levels of snowmobile use, traffic levels would be reduced by a factor of eight, and no ungulates have been struck by snowcoaches (Gunther et al. 1998). Furthermore, NPS policy would require that snowcoach drivers be trained and that stops be made only in areas where wildlife would be unaffected. The elimination of the CDST would benefit moose because this route intersects moose winter range in the northern part of GTNP. In all parks, collisions would be mitigated by the prohibition on oversnow motorized use from 11 P.M. to 5 A.M.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to ungulate movements (Aune 1981). In addition plowed roads, like groomed roads, also may provide an energy efficient mechanism for wildlife movements, including bison, elk, and moose. Under alternative G, YNP would plow 76 miles of road for wheeled-vehicle access in the winter, the same as under current management. GTNP would plow 82 miles, a reduction of 17 miles as a result of replacing wheeled-vehicles with snowcoaches from Colter Bay north to Flagg Ranch.

For YNP, the effects associated with plowed roads would be the same as alternative A. Effects associated with plowed roads in GTNP would be the same as those described in alternative D. Relative to current management, impacts would be reduced and negligible, especially for moose north of Colter Bay in GTNP.

Effects of motorized use of plowed roads. The effects of plowed roads are similar to those of groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause injury and death for wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall, and can cause displacement from preferred habitats.

For YNP, the effects associated with plowed roads would be the same as alternative A. Effects associated with plowed roads in GTNP would be the same as those described in alternative D. Relative to current management, impacts would be reduced and negligible, especially for moose north of Colter Bay in GTNP.

Effects of nonmotorized use of groomed and designated ungroomed routes. The primary effects of nonmotorized use on ungulates are displacement from preferred habitats, especially geothermal areas that are important for winter survival in YNP, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. In alternative G, YNP offers 37 miles of groomed nonmotorized routes, the same as alternative A, and GTNP and the Parkway remain the same at 26 miles.

The level of impact in the parks would be the same as alternative A — minor.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and ungulates may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Under alternative G, nonmotorized uses in certain wildlife winter ranges and thermal areas would be restricted to travel on designated routes only.

Effects decrease relative to alternative A. In GTNP winter use in important bighorn sheep winter ranges would be restricted or prohibited, including areas in the north and south Teton Range.[43]

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[43] Southern Tetons: (1) in the Prospectors Mt. and Mt. Hunt areas (including peak 10988), all areas above 3000m (9,900 ft.), and south-facing slopes on Mt. Hunt above 2600m (8,580 ft.); (2) the slopes of Static Peak above 3300m (10,890 ft.) (does not affect Albright Peak); and (3) the south-facing slopes above 3000m (9900 ft.) along the north side of Avalanche Canyon and the north fork of Avalanche Canyon.
Northern Tetons: 1) in the Ranger-Doane-Eagles Rest area (including peaks 10,298; 10,881; 10,023; 10,686), all areas above 3,000 m (9,900 ft.), and south-facing slopes of Eagles Rest above 2,600m (8,580 ft.); 2) in the Elk Mt.-Owl Peak area, all areas above 3,000 m (9,900 ft.), and south-facing slopes above 2,600m (8,580 ft.); 3) on Forellen Peak, all areas above 2,800 m (9,240 ft.)

Effects of the presence and use of winter support facilities. Increases in human activity associated with the presence of support facilities may displace species sensitive to human disturbance. Under this alternative, a warming hut would be constructed at Norris in the vicinity of ungulate winter range important to elk, deer, and bison. Introducing winter human use into this area would reduce its habitat effectiveness by potentially causing these species to be displaced to lower quality habitats. However, over time, the predictable nature of the recreation expected to occur in the area may allow these species to habituate to the increase in human activity. Effects could be the same as in alternative A, minor and short term.

Federally Protected Species

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow. Under alternative G, YNP would groom an additional 4 miles (of previously designated route) over alternative A for a total of 225 miles, and GTNP and the Parkway would groom about 24 miles (12 miles less than alternative A due to the elimination of the CDST).

Impacts related to packed trails would be less relative to alternative A in GTNP and remain the same in YNP. The extent to which packed surfaces influence lynx in the parks are largely unknown but would be investigated (see mitigation).

Effects of motorized use of groomed and ungroomed roads and trails. The use of motorized oversnow vehicles can cause displacement from preferred habitats. Collision impacts from oversnow motorized vehicles have not been documented for any of the federally protected species in the parks.

Impacts are generally decreased relative to alternative A. The elimination of snowmobiles from the three parks would decrease impacts related to noise and displacement. Use of snowcoaches would continue to potentially displace lynx because these routes pass through areas of lynx habitat, but the effects of snowcoaches would be less than those associated with snowmobiles because snowmobiles would be fewer in number and slower. Because the majority of visitors would be traveling on NPS-managed snowcoaches, the ability to control where and when stops are made would benefit all species. If federally protected species activity is detected, park managers can close the area to human activity to mitigate disturbance.

Effects of plowed roads. Road plowing may cause habitat fragmentation by creating structural barriers (i.e., snow berms) to wildlife movements (Aune 1981). In addition similar to groomed roads, plowed roads may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to

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and south-facing slopes above 2,500 m (8,250 ft.); and 4) the ridgecrest and south-facing slopes of the cliffs at the mouth of Moose Creek (also known as the “Lower Berry Cliffs”) above 2,300 m (7,590 ft.).

deep snow. Under alternative G, YNP would plow 76 miles of road for wheeled-vehicle access in the winter, the same as under current management. GTNP would plow 83 miles, a reduction of 17 miles as a result of replacing wheeled vehicles with snowcoaches from Colter Bay north to Flagg Ranch.

Impacts are generally as stated in alternative A for YNP and would decrease in GTNP. If protected species are detected in an area, park managers can close the area to human activity to mitigate disturbance.

Effects of motorized use of plowed roads. The effects of traffic on plowed roads are similar to those of traffic on groomed roads, except that the magnitude of the effect is usually greater. The use of motorized vehicles on plowed roads can cause injury and death to wildlife, especially in poor lighting conditions, at dusk and dawn, and during snowfall, and can cause displacement from preferred habitats.

Impacts are generally as stated in alternative A — none to minor. Collision impacts to wolves and lynx may be reduced by the elimination of wheeled vehicles on the road from Colter Bay to Flagg Ranch.

Effects of nonmotorized use on groomed and designated ungroomed routes. The primary effects of nonmotorized use on wildlife are displacement from preferred habitats and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. In alternative G, YNP offers 37 miles of groomed nonmotorized routes, the same as alternative A, and GTNP and the Parkway would remain the same at 26 miles.

Impacts are generally as stated in alternative A — none to negligible.

Effects of unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and federally protected wildlife species may only occur sporadically, they may cause displacement and additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Under alternative G, nonmotorized uses in certain wildlife winter ranges and thermal areas are restricted to travel on designated routes only, or closed to use entirely.

The potential for bear-human confrontation or conflicts due to the earlier opening of the winter use season (Thanksgiving weekend) would be limited to nonmotorized users who leave the road corridor and travel into high-elevation areas frequented by bears prior to denning. The likelihood of visitors coming into contact with grizzly bears during this time would be small. Although some bears (about 10%) may still be active in late November, park visitation at this time is expected to be low due to generally poor snow conditions, thus the earlier opening date would not be expected to result in a substantial increase in early winter visitation. Furthermore, based on visitation records for the past

seven years, an average of 12,485 people visited the parks in December to participate in oversnow-related activities. Calculated on a per day basis for the period of time from November 27 to December 15 (the initiation of the winter use season that coincides with the time when some bears may still be active), about 8,442 visitors. Skiers comprise about 20% of this figure (1,688). Of this 20%, half (844) indicated that they ski for less than four hours (Littlejohn 1996). Thus, it can be inferred that these skiers were not backcountry users, but remained on the groomed roads or trails in the front country, consequently, the odds of their encountering grizzly bears are small. Other surveys estimated the percentage of visitors who come to the park to ski as 10% (Borrie et al. 1999) and 24% (Duffield and Neher 1999). To minimize potential conflicts between visitors and bears during the pre-denning period, visitors in certain wildlife winter ranges would be restricted to designated trails, and according to park policy, other areas where pre-denning activity is high may close at the discretion of park managers.

Restrictions on use would reduce the level of effect relative to alternative A. Closures and restrictions may help to mitigate any increased potential for human-bear conflicts due to the earlier opening date of the winter use season (Thanksgiving weekend).

Presence and use of winter support facilities. Warming huts and campgrounds can cause habituation in some wildlife species by the presence of human food and garbage, and can lead to human-wildlife conflicts. In addition increased human activity associated with the presence of support facilities may displace species sensitive to human disturbance. A warming hut at Norris is the only new facility proposed under alternative G.

Potential impacts are generally as stated in alternative A — none to minor. All alternatives call for the construction of wildlife-proof garbage facilities to mitigate the potential effect of habituating animals, particularly bears.

Species of Special Concern

Effects of groomed roads and trails. Packed trails may influence wildlife movements and distributions by facilitating travel into areas that would normally be inaccessible due to deep snow; inhibit foraging activities of carnivores that tunnel beneath the snow to hunt subnivian prey; and reduce subnivian prey availability by increasing mortality of these small mammals. Under alternative G, YNP would groom an additional 4 miles over alternative A (of previously designated route) for a total of 225 miles, and GTNP and the Parkway would groom 24 miles (12 miles less than alternative A due to the elimination of the CDST).

For all species, known impacts related to packed trails are generally as stated in alternative A — none to negligible. In GTNP the reduction in packed surface area relative to alternative A would potentially benefit the ability of martens to tunnel and forage under the snow.

Effects of motorized oversnow use of groomed and ungroomed roads and trails. The most likely impacts to park sensitive species are displacement from preferred habitats, and degradation of the aquatic environment from pollutants in the snowpack. Documented mortality caused by collisions with oversnow vehicles in the parks is rare — in 10 years only one of these species (a marten) was reportedly killed by a snowmobile in YNP (Gunther et al. 1998).

Impacts are generally as stated in alternative A — none to minor. The elimination of snowmobiles from the parks would decrease impacts related to noise and displacement. Use of motorized oversnow vehicles would continue to potentially displace fishers, martens, and, in YNP, swans. Because the majority of visitors would be traveling in snowcoaches, the ability to control where and when stops are made would potentially benefit all species. In addition effects associated with motorized use would decrease because snowcoaches would be fewer in number, slower, and quieter.

See *Water and Aquatic Resources* for an assessment of the impacts of exhaust on water quality in the parks.

Effects of plowed roads. Similar to groomed roads, plowed roads also provide an energy efficient mechanism for wildlife movements. Under alternative G, YNP would plow 76 miles of road for wheeled-vehicle access in the winter, the same as under current management. GTNP would plow 82 miles, a reduction of 17 miles as a result of replacing wheeled vehicles with snowcoaches from Colter Bay north to Flagg Ranch.

Impacts are generally as stated in alternative A for YNP and less for GTNP. If protected species are detected in an area, park managers can close the area to human activity to mitigate disturbance.

Effects of motorized use of plowed roads. The most likely impact to park species of special concern is displacement from preferred habitats and mortality caused by collisions with wheeled-vehicles.

Impacts are generally as stated in alternative A — none to negligible. The elimination of 16 miles of plowed road from Colter Bay to Flagg Ranch would potentially decrease effects related to displacement.

Effects of nonmotorized use on groomed and ungroomed designated routes. The primary effects of nonmotorized use are displacement from preferred habitats, and increased energy expenditures, including physiological stress, which may reduce individuals' chances of survival. In alternative G, YNP offers 37 miles of groomed nonmotorized routes, the same as alternative A, and GTNP and the Parkway remain the same at 26 miles.

Impacts are generally as stated in alternative A — none to minor.

Unregulated backcountry nonmotorized use. Unregulated backcountry nonmotorized use is more random and infrequent relative to nonmotorized use on designated routes. Consequently, although encounters between backcountry users and species of special management concern may only occur sporadically, they can be especially disturbing and lead to additional energy expenditure and stress that reduces animals' chances of survival and reproduction. Under alternative G, nonmotorized uses in certain wildlife winter ranges and thermal areas are restricted to travel on designated routes only, or closed entirely.

Effects associated with backcountry use would be reduced relative to alternative A. Impacts, if they did occur, would be negligible to minor. Wolverines and other species that consume carrion may benefit by restrictions and closures in wildlife winter ranges, and there may be a decrease in disturbance to sagebrush lizard habitats.

Presence and use of winter support facilities. The primary effects of warming huts and campgrounds on park species of special concern are associated with increases in human activity and the subsequent disturbance and displacement of species or their prey. A warming hut at Norris is the only new facility proposed under alternative G.

Potential impacts are generally as stated in alternative A — none to minor.

Conclusion

The potential levels of impacts associated with alternative G are similar to those under alternative A – none to minor, adverse, and short term. There would be an expected reduction or elimination of road-killed large mammals due to the elimination of snowmobiles in all parks and the reduction in wheeled-vehicle traffic in GTNP. In addition the replacement of individual snowmobiles with mass transit snowcoaches will serve to decrease effects associated with displacement, including the sound, speed, and volume of traffic. Closures or restrictions in backcountry areas also significantly differentiate this alternative from current management, and may benefit winter-stressed ungulates and other wildlife. Adaptive management may be employed to make adjustments in management if and when impacts to wildlife are determined.

Although impacts to populations resulting from winter recreation are neither long-term nor very significant, impacts to individual members of the population can be important, leading to death either directly from collisions or continued harassment, or indirectly through management actions taken as a response to habituation to human presence and food. The NPS is concerned about impacts to individual animals; however, except for federally protected species, which are protected, the NPS provides for the protection of populations of native animals. See, for example, Chapter II, NPS 77, Natural Resources Management.

Ungulates

- Effects of groomed roads and trails on animal movements – unknown if and to what extent beneficial effects outweigh negative effects. Effect is reduced relative to alternative A in GTNP.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on: 1) mortality caused by collisions – adverse, none to negligible, and short term; and 2) displacement from preferred habitats – adverse, negligible to minor, and short term. Greatly reduces collision impacts over alternative A due to the elimination of snowmobiles.
- Effects of plowed roads on: 1) habitat fragmentation – adverse, minor, and short term; and 2) animal movements – unknown if and to what extent beneficial effects outweigh negative effects (same as alternative A for YNP). In GTNP effects would decrease as compared to alternative A.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, minor, and short term; and 2) displacement from preferred habitats – adverse, moderate, and long term (same as alternative A for YNP). In GTNP effects would decrease as compared to alternative A.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, minor, and short term. Same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible to minor, and short term. Effects decrease relative to alternative A due to restrictions on backcountry travel. Impacts to bighorn sheep in GTNP would significantly decrease.
- Effects of the presence and use of winter support facilities on displacement – adverse, minor, and short term. Same as alternative A.

Federally Protected Species

- Effects of groomed roads and trails on animal movements: 1) bald eagles, grizzly bears, and wolves — no effect; and 2) lynx – adverse, negligible to major, and short term, depending upon lynx distribution and abundance in the parks. Effect is decreased relative to alternative A in GTNP.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement from preferred habitats – adverse, negligible, and short term for all species excluding the grizzly bear, which typically is not active during the winter use season. Effect is decreased relative to alternative A due to the elimination of snowmobiles.
- Effects of plowed roads on: 1) habitat fragmentation – no effect on any of the listed species; and 2) animal movements – no known effect on any of the listed species. Same as alternative A for YNP and less than alternative A for GTNP.
- Effects of motorized use of plowed roads on: 1) mortality caused by collisions – adverse, negligible, and short term on bald eagles and grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx; and 2) displacement from preferred habitats – adverse, negligible, and short term on bald eagles, no effect on grizzly bears; no known effect to date on wolves and lynx. May decrease impacts to wolves and lynx relative to alternative A due to the elimination of wheeled vehicles from Colter Bay to Flagg Ranch. Otherwise, effects are generally the same as alternative A.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – adverse, negligible, and short term on bald eagles; no effect on grizzly bears; no known effect to date on wolves and lynx. Same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, minor, and short term on bald eagles; adverse, negligible, and short term on grizzly bears; adverse, minor, and short term on wolves; no known effect to date on lynx. Effects decrease relative to alternative A due to restrictions on backcountry travel in both parks. Restrictions may also mitigate any potential grizzly bear-human conflicts associated with the early opening date of the parks.

- Effects of the presence and use of winter support facilities on displacement – no affect on bald eagles; adverse, negligible, and short term on grizzly bears, with mitigation; adverse, minor, and short term on wolves; no effects on lynx. Effects are the same as alternative A.

Species of Special Concern

- Effects of groomed roads and trails on 1) animal movements – no known effect on wolverines; adverse, negligible, and short term on fishers and martens; no effect on otters, swans, reptiles, amphibians, and fish; 2) foraging activities – adverse, negligible, and short term on marten; no effect on the other species; and 3) subnivian prey availability — adverse, negligible, and short term on marten; no effect on the other species. Effects are reduced relative to alternative A in GTNP.
- Effects of motorized oversnow use of groomed and ungroomed roads and trails on displacement – no known effect on wolverine; adverse, negligible, and short term on fishers and marten; no effect on otters, reptiles, amphibians, and fish; adverse, minor, and short term on swans. Effect is decreased relative to alternative A due to the elimination of snowmobiles.
- Effects of plowed roads on animal movements – no known effect on wolverines, fishers, martens; no effect on otters, swans, reptiles, amphibians, fish. Same as alternative A.
- Effects of motorized use of plowed roads on displacement from preferred habitats: 1) adverse, negligible, and short term on wolverines, fishers, and martens; no effect on otters, swans, reptiles, amphibians, and fish; and 2) mortality from collisions — adverse, negligible, and short term on otters and martens; no effect to date on other species. Same as alternative A. Impacts may be decreased relative to alternative A due to the elimination of wheeled—vehicles from Colter Bay to Flagg Ranch.
- Effects of nonmotorized use of groomed and designated ungroomed routes on displacement from preferred habitats – no effect on wolverines; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; adverse, negligible, and short term on sagebrush lizard no effect on rubber boa, amphibians, and fish. Same as alternative A.
- Effects of unregulated backcountry nonmotorized use on displacement from preferred habitats – adverse, negligible, short term on wolverines and sagebrush lizard; no known effect on fishers, martens, and otters; adverse, minor, and short term on swans; no effect on rubber boa, amphibians, and fish. Effects decrease relative to alternative A due to restrictions on backcountry travel in all parks. Wolverines may benefit from bighorn sheep closures in GTNP.
- Effects of the presence and use of winter support facilities on displacement of potential prey (carcass) availability – adverse, minor, short term on wolverines, fishers, and martens; no effect on swans, rubber boa, amphibians, and fish; no known effect on otters; adverse, minor, and short term on sagebrush lizard. Same as alternative A.

Mitigation

- Grizzly bear abundance, distribution and habitat selection, including the location of dens would continue to be assessed. The information obtained will assist park managers in protecting important habitats and planning recreational activities that minimize disturbance to bears.
- Snow track surveys for carnivores, including lynx, on both groomed and ungroomed routes would be conducted.
- Use of groomed, ungroomed, and plowed surfaces by bison and other ungulates would continue to be monitored.

Effects on Natural Soundscape

Audibility analysis — combined effects of all wheeled and oversnow vehicles

Table 141 presents the acres of park land by road segment where any wheeled or oversnow vehicle noise would be audible under the two background conditions, "average" and "quiet," as defined in the *Assumptions and Methodologies* section of this chapter. For each background condition, acreage is presented for three categories of audibility: (1) audible for any amount of time (labeled "audible at all"); (2) audible for 10% of the time or more; and (3) audible for 50% of the time or more. Appendix M contains tables with distances to audibility for each segment for each alternative.

Alternative G features no motorized vehicles of any type on Jackson Lake and Teton Park Road in GTNP. It also replaces snowmobiles with snowcoaches in YNP, and replaces snowmobiles and wheeled vehicles with snowcoaches from Colter Bay to Flagg Ranch and on the Grassy Lake Road.

The results for alternative G show that for the "average" background sound level condition, wheeled or oversnow vehicles would be audible to some degree on more than 178,000 acres in the three park units. On more than 74,000 of those acres, wheeled or oversnow vehicles would be audible for at least 10% of the time during the day. For nearly 13,000 of those acres, they would be audible for at least half of the time during the day. These acreage totals increase by 12% for the "audible at all" category, 27% for the "audible 10% or more" category, and 9% for the "audible for 50% of the time or more" category for the "quiet" background conditions.

The segment from Moran Junction to the South Entrance of GTNP, which carries a great deal of wheeled-vehicle traffic unrelated to the alternatives, contributes the greatest to the total acreage values for all three audibility categories. These amounts remain almost constant for all of the alternatives.

The plowed road from Mammoth to the YNP Northeast Entrance is a major contributor to the "audible at all" acreage (and, to a lesser extent, "audible 10% or more"), which remains virtually unchanged across all of the alternatives.

Compared to the no action alternative, there are increases in acreage for the "audible at all" categories for all of the YNP road segments using snowcoaches only due to the long distances to audibility for the Bombardier Snowcoaches as discussed under the *Effects Common to All Alternatives* section of this chapter. Likewise, there is nearly a doubling in acreage for the Flagg Ranch-Colter Bay segment. However, these increases are more than compensated for by the elimination of oversnow vehicles on Jackson Lake and Teton Park Road, leading to the overall reduction in acreage.

For the "audible for 10% of the time or more" categories, the acreage compared to the no action alternative increases for some YNP segments and decreases for others.

For the "audible for 50% of the time or more" categories, there are major reductions in acreage for the YNP West Entrance to Madison, Madison to Old Faithful, and West Thumb to Flagg Ranch segments, due to the reduction in total vehicular traffic, in addition to those segments where oversnow vehicles would be eliminated.

Table 141. Acres of park land affected by vehicle audibility for alternative G.

Road Segment	Miles	With Average Background Conditions			With Quiet Background Conditions		
		Audible at all	Audible 10% of the time or more	Audible 50% of the time or more	Audible at all	Audible 10% of the time or more	Audible 50% of the time or more
1. Mammoth to Northeast Entrance	47	16,126	5,445	0	16,822	6,342	0
2. Mammoth to Norris	21	11,671	649	0	12,734	1,225	0
3. West Entrance to Madison	14	11,129	7,049	433	12,487	8,128	556
4. Madison to Norris	14	9,075	4,913	0	10,275	6,002	0
5. Norris to Canyon Village	12	5,740	1,031	0	6,637	2,518	0
6. Canyon Village to Fishing Bridge	16	10,883	4,433	0	12,233	5,521	0
7. Fishing Bridge to East Entrance	27	14,805	0	0	16,100	0	0
8. Fishing Bridge to West Thumb	21	17,671	10,032	0	20,423	12,495	0
9. Madison to Old Faithful	16	13,393	8,573	870	15,098	9,746	1,170
10. Old Faithful to West Thumb	17	10,207	4,822	0	11,549	5,918	0
11. West Thumb to Flagg Ranch	24	14,008	3,926	0	16,141	7,618	0
12. Grassy Lake Road	7.6	2,122	0	0	2,376	0	0
13. Flagg Ranch to Colter Bay	15.6	13,437	6,808	0	15,405	9,723	0
14. Colter Bay to Moran Junction	10.2	4,579	1,825	0	4,926	2,040	0
15. Moran Junction to East Entrance	2	1,225	753	490	1,319	863	535
16. Moran Junction to South Entrance	26	21,714	14,536	11,123	23,842	16,922	11,825
17. Teton Park Road	15	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	2.5	659	0	0	695	0	0
19. Antelope Flats Snowmobile Route	--	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
20. Jackson Lake	9.7	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.	No Veh.
TOTAL		178,445	74,795	12,916	199,063	95,060	14,087

Average sound level analysis

To give a sense of the effect of the number of oversnow or wheeled vehicles on a road segment, and their speed and sound level, Table 142 shows the computed hourly equivalent or "average" sound level (L_{eq}) over the daytime period. Levels are shown for each road segment at two distances, 100 feet and 4,000 feet, and for both open and forested terrain. These hourly L_{eq} values do not have the background sound level added in to them. Also, they cannot be compared against the background levels to assess audibility, because L_{eq} represents a long-term average of both quiet and loud moments.

The hourly L_{eq} at 100 feet are highest for the West Entrance to Madison and Madison to Old Faithful segments. The L_{eq} are reduced substantially (7 dB to 8 dB) compared to alternative A for the YNP road segments where the snowmobiles would be replaced with snowcoaches. At 4,000 feet away, the L_{eq} are also highest for the West Entrance to Madison and Madison to Old Faithful segments, as well as the segments from Moran Junction to both the East Entrance and the South Entrance of GTNP.

Table 142. Average hourly L_{eq} from wheeled and oversnow vehicle noise at two distances to each road segment for alternative G.

	L_{eq} at distance (dBA)			
	Open Terrain		Forested Terrain	
Road Segment	100 feet	4,000 feet	100 feet	4,000 feet
1. Mammoth to Northeast Entrance	35	2	33	0
2. Mammoth to Norris	42	6	40	0
3. West Entrance to Madison	49	15	47	7
4. Madison to Norris	46	12	44	4
5. Norris to Canyon Village	44	10	43	2
6. Canyon Village to Fishing Bridge	43	9	42	1
7. Fishing Bridge to East Entrance	36	2	35	0
8. Fishing Bridge to West Thumb	43	9	41	1
9. Madison to Old Faithful	49	15	47	7
10. Old Faithful to West Thumb	45	11	43	3
11. West Thumb to Flagg Ranch	44	10	42	2
12. Grassy Lake Road	42	2	41	0
13. Flagg Ranch to Colter Bay	44	10	42	2
14. Colter Bay to Moran Junction	40	7	38	0
15. Moran Junction to East Entrance	47	13	45	5
16. Moran Junction to South Entrance	46	14	44	6
17. Teton Park Road	No Veh.	No Veh.	No Veh.	No Veh.
18. Moose-Wilson Road	24	0	22	0
19. Antelope Flats Snowmobile Route	No Veh	No Veh	No Veh	No Veh.
20. Jackson Lake	No Veh	No Veh	No Veh	No Veh.

Conclusion

Alternative G impacts 97% to 98% of the acreage impacted by the no action alternative for the “audible at all” categories, the second highest after alternative C. Increases in acreage for the YNP and GTNP road segments using only snowcoaches are more than compensated for by the elimination of oversnow vehicles in all of GTNP except the Flagg Ranch to Colter Bay and Grassy Lake Road segments.

Alternative G impacts 79% and 89% of the no action acreage for the “audible 10% of the time or more” categories for the “average” and “quiet” background conditions,

respectively. These percentages are the third highest among the alternatives for the "average" background and highest for the "quiet" background.

For the "audible 50% or more" categories, alternative G impacts only 53% to 55% of the acreage for the no action alternative. These reductions are the greatest among the alternatives, and are due to the exclusive use of snowcoaches in YNP.

The contributions to the L_{eq} are reduced to zero for those road segments where vehicular travel of all types is eliminated, and are substantially reduced for those segments where snowcoaches replace snowmobiles.

Effects on Cultural Resources

The effects on cultural resources would be the same as described in alternative B.

Conclusion

None of the actions described would adversely impact cultural resources.

Effects on Visitor Access and Circulation

Access

Yellowstone National Park. Overall, access to park resources would not be affected by this alternative, although visitors would be required to change their mode of motorized travel to these resources from snowmobile to snowcoach.

Grand Teton National Park and the Parkway. Under this alternative, access to Flagg Ranch would be closed to wheeled vehicles and snowmobiles in the winter use season. Access to Flagg Ranch would be limited to snowcoach. Access to other areas of the park would remain, although some limited changes in mode of travel would occur.

A reasonably foreseeable distribution of vehicle use as a consequence of this alternative is depicted in the following table. Since the parks would be closed to snowmobiles there would be a 100% decrease in snowmobile vehicle-miles traveled in the three park units. Because snowcoaches would provide motorized access at current visitation levels to YNP's interior, from Colter Bay to Flagg Ranch and Flagg Ranch to the west boundary of the Parkway, there would be an increase of 723% in snowcoach-miles traveled. Daily wheeled-vehicle-miles traveled in this scenario would decrease by about 3%.

Table 143. Alternative G motorized use.

Road Segment	Average Daily Vehicle Use January-February				
	Autos	Vans	Snowcoaches	Snowmobiles	Buses
Mammoth to Northeast Entrance	No change from current condition				
Mammoth to Norris	0	0	8	0	0
West Entrance to Madison	0	0	88	0	0
Madison to Norris	0	0	40	0	0
Norris to Canyon Village	0	0	30	0	0
Canyon Village to Fishing Bridge	0	0	24	0	0
Fishing Bridge to East Entrance	0	0	5	0	0
Fishing Bridge to West Thumb	0	0	20	0	0
Madison to Old Faithful	0	0	80	0	0
Old Faithful to West Thumb	0	0	34	0	0
West Thumb to Flagg Ranch	0	0	29	0	0
Grassy Lake Road	0	0	4	0	0
Flagg Ranch to Colter Bay	0	0	29	0	0
Colter Bay to Moran Junction	190	10	0	0	1
Moran Junction to East Entrance	560	28	0	0	2
Moran Junction to South Entrance	No change from current condition				
Teton Park Road	0	0	0	0	0
Moose-Wilson Road	5	0	0	0	0
Antelope Flats Snowmobile Route	No change from current condition				

Concession Services

Present concessions affected in this alternative would be all those permitted to run snowmobile guided tours or provide snowmobile rentals (under concession contracts) for use in the parks. This would adversely affect permittees or concessioners and their employees at all gateways and destinations in the parks by removing the source of winter income associated with this activity.

Oversnow tour and transportation services from all affected locations would need to be developed or enhanced in order to meet visitor needs in this alternative. Approximately 180-200 snowcoaches would be necessary to accommodate today's use levels. This includes snowcoach access to and from the East Entrance of YNP once safer and more feasible coaches are available. Since the availability of access does not change, only the mode, concession operations would have the opportunity to adapt to the change while still providing visitor services to and in the parks.

At Old Faithful, the logistics of moving people, fuel, supplies, or garbage would remain dependent on oversnow transport. Storage of material in the park's interior would be the same as at present.

Concessions and services offered at Flagg Ranch in the Parkway, would be affected by not plowing the highway north of Colter Bay, and by eliminating snowmobile access from Idaho via the Grassy Lake Road. NPS-managed snowcoach access from Idaho would be allowed. The segment connecting Colter Bay and Flagg Ranch would be accessible via NPS managed (concession) snowcoach only. Instead of wheeled-vehicle access, most employees and clients would travel to and from the ranch by snowcoach. Flagg Ranch would be snowbound, offering a more specialized experience than at present – similar to Old Faithful. Its business focus would need to support and capitalize on nonmotorized winter recreation, as would Old Faithful. This change would entail operational changes and higher expenses for the concessioner in terms of moving supplies and employees, and providing winter storage space.

The time available under this alternative for business adaptation is three years, when all snowmobile access would be terminated in the winter 2003-2004.

The implementation of any alternative that might make substantial changes affecting a concessioner would require negotiation between the NPS and the concessioner or be deferred until a new concessions contract is awarded.

Conclusion

Negligible impacts to park access in all three parks would occur because access is not altered, only the mode of travel is changed. Minor adverse impacts would occur in GTNP because all motorized use on Jackson Lake is eliminated.

Effects on Visitor Experience — Yellowstone National Park

The amount and type of visitor opportunities offered in YNP under alternative G are provided in Table 144.

Table 144. YNP Visitor opportunities available under alternative G.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	0	-184	Mid-December to Mid-March	Late night closure
Groomed motorized route, snowcoach only	184	0	Mid-December to Mid-March	Late night closure
Groomed motorized trail	0	0	Mid-December to Mid-March	Late night closure
Plowed route	76	0	Mid-December to Mid-March	Late night closure
Groomed nonmotorized	37	0	Mid-December to Mid-March	Late night closure
Warming huts	7	+1	Mid-December to Mid-March	Late night closure
Backcountry	2.2 million acres	0	Contingent on snowfall in northern portion of park	None

Visitor Satisfaction and Experience

Opportunities to view wildlife. Opportunities to view wildlife would not decrease under this alternative because the same level of oversnow visitor access would be provided. However, because visitors riding on snowcoaches would be traveling in groups, wildlife viewing would rarely be a solitary or an individualized experience. If wildlife habituates to the new travel patterns of the snowcoach, wildlife viewing could be improved. Because of the required use of mass transportation visitors would not experience the personal freedom to stop and view wildlife at will.[44]

Opportunities to view scenery. Opportunities to view scenery would not decrease under this alternative because the same level of oversnow visitor access would be provided. However, the nature of the viewing experience for motorized access would change substantially. Visitors who find the personal freedom to stop and view scenery, at will, essential to their park experience would be adversely affected by this alternative.[44] (see discussion under access to winter experiences below).

Safety (the safe behavior of others). Snowcoach-only travel would eliminate the risk of snowmobile accidents and snowmobile/skier conflicts. The general decrease in vehicle miles traveled would necessarily reduce the likelihood of motorized vehicle accidents. In addition there were no large mammals hit or killed by busses or snowcoaches in YNP from 1989 to 1998 (Gunther et al. 1998). Wildlife and snowmobile collisions often result in human injury. Alternative G would result in moderate to major beneficial improvements to visitor safety.

Safety concerns regarding avalanches for both motorized and nonmotorized users would remain the same as alternative A.

Quality of the groomed surface. Both positive and negative effects to the groomed surface would occur under this alternative. The larger tracks of snowcoaches would reduce the overall quality of the groomed surface. However, because the total number of vehicles would be reduced, an improvement in groomed surface quality would be expected.

The availability of access to winter activities or experiences. Oversnow mechanized access would be maintained on all existing groomed routes. Snowcoaches generally travel at lower speeds (about 30 mph to 35 mph) than snowmobiles (40 mph to 45 mph). For visitors who travel from the South Entrance to Old Faithful the slower snowcoach travel time combined with the additional oversnow mileage from Colter Bay would require an additional one hour of travel time each way.

[44] It is important to note that impromptu stops by snowcoaches to view scenery and wildlife are frequent occurrences under current operations and there is no reason to assume that this situation would change.

The removal of snowmobile access into the park would eliminate the current most popular form of winter experience (more than 60% of users) resulting in major adverse effects on snowmobile users.[45]

The late night closure from 11 P.M. to 6 A.M. would result in negligible adverse effects due primarily to visitor inconvenience.

Availability of information. Same as alternative C.

Quiet and solitude. Under alternative G only snowcoaches that can meet strict sound standards would be allowed in the parks. Initially reduction in sound emissions would be moderate; however, as the bombardier snowcoaches, which produce higher sound levels, are retrofitted or phased out, the opportunities to experience quiet will be greatly improved. This alternative would result in major beneficial effects overtime, particularly for nonmotorized users of the parks. Because of the mass transit requirement, options for solitude would be limited for visitors who cannot physically ski or hike.

Backcountry users would be restricted to designated routes in important winter range. This action would result in a higher rate of skier encounters in these areas and limit the range of opportunities currently available to skiers, about 20% of all winter visitors (Littlejohn 1996).

Clean air. Through the permitting process the NPS would require that all snowcoaches meet the highest environmental standards possible for commercially produced mass transit oversnow vehicles. Currently this vehicle is the mat track conversion van. The reductions in vehicle emissions would provide major beneficial improvements in opportunities to experience clean air in YNP.

Conclusion

The reduction in emissions and sound under this alternative would result in direct major beneficial improvements to the experiences of park visitors. There would be a minor to moderate beneficial impact on visitor experience due to increased availability of information, interpretation, and winter programs. There would be no change relative to alternative A in opportunities to view wildlife and scenery, except for backcountry skiers who would experience a minor to moderate decrease in these opportunities in some areas. There would be major beneficial changes relating to safety by eliminating the possibility of snowmobile related motor vehicle accidents.

Under specific circumstances, the adaptive management provisions of this alternative may result in area closures. If monitoring or scientific studies regarding winter visitor

[45] Recent survey data collected by Duffield et al. (2000a) indicates that about 33.4% of non-resident winter visitors would not return to YNP under snowcoach-only management. However, national and regional survey respondents indicated that they favored snowcoach-only access (Duffield et al. 2000c). Similarly, a review of public comment on the DEIS indicates an even split between those who favored snowmobile access and those who favored snowcoach only access. For park visitors who favored snowcoach-only access alternative G would have a positive effect.

use, natural resources, and other park values indicate that sections of the park must be closed or certain uses restricted to protect park values (for example, snowmobiling or backcountry skiing), some or all visitor experiences in the closure area would be eliminated. These areas of closure would result in localized direct adverse impacts to desired winter visitor experience. However, the long-term protection of these resources would provide major benefits to the protection of desired visitor experiences park-wide.

The overall effect of this alternative on the winter visitor experience would be moderate to major and beneficial. However, the elimination of snowmobiles would result in major adverse impacts to the experiences of visitors in this user group. Currently this represents 60% of all winter visitors to the park.

Effects on Visitor Experience — Grand Teton and the Parkway

The amount and type of visitor opportunities offered in GTNP under alternative G are provided in Table 145.

Table 145. Visitor opportunities available under alternative G.

Opportunities	Miles or Areas	Increase/ Decrease	Length of Season	Other
Groomed motorized route	0	-18.2	December to April†	Late night closure
Groomed motorized route, snowcoach	29	25.8	December to April†	Late night closure
Groomed motorized trail	0	-33.9	December to April†	Late night closure
Plowed road	83.4	-16.6	December to April†	Late night closure
Ungroomed motorized trail or area	0	-35.6	December to April†	Late night closure
Groomed nonmotorized	0	0	December to April†	Late night closure
Ungroomed nonmotorized trail or area	27.4	1.0	December to April†	Late night closure
Warming huts/interpretive centers	5	3	December to April†	Late night closure

†Variable, dependent on snow conditions

Visitor Satisfaction and Experience

Opportunities to view wildlife. Same as in alternative B.

Opportunities to view scenery. With the elimination of snowmobile access, and no wheeled-vehicle access north of Colter Bay, there would be fewer opportunities to view scenery by auto and snowmobile. Scenery would be viewed in this area from a snowcoach operating from Colter Bay north to YNP and Flagg Ranch west to Idaho.

Safety (the safe behavior of others). The CDST would be eliminated through GTNP and the Parkway, except for mass transit from Colter Bay to YNP and the west Parkway boundary. This would enhance safety for other nonmotorized uses.

Quality of the groomed surface. Oversnow motorized uses would be eliminated except for snowcoaches. Snowcoaches would operate on a groomed route from Colter Bay into YNP and to the west Parkway boundary.

The availability of access to winter activities or experiences. Access to motorized winter experiences would be decreased except for snowcoaches operating from Colter Bay into YNP and to the west Parkway boundary. There would be a loss of ice fishing opportunities via snowmachine on Jackson Lake. The exclusion of motorized travel from the Lake would also result in limited access to Webb Canyon and other backcountry areas. However nonmotorized use on the Lake would be enhanced. Under this alternative skiing on the groomed surface of the roadway north of Moran Junction would also be available. These actions would particularly benefit local residents who indicated that skiing in the park was their favorite activity (Teton County 1998). However, because of the elimination of wheeled access to Flagg Ranch, park visitors who wish to ski in areas between Moran Junction and Flagg Ranch may (depending on distance) require a snowcoach shuttle for transport.

Availability of information. Same as in alternative D.

Quiet and solitude. With elimination of snowmobile and snowplane use, opportunities for quiet and solitude would be enhanced. The major benefit of this would accrue to nonmotorized uses. There would be a lost opportunity for snowmobilers who are seeking this experience.

Clean air. With elimination of snowmobile use, a major source of pollution would be eliminated. The opportunity to experience clean air would be greatly enhanced under this alternative.

Conclusion

Minor adverse to negligible impacts on visitor experience relating to wildlife and scenery viewing would occur because of the elimination of motorized travel on the frozen surface of Jackson Lake. Opportunities to view wildlife would be improved for nonmotorized users of these areas. There would be major beneficial changes relating to safety by eliminating the possibility of snowmobile-related motor vehicle accidents, and wheeled-vehicle accidents on the road segment from Colter Bay to Flagg Ranch. Improving groomed surfaces would be moderately beneficial for snowcoach use and occupant safety. Overall, there would be a major adverse impact on the availability of access for those who wish to ride snowmobiles or snowplanes. There would be a minor to moderate beneficial impact to visitor experience due to increased availability of information, interpretation, and winter programs. There would be a major beneficial impact relative to opportunities for quiet and solitude. Opportunities to appreciate clean air would be greatly improved. Where oversnow motorized use occurs, via snowcoach, quiet and clean air would be facilitated by improved motorized technology.

The adaptive management provisions of this alternative require that if monitoring or scientific studies regarding winter visitor use, natural resources and other park values indicate that sections of the park must be closed or certain uses (for example, snowmobiling or backcountry skiing) restricted to protect these values, some or all visitor experiences currently afforded in the area of closure would be eliminated (see Appendix L, *Adaptive Management*). These areas of closure would result in direct and localized adverse impacts to desired winter visitor experience. However, the long-term protection of these resources would provide major benefits to the protection of desired visitor experiences park-wide.

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS ON ADJACENT LANDS

Potential effects on lands within the GYA other than the three national park units is discussed in this section. The US Forest Service (USFS); the States of Wyoming, Montana, and Idaho; and five counties surrounding the park units (all cooperating agencies in this EIS, see Chapter I and Appendix A) provided information for effects analysis in this section. Since the potential for impacts on adjacent lands (apart from economic impacts) is primarily due to possible displacement of winter recreation use from the parks, an analysis of displacement introduces the disclosure of possible impacts.

Possible Conflicts with other Land Use Plans, Policies or Controls

CEQ Regulations (40 CFR 1502.16(c)) require discussion of possible conflicts between the proposed action and objectives of land use plans, policies, or controls for the area concerned. The cooperating agencies represent the jurisdictions in which such conflicts might occur.

The chief concerns expressed by counties, as reflected in their areas of special expertise, have to do with economic impacts of changes in park management (i.e., changes in access or mode of access, and recreational opportunities available from each gateway). Possible effects relating to loss of jobs or income in adjacent communities are disclosed in the *Socioeconomics* section, Chapter IV. Such impacts would not affect local government land use plans, other policies, or controls. This is largely because the essential objectives of park management have not changed, but the means by which they are to be attained could be altered. Teton County, Wyoming, expressed the desire that GTNP would be consistent with the county's new transportation plan. There is nothing in any winter use plan alternative that changes the transportation interface with the county. The park has initiated a separate study effort to review year-round transportation needs in the park related to the county plan.

The States' special expertise extended to resource analyses and recreation. They did not indicate specific conflicts with any plan objectives. However, it can be assumed from their comments that existing snowmobile use does not violate any state or federal standards for air or water quality in or outside the parks. The State of Montana expressed concerns about displaced recreational use and its potential impacts in the areas of safety

and wildlife management. These concerns are discussed in the Montana section below. It can be inferred that if significant use is displaced to state jurisdictional lands, some state objectives might not be met without further management. Wyoming's chief concerns had to do with possible declines in snowmobile tourism to the state through loss of recreational opportunities, and related economic effects. It can be inferred that this would conflict with state level tourism and recreation plan objectives. Similarly, Idaho was concerned about impacts of possible displacement on recreational experience, groomed trail quality, and grooming expense – possibly conflicting with local plans and controls. The NPS has determined that there is no indication of any possible conflict with county land use plans for any alternative because land allocations and basic objectives in the parks would not change significantly.

All adjoining national forests have forest plans in effect, albeit in various stages of revision. In The Winter Visitor Use Management Assessment (GYCC 1999), identifies conflicts relating to winter use. Most conflicts include motorized use and related infrastructure needs, wildlife impacts, and displacement of nonmotorized uses. The assessment indicates that most such conflicts can be handled within the framework of current forest plans, and the rest by forests during upcoming plan revisions. Considering possible displacement of snowmobile use from the parks, the Bridger-Teton National Forest indicates that increased use would destabilize a local balance between nonmotorized and motorized use, and not meet plan objectives. Similarly, the Caribou-Targhee National Forest states that increased use could exceed existing infrastructure and result in the need to amend its new plan. The NPS interprets this conflict as follows for all the forests involved. The forests have standards and guidelines that relate to quality experiences within the spectrum of recreational opportunities. Some forests do not have direction specific to winter use and recreation experience objectives. However, increased use could cause facility capacities to be exceeded. It could also cause heavy trail use that would not meet implied standards for quality use in a given management area. This impact indicates the need for management action to bring use into conformance with the plan – per the analysis in the Winter Visitor Use Management Assessment. The issue is nearly moot since the National Forests indicate they are already at a threshold without any park management changes.

Displacement of Snowmobile Recreation Use to Adjacent Lands

To perform additional effects analysis on forest lands, the USFS requested the NPS to provide information on how use would change in the GYA as a result of each winter use alternative for the parks. The NPS believes that such information is speculative. Many different scenarios can be constructed for the same basic situation, for example, plowing the road from West Yellowstone to Old Faithful. Additional permutations are added when multiple alternatives must be dealt with, and even more when dealing with four major gateways and several other access routes. A partial list of possible considerations follows.

Many nonresident visitors that presently snowmobile in the parks also snowmobile on the adjacent national forests during the same trip. If they cannot snowmobile in the park from the gateway of their choice, they could:

- Continue to visit in future years but spend their time exclusively on national forest lands. The net increase would be the one or two days per trip previously spent in the parks.
- Continue to visit in future years but spend their time on national forest lands as before, and shorten their trip.
- Decline to come to the GYA and forego both national forest and park experiences.
- Continue to visit the GYA, spend as many days on the national forests as they do now and visit the parks using another gateway or a different mode of transport.

Other considerations include the possibility of attracting new visitors with new preferences, and different local users. Some people that have not come to the parks in the past might choose to do so because of available mass transit opportunities, either on plowed roads or groomed, oversnow routes. Such visitors could split their trips to spend a day snowmobiling on the adjacent national forests.

Local snowmobilers would likely continue to use national forest lands as they have in the past. If they can no longer use the parks as they have traditionally done from their local community, they could:

- Enter the parks from another available gateway.
- Leave the region and go elsewhere for one to several trips over the season.
- Curtail their activity overall.
- Spend more time on local national forest lands.
- Visit national forest lands near of other gateways.

The development of a quantified scenario for future recreation use by alternative is speculative. The NPS is in the position of providing a scenario of recreation displacement. The scenario provided represents the most reasonable outcome based on known preferences of current visitors through visitor surveys and current use at each park gateway.[46] Appendix J provides supporting computations for this displacement analysis, including assumptions and methods. Conclusions are presented below.[47]

Alternative A

It is assumed that the existing winter visitor use trends for a given area would continue.

[46] CEQ Regulations at 40 CFR § 1502.22(b) address incomplete or unavailable information. Definitive information about what people would do under a variety of scenarios cannot be obtained. The best available data is from visitor surveys (Duffield, 2000) designed to ask pertinent questions of current winter visitors in the parks. The results indicate what people may do under circumstances posed by key features of EIS alternatives. These surveys are also the basis for impacts described in the socio-economic section and are fully cited therein. Also see Appendix J.

[47] As a cooperating agency, the USFS advocates the use of a worst-case scenario for displacement that might occur in each alternative. The worst-case might be represented by the total amount of park visitation by gateway or otherwise that would no longer be able to use that entrance. What those displaced visitors might do is highly speculative.

Alternative B

- Based on survey responses of current winter visitors about what the visitor would do if the road from West Yellowstone to Old Faithful was available for wheeled-vehicle mass transit only, total visitation to the GYA by nonresidents (snowmobilers, snowcoach riders, and skiers-snowshoers) would be reduced by 18.4%. Nonresidents account for nearly 80% of total visitation in the parks. This reduction is a net change. It takes into account visitors who said they would visit more often in this circumstance, and those who said they would visit the same but shift their use to other areas of the GYA (e.g., from the parks to the national forests). Total visitation to GYA national parks and adjacent national forests by nonresidents could decrease by that amount. Visitation numbers are unavailable for national forests. However, an wholesale decrease of nonresident visitors by 18.4% could offset or exceed displacement of park use as estimated below (Ref. Economic impacts for alternative B).[48]
- Considering a net decrease in the use of GYA national parks and adjacent national forest lands in this alternative, about 6,700 trips (into the parks annually) are associated with visitors who indicate they would visit the GYA at the same level, but would go to other destinations. Based on the assumption that all the trips involve snowmobiling, a total of about 75 snowmobile trips daily could be displaced to other available lands outside the park near West Yellowstone, to other available areas in the parks, or to other adjacent lands. This would be in addition to resident visitors (accounting for about 20% of park visitation) who currently recreate on adjacent lands much of the time.
- In this alternative, interior roads of GTNP would be closed. Current use consists mostly of local visitors, who could be displaced to the CDST into the Parkway and YNP, or to lands on the Bridger Teton National Forest. About 3,600 snowmobile visits or 45 daily visits could be displaced in this fashion.

Alternative C

- Similar to alternative B, this alternative would also result in a net 18.4% decrease in GYA visitation by nonresidents. In addition early season plowing from the North Entrance could displace about 1,600 visitors during February and 98 during March.
- For GTNP, plowing of the Moose-Wilson Road and Antelope Flats Roads would appear to displace existing negligible use to within the park only. It would be shifted to the proposed east side snowmobile trail.

Alternative D

- The winter use survey asked a question about what the visitor would do if the YNP's East Entrance were closed to snowmobiling, and the road from Colter Bay to Flagg Ranch was not plowed. Based on the response, total visitation by winter visitors living outside the five-county area to the GYA would be reduced by 4.4%. This reduction is a net change. It takes into account visitors who said they would visit more often in this circumstance, and those who said they would visit the same, but shift their use to other areas of the GYA (e.g., from the parks to the national forests). Total visitation to GYA national parks and adjacent national forests by nonresidents could decrease by that amount. Visitation numbers are unavailable for national forests, but an across the board decrease of 4.4% could offset displacement of park use as estimated below (Ref. Economic impacts for alternative D). Overall, visitation in this alternative would be nearly the same as in alternative A, and very little displacement would occur.
- Considering a net decrease in use in GYA national parks and on adjacent national forest lands in this alternative, about 3,340 snowmobile visits are associated with visitors who enter the park from YNP's East Entrance. A total of about 40 snowmobile trips daily could

[48] The worst-case scenario indicated by the USFS is that the total snowmobile visitation at the West Entrance would be displaced to adjacent lands primarily in the Gallatin, Targhee or Beaverhead-Deerlodge National Forests west of YNP. The average annual visitation is about 56,000 snowmobile passengers through the West Entrance. This equates to an average daily number of snowmobile passengers over the season of about 620 distributed among the three forests.

be displaced to other available lands outside the park near Cody, Wyoming, such as the Beartooth Plateau, or to other available park gateways.[49]

- In this alternative, interior roads of GTNP would be closed. Current use consists mostly of local visitors who could be displaced to the CDST into the Parkway and YNP or to lands on the Bridger Teton National Forest. About 3,600 snowmobile visits or 45 daily visits could be displaced in this fashion.

Alternative E

- Foreseeable use distribution for YNP would be the same as in alternative A, with no net change in visitation to the GYA and no displacement to national forests (Ref. Economic impacts for alternative E).
- In this alternative, interior roads of GTNP would be closed. Current use consists mostly of local visitors, who could be displaced to the Parkway north of Flagg Ranch and YNP, or to lands on the Bridger Teton National Forest. About 3,600 snowmobile visits or 45 daily visits could be displaced in this fashion.[50]
- The CDST trail would be closed through the park. A CDST shuttle service would be provided. Snowmobiling would be allowed only on the Grassy Lake road and north of Flagg Ranch. Most of the use that currently exists on this segment is in transit to Flagg Ranch and YNP's South Entrance. Since this opportunity would remain via shuttle or personal vehicle, none of this use is expected to be displaced to adjacent lands.

Alternative F

- Based on survey responses of current winter visitors about what the visitor would do if the roads from the West and North Entrances to Madison and Old Faithful were closed during the winter, total visitation to the GYA by those who live outside the five-county area would be reduced by 24.6%. Nonresident visitors account for about 80% of park visitation. This reduction is a net change. It takes into account visitors who said they would visit more often in this circumstance, and those who said they would visit the same, but shift their use to other areas of the GYA (e.g., from the parks to the national forests). This means that total visitation to GYA national parks and to adjacent national forests by nonresidents could decrease by that amount. Visitation numbers are unavailable for national forests, but an across the board decrease of 24.6% could offset or exceed displacement of park use as estimated below (Ref. Economic impacts for alternative F).
- Considering a net decrease in use in GYA national parks and on adjacent national forest lands in this alternative, about 4,000 snowmobile trips into the parks annually are associated with visitors who indicate they would visit in the GYA the same amount, but would go to other destinations. A total of about 50 snowmobile trips daily could be displaced to other available lands outside the park near West Yellowstone, near Gardiner, other available areas in the parks, or other adjacent lands. This would be in addition to resident visitors (accounting for about 20% of park visitation) who currently recreate on adjacent lands.[51]
- In this alternative, interior roads of GTNP would be closed. Current use consists mostly of local visitors, who could be displaced to the Parkway north of Flagg Ranch and YNP, or to lands on the Bridger Teton National Forest. About 3,600 snowmobile visits or 45 daily visits could be displaced in this fashion.
- The CDST trail would be closed through the park. A CDST shuttle service would be provided. Snowmobiling would be allowed only on the Grassy Lake road and north of Flagg Ranch. Most of the use that currently exists on this segment is in transit to Flagg Ranch and YNP's South Entrance. Since this opportunity would remain via shuttle or personal vehicle, none of this use is expected to be displaced to adjacent lands.

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[49] This would correspond with the Forest Service worst-case scenario.
[50] This would correspond with the Forest Service worst-case scenario.
[51] According to the USFS, the worst-case scenario is that the total snowmobile visitation at the West and North Entrances would be displaced to adjacent lands in all the GYA National Forests. The average annual visitation is about 57,500 snowmobile passengers through the West Entrance. This equates to an average of about 675 snowmobile passengers a day to be distributed among the forests throughout the season.

Alternative G

- Based on survey responses of current winter visitors about what the visitor would do if the parks open for snowcoach access only, total visitation to the GYA by those who live outside the five-county area would be reduced by 33.4%. Nonresident visitors account for about 80% of park visitation. Nearly 60% of the visitors who snowmobiled on their trip said they would visit the GYA less frequently. The 33.4% reduction is a net change. It takes into account visitors who said they would visit more often in this circumstance, and those who said they would visit the same, but shift their use to other areas of the GYA (e.g., from the parks to the national forests). This means that total visitation to GYA national parks and adjacent national forests by nonresidents could decrease by that amount. Visitation numbers are unavailable for national forests, but an across the board decrease of 33.4% could offset or exceed displacement of park use as estimated below (Ref. Economic impacts for alternative G).
- Considering a net decrease in use in GYA national parks and on adjacent national forest lands in this alternative, about 5,230 snowmobile trips (into the parks annually) are associated with visitors who indicate they would visit in the GYA the same amount, but would go to other destinations. A total of about 65 snowmobile trips daily could be displaced to other available lands outside the parks near all gateways. This would be in addition to resident visitors (accounting for about 20% of park visitation) who currently recreate on adjacent lands.[52]

Direct and Indirect Impacts on National Forest Lands

As described in the Chapter III, 51% of the GYA is in the national forest system. About 95% of the perimeter of the three parks abuts national forest lands. A high percentage of the national forest system along this common boundary is in congressionally designated wilderness, and inventoried or other roadless areas. There may be potential impacts to wilderness and inventoried or other roadless areas from programmatic changes in national park management that displaces oversnow motorized use.

Changes in management of the three parks that affect access by personal snowmobile could result in changes in use on adjacent public lands, particularly national forest lands. These lands are already heavily used by snowmobilers, and a number of existing and potential conflicts relating to this use have been identified (GYCC 1999). The USFS indicates that use is generally increasing on forest lands. From the standpoint of the three parks, changes in recreation use on national forests would be an indirect effect of various alternatives for park management.[53] Impacts on national forest lands, wildlife, air, water, or other resources from displaced recreation use are further removed from the source of change. The difficulty in addressing these indirect and tertiary effects is that the impacts associated with possible management changes in the parks are indistinguishable from the impacts of currently increasing use on national forest lands. The most reasonable approach is to consider increased use in the context of cumulative impacts because the magnitude and type of impact from increased use is additive to the amount and type of

[52] According to the USFS, the worst-case scenario is that the total snowmobile visitation in the three park units would be displaced to adjacent lands on all GYA national forests. The average annual visitation is about 84,000 snowmobile passengers through all Yellowstone entrances and within Grand Teton. This equates to an average of about 1,000 snowmobile passengers distributed among the forests throughout the season.
[53] Indirect effect is defined as an effect removed in time or space from the activity that causes the impact.

impact from current snowmobile use. The USFS has not identified any other impact sources, other than displaced winter visitors (snowmobiling and skiing), that would add cumulatively to impacts on USFS lands adjacent to the parks.

Effects Common to all Alternatives

Impacts on the national forests likely would be initiated by a change in the pattern, distribution, or amount of winter recreational use within the parks. The primary indirect effect on the national forest would be a redistribution of the type, amount, and location of use on adjacent forest lands. Other indirect effects may occur on wildlife, recreation special use permittees, recreation quality, facility use, or program administration.

If "clean and quiet" motorized technology were required for parks, decreased sound or emissions could occur on national forests as well. All alternatives except A and C provide for some improvement in technology. The effects of new emission and noise standards for oversnow vehicles could result in cleaner and quieter snowmachines on nearby national forest lands. However, machines that do not meet the new emission and noise standards are likely to continue operating on adjacent national forests, especially on lands more distant from national park entrances, such as those near Lander, Dubois, or Pinedale, Wyoming. Limiting backcountry use in the parks may increase this type of winter use on national forests.

Potential Effects of Recreation Use Displacement on National Forest Lands

Alternative A

The best information source about existing use on National Forests is the 1999 Multi-agency Assessment of Winter Visitor Use. The following descriptions for each GYA forest are based on that assessment.[54]

Beaverhead-Deerlodge National Forest. The Beaverhead Deerlodge NF identified nine areas of conflict involving winter use activities.[55] The major issues relate to heavy use by snowmobiles resulting in crowding (conflicts between snowmobilers), and in displacement of skiers following conflict between those two user groups. Other issues include use of elk winter range, nesting eagles, grizzly bears, wolverines, and motorized trespass. The areas of conflict are shown on a map in the Winter Visitor Use Assessment (GYCC 1999). The forest also notes that there are extensive areas offering backcountry snowmobiling at very low to moderate use levels. Increasing motorized use levels have displaced or are displacing nonmotorized users from the area. This is particularly evident in more easily accessed day-use areas by people engaged in nonmotorized recreation activities.[56] An estimate of total snowmobile use on the forest is unavailable at this time.

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[54] A current analysis of existing conditions or impacts from winter use on national forest system lands, including use statistics, is not available. Such information would be important in gauging the impact associated with potential changes in recreation use resulting from the alternatives, using alternative A as the baseline condition.

[55] Greater Yellowstone Coordinating Committee (GYCC), *Winter Visitor Use Management: A Multi-agency Assessment*. 1999. Pages 33-34.

[56] Ibid. Appendix E.

Bridger-Teton National Forest. The Bridge-Teton NF identified 24 areas of conflict involving winter use activities.[57] The major issues relate to heavy use by snowmobiles and cross-country skiers competing for trailhead space and suitable experiences, especially in front country areas. The Shadow Mountain area balances motorized and nonmotorized use precariously, such that any change on the east side of GTNP would disrupt management. This is characterized as conflicts between users (crowding), as well as between user groups. In the latter instance, displacement of skiers follows conflict between motorized and nonmotorized users. In many of the identified issue areas, conflicts are also identified with wintering ungulates, primarily elk and moose. The areas of conflict are detailed and shown on a map in the Winter Visitor Use Assessment. The forest also notes that extensive backcountry areas offer powder, uncrowded play areas, and excellent opportunities for expert snowmobilers and skiers. On many routes, motorized and nonmotorized uses coexist without problems, but concerns exist with routes as crowding increases. The forest notes that there are places where additional parking could be provided to access available terrain and disperse existing use. Use trends indicate that winter recreation is on the increase everywhere on the forest.[58] An estimate of total snowmobile use on the forest is unavailable at this time.

Caribou-Targhee National Forests. Because activity in the sport is increasing, motorized winter use is expected to increase. The annual change is expected to be a 4% to 6% increase based on industry growth rates. There are potential effects on grizzly bears and lynx from increased use. This may require future analysis and consultation by the Targhee NF on specific use areas. In the 1999 assessment the Targhee NF identified 16 areas of conflict involving winter use activities.[59] The major issues relate to heavy use by snowmobiles, resulting in crowding, accidents, impacts on wildlife, and associated with trespass into wilderness or wildlife closures. The areas of conflict are shown on a map in the Winter Visitor Use Assessment (GYCC 1999). The forest also notes that, in the past, the unequal distribution of uses has led to some displacement of nonmotorized users by motorized users. Increased use in all areas has led to conflicts between users. Those wishing a less crowded setting have been pushed further from trailheads and other facilities to find the experiences they are seeking.[60] The Targhee NF estimates current snowmobile use, in concert with Fremont County, Idaho, to be about 300,000 snowmobiler days each year.

Custer National Forest. The Custer NF identified one area of conflict involving winter use activities.[61] This issue concerns wilderness trespass by snowmobiles, and is shown on a map in the Winter Visitor Use Assessment (GYCC 1999). The forest also notes that there are limited opportunities for oversnow motorized use due to difficult access, and low or unreliable snow conditions in most years.[62] It could be assumed that there are

[57] Ibid. Appendix E.
[58] Ibid. Pages 34-35.
[59] Ibid. Appendix E.
[60] Ibid. Pages 41-42.
[61] Ibid. Appendix E.
[62] Ibid. Page 37.

insufficient opportunities on the Custer NF to provide an attraction for displaced use. An estimate of total snowmobile use on the forest is unavailable at this time. However, the forest indicates that snowmobile use in the Cooke City area, the open basin near Crown Butte, is less than 30,000 annually.

Gallatin National Forest. The Gallatin NF identified 24 areas of conflict involving winter use activities.[63] Similar to the Bridger-Teton NF, the major issues relate to heavy use by snowmobiles and nonmotorized uses competing for trailhead space and suitable experiences along trails and routes, and in open areas. This is characterized as conflicts between users (crowding) as well as between user groups. Displacement of skiers often follows conflict between motorized and nonmotorized users. In many of the identified issue areas, conflicts are also identified with wintering ungulates, primarily elk. Several areas are noted for potential conflicts with grizzly bears and eagles. Some areas are characterized by wilderness trespass or entering wildlife closures by motorized vehicles. The areas of conflict are shown on a map in the Winter Visitor Use Assessment (GYCC 1999). The forest also notes the need for change to provide a fairer mix of nonmotorized uses where that category is in short supply or difficult for the public to access. The needed management strategy is to maintain the quality of motorized opportunities while protecting neighboring nonmotorized areas, wintering wildlife, and wilderness as use continues to grow.[64] The Gallatin NF provides estimates of snowmobile use on the Hebgen Lake District and out of Cooke City at an average of 154,840 visitor days from 1995 to 1998.

Shoshone National Forest. The Shoshone NF notes that there is continued growth in motorized winter use on the forest. Continued use conflicts related to snowmobiles are as described in the Winter Visitor Use Assessment, accompanied by a continued need to deal with conflicts using a variety of methods described therein. In the assessment the forest identified 24 areas of conflict involving winter use activities.[65] A variety of types of conflicts are presented, most of which are described as of low to moderate intensity. High levels of conflict are identified for Togwotee Pass and Brooks Lake involving skiers and snowmobilers, crowding, safety, and wildlife impacts. The areas of conflict are shown on a map in the Winter Visitor Use Assessment (GYCC 1999). The forest also notes the need to manage growth in winter motorized use, and the demand for new groomed or upgraded motorized trails (wider groomed surfaces). The forest states that it could accommodate this need by grooming presently marked, ungroomed routes, or by creating new routes in areas presently available for backcountry motorized experiences.[66] An estimate of total snowmobile use on the forest is unavailable at this time.

[63] Ibid. Appendix E.
[64] Ibid. Pages 37-38.
[65] Ibid. Appendix E.
[66] Ibid. Page 40.

Alternative B

Impacts of this Alternative Noted as Common to all GYA National Forests. More stringent standards for snowmobile emissions and noise in the parks would displace non-complying snowmobiles to adjacent national forests in the short term. Long-term effects of more stringent standards might result in development of quieter, cleaner snowmobiles that would also be used on national forests.

Beaverhead-Deerlodge National Forest. The USFS indicates that increased use on the forest might have the following effects. The quality of the snowmobiling experience would be reduced for existing users who prefer a less-crowded experience. There could be an increased impact to trails with resulting reduction in quality of experience or the increased need for trail grooming. Increased pioneering into little used backcountry areas could have corresponding increased impacts on wildlife such as lynx, wolverines, and bald eagles. Increased impacts on wildlife might lead to restrictions on areas and seasons of winter recreation use. Increased conflict between and within recreation user groups could also occur.

However, nonresident visitor trips to the GYA are expected to decrease by 18.4% in this alternative, so the impacts of increased use would likely not be realized from any change in park management. The impacts of current local visitor use would be undiminished, or it may increase to the extent local visitors no longer access the park by snowmobile. The number of nonresidents who would no longer visit the area could more than offset the increase in use by residents for a net decrease in use. The ratio of resident to nonresident use currently experienced on the forest is not known. If nonresident use is a small percentage of total use, then very little change could be expected in comparison to the current condition.

Bridger-Teton National Forest. The USFS states that impacts would be the same as in alternative A. Given the scenario based on the winter use survey, nonresident visitation to the GYA could decrease by 18.4%. There is no definitive information about the ratio of nonresident snowmobilers to resident snowmobilers, but it is likely that a high percentage of use on the Bridger-Teton is from nonresidents. Therefore, in this alternative, use on the forest could decline with overall visitation.

Caribou-Targhee National Forests. The USFS states that the Targhee NF would experience more requests for outfitter and guide activities from operators in the West Yellowstone and Jackson, Wyoming areas in this alternative. USFS states that there would be an expected increase in use on some trails that are not presently heavily used; this could force crowding on all trails in Fremont County, Idaho. Increasing use would force a forest plan amendment to discuss additional use on lynx habitat. The forest would expect an increase in the amount of traffic, currently traveling from Utah to experience the park, to remain in the Island Park area. This would create a safety hazard due to narrow winding trails found on the forest. Increased use may also lead to requests

to modify trails as an accommodation. Some destination users for the park could visit Old Faithful and still snowmobile in the national forest as part of the overall experience.[67]

However, nonresident visitor trips to the GYA are expected to decrease by 18.4% in this alternative, so the impacts of increased use would likely not be realized from any change in park management. The impacts of current local visitor use would be undiminished, or it may increase to the extent local visitors no longer access the park by snowmobile. The number of nonresidents who would no longer visit the area could more than offset the increase in use by residents for a net decrease in use. The ratio of resident to nonresident use currently experienced on the forest is not known.

Custer National Forest. This alternative would minimally affect the Custer NF. While plowing the West Entrance access could cause a shift in nonresident usage, the Beartooth area or other parts of the Custer would be minimally affected. Since much of the current use is from the resident population, use would not be expected to increase or decrease significantly.

Gallatin National Forest. The Gallatin NF states that effects could be substantial, creating potential impacts to wintering big game, threatened and endangered species, and exacerbating already growing recreation health and safety issues, trespass into closed areas, taxing existing infrastructure and heightening recreation user conflicts. However, nonresident visitor trips to the GYA are expected to decrease by 18.4% in this alternative, so the impacts of increased use would likely not be realized from any change in park management. The impacts of current local visitor use would be undiminished, or it may increase to the extent local visitors no longer access the park by snowmobile. The number of nonresidents who would no longer visit the area could more than offset the increase in use by residents for a net decrease in use. The ratio of resident to nonresident use currently experienced on the forest is not known.[68]

Shoshone National Forest. Nonresident visitor trips to the GYA are expected to decrease by 18.4% in this alternative, so the impacts of increased use would likely not be realized from any change in park management. The impacts of current local visitor use would be unchanged because access to the parks from the Shoshone NF would not change. That is, access would remain through YNP's East Entrance, the CDST and YNP's South Entrance. The number of nonresidents who would no longer visit the area could more than offset the local redistribution of use by residents for an overall net decrease in use. There is a potential for users who could not use the West Entrance to come to the East Entrance instead. This redistribution would not affect forest lands. The potential for redistribution of nonresident use to the southern portion of the Shoshone NF,

[67] General public use of the plowed road by personal vehicle would not be available as part of this alternative.
[68] The worst-case scenario would be that in which all West Entrance snowmobile users would continue to come to the GYA but not enter the parks at any other gateway and use only adjacent lands. The average annual access by snowmobiles through the West Entrance is about 56,000 snowmobile passengers. Over a season, this equates to about 620 snowmobile passengers per day distributed possibly among the Gallatin, Targhee and Beaverhead-Deerlodge forests on the west side of Yellowstone.

thus increasing use on Togwotee Pass, is possible but not likely because of the overall decrease in use by nonresidents.[69] Should there be a local redistribution of this type, the effect would be to exacerbate the existing motorized use conflicts in that area which relate primarily to snowmobile crowding and displacement of nonmotorized users as shown in alternative A.

Alternative C

Impacts of this Alternative noted as common to all GYA Forests. Potential displacement of recreation use from the parks is very much the same as in alternative B. That is, an overall reduction of nonresident visitor use to the GYA of 18.4% is expected based on the survey of current winter visitors. The USFS states that in this alternative, the elimination of the loop route in YNP in mid-February (from an early season plowing) could inordinately affect the forests by displacing motorized use to them during times that are critical for wildlife (spring bear emergence, lynx, wolverines, nesting bald eagles, and moose winter range).[70] Any displaced use that causes local increases near denning habitat for bears may be of concern during both the winter and the spring use period.

Beaverhead-Deerlodge National Forest. Effects of increased use on the forest could be similar to those outlined for alternative B above.

Bridger-Teton National Forest. With respect to access into YNP and GTNP, this alternative is not materially different from alternative B the impacts as noted in that alternative would apply here as well. The USFS states that impacts would be the same as in alternative A. Considering the scenario based on the winter use survey, nonresident visitation to the GYA could decrease by 18.4%. There is no definitive information about the ratio of nonresident snowmobilers to resident snowmobilers, but it is likely that a high percentage of use on the Bridger-Teton NF is from nonresidents. Therefore, in this alternative, use on the forest could decline with overall visitation.

The major difference in this alternative from current management in GTNP is the proposed east side snowmobile trail between GTNP's south boundary and Moran. Use of this trail could affect existing nonmotorized uses on the national forest east of the park. However, existing access by passenger car to the Shadow Mountain trailhead would remain the same as at present to facilitate multiple use access to national forests from the park. Any significant use of the new snowmobile trail could displace cross-country skiers from the Shadow Mountain area, one of the most popular ski trails in Jackson Hole. The USFS states that this would not be compatible with forest objectives; the

[69] There is no quantified estimate of total use on Togwotee Pass. The worst-case scenario is that a portion of the 56000 annual snowmobile passengers no longer using the West Entrance would come to the Shoshone as well as the other west GYA forests, and not reenter the parks.

[70] NPS notes that there is no supporting information associated with this statement, and that it is a statement contributed generically by most of the GYA forests. Considering that there is no recent forest data regarding the current condition that would indicate any concern about present use on the forests regarding wolverines, eagles or lynx, there appears to be a suggestion that only use displaced from the parks is of concern. It should be noted that all forests also indicate that use is increasing on NF lands, such that without any changes in park management there would still be a concern about such impacts.

Bridger-Teton NF offers little opportunity for family skiing and easy terrain. Offered areas (Cache Creek, Shadow Mountain, a few other places) are also used increasingly by snowmobiles.

Caribou-Targhee National Forests. The Caribou-Targhee NF states that an increase in the amount of traffic that currently travels from Utah to experience the park would in this alternative (as in alternative B) remain in the Island Park area to continue the sport of snowmobiling. Should this happen, it would create a safety hazard due to narrow winding trails found on the forest. Increased use may also lead to requests to modify trails to accommodate increased use. Due to the plowing of the roads in the park from the north in the late season, an increase in the number of users from the eastern states would be expected. Access to the West Yellowstone and Island Park area becomes easier during the prime part of the season. With any local increase in use, the Ashton area of the Targhee NF could expect more snowmobile traffic over the Ashton Flagg Ranch road, past Mesa Falls to Island Park, as this would become the major access snowmobile route coming from the east and terminating in West Yellowstone. Increased use over the Flagg Ranch Road and expected late season snowmobile traffic coming through the park from the eastern states may have effects on lynx habitat. With increases in local use, the Targhee NF states that it could experience more requests for outfitter and guide activities from operators in the West Yellowstone and the Jackson Hole areas. Use would be expected to increase on some trails not presently heavily used. This could force all trails to be crowded in Fremont County, Idaho. Increasing use would force a forest plan amendment to discuss additional use on lynx and habitat.

Considering the scenario based on the winter use survey, nonresident visitation to the GYA could decrease by 18.4% and the potential impacts described above would not materialize since most are related to visitation from outside the GYA.

Custer National Forest. Impacts on the Custer NF would be the same as in alternative B, in which there is a negligible change from the current management situation.

Gallatin National Forest. The impacts of alternative C would be the same as those described in alternative B, with one exception. The USFS states that the late season plowing from Mammoth to Madison could locally displace use to the Cooke City vicinity. Given the scenario from the winter use survey responses, any such displacement would primarily affect resident snowmobilers. The overall reduction of nonresident visitors by 18.4% could offset any local redistribution of use.

Shoshone National Forest. Impacts on the Shoshone NF would be the same as in alternative B, in which there is a negligible change from the current management situation.

Alternative D

Beaverhead-Deerlodge National Forest. Since access to YNP from the north, west, and south do not change from current management in this alternative, there would be no

concerns about effects of increased use on the forest. The minimal amount of local redistribution of use from the closed East Entrance is not likely to be displaced to the Beaverhead-Deerlodge NF. The USFS states that prohibition of night use in the parks in this alternative could increase night use on the Beaverhead-Deerlodge NF. Night use in backcountry of the national forest would have a greater safety risk than night use on the well-groomed and marked trails of the parks.[71]

Bridger-Teton National Forest. Since access to YNP from the north, west, and south do not change from current management in this alternative, there would be no concerns about effects of increased use on the forest. The minimal amount of local redistribution of use from the closed East Entrance is not likely to be displaced to the Jackson, Wyoming area except for the small portion of it that relates to nonresident visitors. The USFS states a concern about redistribution of local skiing use by people who engage in that activity by wheeled-vehicle access along the Colter Bay to Flagg Ranch road segment. In this alternative, GTNP does not plow the road from Colter Bay to Flagg Ranch. However, most of GTNP would be available for nonmotorized use without motorized conflicts, and there are possibilities for facilitating nonmotorized use between Colter Bay and Flagg Ranch using snowmobile or snowcoach shuttle access. There is no expectation that any nonmotorized use would be displaced, or that it would be displaced to adjacent lands.[72]

Access via motorized means to private inholdings and adjacent private and public lands would be maintained along the eastern boundary of GTNP. For adjacent public lands, this applies primarily to those on the east side of the park including access to Shadow Mountain and access near the Triangle X Ranch. Maintenance of this access would not affect the balance of motorized and nonmotorized use in the Shadow Mountain area. See *Actions and Assumptions Common to All Alternatives* in this EIS.[73]

Caribou-Targhee National Forests. The USFS expects effects similar to the no action alternative covering numbers of users. Prohibition of night use in the parks could increase night use on the Island Park district, exacerbating existing problems.[74]

Custer National Forest. Closing the East Entrance could increase snowmobile use in the Beartooth and Cooke City areas. Topographic features and wind blown areas in the Beartooth Mountains on the Beartooth Ranger District currently limit the potential for

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[71] If night use presently occurs, and is a safety hazard, it is not reasonable to attribute this impact solely to possible changes in park management.
[72] The Forest Service states that most of the skiers in this area are coming from Jackson and their primary destinations in the Colter-Flagg area are Colter Bay/Hermitage Point, Flagg Canyon, Huckleberry and Polecat Hot Springs, and Huckleberry Mountain. Because the lookout and hot springs are primary destinations, these skiers don't have an alternative that would meet the same desires, so it's hard to say where they would be displaced to. If snowcoach transport were available and affordable, it would be possible to reach trailheads in the Flagg Ranch area for skiing, and a few people who own snowmobiles would still be able to access these areas.
[73] It was not made clear in the DEIS that such access would be maintained.
[74] If night use presently occurs, and is a safety hazard, it is not reasonable to attribute this impact solely to possible changes in park management.

even moderate increases in new snowmobile play use areas, however, use could increase along existing trails. To the extent that the East Entrance use comes from nonresident visitors, total visitation on the east side of YNP is most likely to decrease. This amount is some percentage of the average annual 3,340 snowmobile trips, or 40 daily trips. To the extent that this use is attributed to resident visitors, again something less than 40 daily trips, this amount could be displaced to the Beartooth area.

Increased use of something less than 40 snowmobile visits per day along existing trails in the Red Lodge and lower Stillwater River area, and especially in areas of the Custer NF adjacent to Cooke City would be expected. The headwaters of the Stillwater River on the Custer NF, near Cooke City would likely receive increased use, particularly the play area associated with the open grassland basin near Crown Butte. Should all use from the East Entrance be displaced to the Crown Butte area, with an estimated existing snowmobile use of 30,000 (or less) round trips per year in the basin, this would be an increase of just over 1%. This increase would be an upper bound on the estimate for reasons discussed above. Snowmobile use is restricted to non-wilderness areas. Wilderness trespass by snowmobile users is currently a problem that could increase with additional use in the area.

Gallatin National Forest. Since access to YNP from the north, west, and south do not change from current management in this alternative, there would be little concern about effects of increased use on the forest. The minimal amount of local redistribution of use from the closed East Entrance (less than 40 snowmobile trips per day on the average) could be displaced to the Cooke City area, where parking and grooming infrastructure is currently taxed. Additional use pressure at Cooke City could also exacerbate wilderness trespass issues that have grown substantially in recent years. Prohibition of night use in the parks could increase night use on Hebgen Lake district, exacerbating existing problems.

Shoshone National Forest. The USFS is concerned that this alternative could close Pahaska Lodge (located outside YNP's East Entrance) during the winters. Pahaska Lodge now has a considerable number of year-round employees, which allows it to maintain a stable and conscientious work force. Forcing this operation to a summer-only operation would cause considerable disruption for the owners and employees. The Pahaska-East Entrance is also the location of the majority of Park County's nordic skiing trail system. Pahaska gets the majority of its overnight use from snowmobilers, those starting at the East Entrance or those coming from the West Entrance to stay overnight and returning. Without snowmobiler overnight lodging or rentals, there is a high likelihood that the nordic opportunities in the Pahaska area would also close.

Lack of access through the East Entrance would likely displace a minimal amount (less than 40 snowmobile trips per day) of motorized use to Cooke City, Sunlight Basin, and the Beartooth Plateau, where conflicts presently exist or resource concerns have been identified. Some use could also be displaced to the Bighorn NF where motorized

recreation use has been increasing. It could also significantly affect the operation at Pahaska Tepee Lodge (snowmobile rentals and winter stays), and other North Fork lodges that have been gearing toward winter motorized use in recent years. East Entrance motorized use cannot be relocated to the national forest in areas presently accessible via these same lodge facilities due to the near presence of wilderness and the lack of suitable snow and terrain.

Alternative E

Impacts of this Alternative noted as common to all GYA Forests. The USFS states that there is a range of possible effects and outcomes associated with the adaptive management alternative, and that this presents a challenge for determining the possible effects on national forests.[75] Given there is a potential for management changes in this alternative due to adaptive management, the foreseeable impacts in alternative E would be the same as in alternative A for YNP. Management changes in GTNP are evident in the alternative description apart from possible future changes due to adaptive management.

Beaverhead-Deerlodge National Forest. The impacts would be the same as in alternative A. The effect of eliminating the CDST from GTNP's East Entrance to Flagg Ranch would not result in use redistribution that could affect the Beaverhead-Deerlodge NF.

Bridger-Teton National Forest. Foreseeable use distribution for YNP would be the same as in alternative A, with no net change in visitation to the GYA and no displacement to national forests (Ref. Economic impacts for alternative E).

The USFS expresses concerns about local displacement of recreation use from changes in motorized use opportunities within GTNP. In this alternative, interior roads of GTNP are closed. Current use consists mostly of local visitors, who could be displaced to the Parkway north of Flagg Ranch and Yellowstone, or to lands on the Bridger Teton NF. About 3,600 snowmobile visits or 45 daily visits could be displaced in this fashion.[76]

The CDST trail is closed through the park except for provided shuttle service; snowmobiling is allowed only on the Grassy Lake road and north of Flagg Ranch. Most of the use that currently exists on this segment is in transit to Flagg Ranch and YNP's South Entrance. Since this opportunity remains via shuttle or personal vehicle, none of this use is expected to be displaced to or remain on the Bridger-Teton NF. Average daily use on the CDST coming from GTNP's East Entrance is 24 snowmobiles (including round trip use). Peak day use is 43 machines. There is no available estimate of total or

[75] Some effects of this alternative would be disclosed by looking at effects in pieces of other alternatives. However, there may be other sensitive areas that could now be identified, or would arise through future monitoring where closures or other restrictions have not been anticipated. A worst-case assessment, shifting significant amounts of use to national forests, raises secondary issues such as ungulate habitat or T&E species, and burgeoning recreational user conflicts. The FS states that it is not sure what the consequences of this would be.
[76] This would correspond with the Forest Service worst-case scenario.

daily use on Togwotee Pass, but it is reasonable to assume that 24 snowmobile trips per day, should it remain on Togwotee, is not a significant percentage of daily use in that area.[77]

Caribou-Targhee National Forests. Conditions would be the same as in alternative A. Management in YNP is unchanged in the foreseeable future, and access through GTNP and into Flagg Ranch from the west would not change. Changes in visitation, up or down, are not anticipated, therefore, there would be no displacement effect to consider.

Custer National Forest. Conditions would be the same as in alternative A. Management in YNP is unchanged in the foreseeable future, and access through GTNP and into Flagg Ranch from the west would not affect the Custer NF. Changes in visitation, up or down, are not anticipated, therefore, there would be no displacement effect to consider.

Gallatin National Forest. Conditions would be the same as in alternative A. Management in YNP is unchanged in the foreseeable future, and access through GTNP and into Flagg Ranch from the west would not affect the Gallatin NF. Changes in visitation, up or down, are not anticipated, therefore, there would be no displacement effect to consider.

Shoshone National Forest. The forest notes no additional or specific impacts. See effects for the Bridger-Teton NF, in which the forest is concerned about possible increases in use on Togwotee Pass due to the closure of the CDST through GTNP.

Alternative F

Impacts of this Alternative noted as common to all GYA Forests. The USFS is concerned that if the parks close to dispersed backcountry use (except on designated routes) an inordinate effect on adjacent national forest wildlife habitat from displaced use could occur. They state that with presently limited access for that type of use on forests, except to areas that are generally closed for wildlife purposes, increased human-crucial winter range habitat conflicts and increased conflicts between user groups would be anticipated. Backcountry closures in alternative F for YNP could displace this type of use. NPS estimates displacement of backcountry nonmotorized use to be about 840 visitors per year. Based on the winter use survey results, about 5% of these users would or may continue to visit the GYA to engage in this use. In this alternative, using the survey assumptions, an estimated 42 skiers annually would be displaced to surrounding

[77] The FS is concerned about infrastructure (trailhead parking, restrooms, trail capacities) limitations on the Bridger Teton and Shoshone over Togwotee pass and in other locations. Trailheads are already full and people are parking on the highway margins. The FS is pursuing what opportunities exist to enlarge a few of the parking areas, but this won't meet the need if significant average amounts of use are displaced from the park to adjacent lands. FS believes that this alternative would force many Togwotee Pass users to stay on the forest rather than use a shuttle system to Flagg Ranch. FS states that users with their own machines or rentals would be more likely to use the forest in the Togwotee area, or drive to Flagg and start their park trip there. Because snow and trail conditions on the CDST in the park (especially around Moran) aren't very good, FS believes most users already use the forest because of better snow and more trails.

national forests or to GTNP, since backcountry use would not be restricted there in this alternative.

The USFS is concerned that if bison exit the park because of availability of groomed routes, and if those routes are no longer available to the west and north where much of the movement presently occurs, then there could be a significant movement of bison along south and east routes onto national forests. With reference to the analysis of alternative F on bison, most of the bison migration from YNP on the north and west does not occur on groomed routes. Therefore, eliminating groomed routes would have little if any impact on migration patterns.

Beaverhead-Deerlodge National Forest. The impacts of this alternative would not be greatly different from those shown in alternatives B and C, except that nonresident visitor trips to the GYA are expected to decrease by 24.6 % instead of 18.4% in this alternative. Given this assumption, the impacts of increased use would be even less likely from any change in park management.

Bridger-Teton National Forest. Nonresident visitor trips to the GYA are expected to decrease by a net 24.6% in this alternative, accounting for visitors who said they would shift their use to other areas in the GYA or would visit more. The impacts of current resident visitor use on the forest would be undiminished. The local redistribution of use by some nonresident snowmobilers who would continue to visit the GYA could continue to access the parks via the South or East Entrances. This could be offset by an overall decrease in nonresident visitor use to the area.[78] Local redistribution, using the winter survey results, show 50 snowmobile trips daily could remain in the West Yellowstone and Gardiner areas, or access the parks through the South and East Entrances. Considering total existing use in all areas, this would not be a significant displacement impact in the Jackson area or on the Bridger-Teton NF.

Caribou-Targhee National Forests. Snowmobile use on the national forest would be similar to alternatives B and C with implementation of this alternative. Nonresident visitor trips to the GYA are expected to decrease by a net 24.6% in this alternative, accounting for visitors who said they would shift their use to other areas in the GYA or would visit more. The impacts of current resident visitor use on the forest would be undiminished. Since much of visitation on this forest comes from nonresidents, it could be expected that the decrease in GYA nonresident visitation would be absorbed largely on the Targhee NF. Local redistribution, using the winter survey results, show 50 snowmobile trips daily could remain in the West Yellowstone and Gardiner areas, or access the parks through the South and East Entrances (via Flagg Ranch and Afton).

[78] FS is concerned that a great deal of additional use at South Entrance would engender additional use in the Moran-Togwotee area. The worst-case scenario involves about 675 daily snowmobile trips distributed to forest lands on the Gallatin, Targhee, Beaverhead-Deerlodge, or to the South and East Entrances of Yellowstone with ancillary use occurring on the Custer, Shoshone and Bridger-Teton.

Considering total existing use in all areas, this would not be a significant displacement of use to the Targhee NF, within the context of an overall decrease in nonresident use.

Custer National Forest. Snowmobile use on the national forest would be similar to alternatives B and C with implementation of this alternative. Nonresident visitor trips to the GYA are expected to decrease by a net 24.6% in this alternative, accounting for visitors who said they would shift their use to other areas in the GYA or would visit more. The impacts of current resident visitor use on the forest would be undiminished. Local redistribution, using the winter survey results, show 50 snowmobile trips daily could remain in the West Yellowstone and Gardiner areas, or access the parks through the South and East Entrances. Considering total existing use in all areas, this would not be a significant displacement of use to the Custer in the Beartooth and Cooke City areas.

Increased use of something less than 50 snowmobile visits per day in areas of the Custer NF adjacent to Cooke City would be expected. The headwaters of the Stillwater River on the Custer NF, near Cooke City would likely receive increased use, particularly the play area associated with the open grassland basin near Crown Butte. Should all use from the North and West Entrances be displaced to the Crown Butte area, with an estimated existing snowmobile use of 30,000 (or less) round trips per year in the basin, this would be an increase of between 1% and 2%. This increase would be an upper bound on the estimate since nonresident use is more likely to decrease or go elsewhere in the GYA. Snowmobile use is restricted to non-wilderness areas. Wilderness trespass by snowmobile users is currently a problem that could increase with additional use in the area.

Gallatin National Forest. Snowmobile use on the national forest would be similar to alternatives B and C, except that nonresident visitor trips to the GYA would be expected to decrease by a net 24.6% in this alternative instead of 18.4%. This would be a net reduction, accounting for visitors who said they would shift their use to other areas in the GYA or would visit more. The impacts of current resident visitor use on the forest would be undiminished. Local redistribution, using the winter survey results, show 50 snowmobile trips daily could remain in the West Yellowstone and Gardiner areas, or access the parks through the South and East Entrances. Considering total existing use in all areas, and the overall decrease in nonresident visits to the GYA, this would not result in a significant displacement of use to the Gallatin NF. If the displaced use were to come to the Cooke City area of the Gallatin, it would represent less than 1% of the estimated 45,000 to 60,000 snowmobiles that annually use the area.[79]

[79] Source: Ron Gardner, and Kimberly Schlenker, Gallatin N. F., April 6, 2000. FS is concerned that a great deal of additional use would be displaced to the Gallatin. The worst-case scenario involves about 675 daily snowmobile trips distributed to forest lands on the Gallatin, Targhee, Beaverhead-Deerlodge, or to the South and East Entrances of Yellowstone. FS states that on the Gallatin, human-crucial winter range habitat conflicts could be anticipated, with potential impacts to wintering big game, T&E species, and exacerbating already growing recreation health and safety issues, trespass into closed areas, taxing existing infrastructure and increasing recreation user conflicts.

Shoshone National Forest. Nonresident visitor trips to the GYA are expected to decrease by 24.6% in this alternative, so the impacts of increased use would likely not be realized from any change in park management. The impacts of current local visitor use would be unchanged because access to the parks from the Shoshone NF would not change. Access would remain through YNP's South and East Entrances. The number of nonresidents who would no longer visit the area could more than offset the local redistribution of use by residents for an overall net decrease in use. There is a potential for users who could not use the West and North Entrances to come to the East Entrance instead. This redistribution would not be expected to affect forest lands due to the lack of available snowmobiling adjacent to it. The potential for redistribution of nonresident use to the southern area of the Shoshone NF, increasing use on Togwotee Pass, is possible but not likely because of the overall decrease in use by nonresidents.[80] Should there be a local redistribution of this type, the effect would be to exacerbate the existing motorized use conflicts in that area which relate primarily to snowmobile crowding and displacement of nonmotorized users as shown in alternative A.

Alternative G

Impacts of this Alternative noted as common to all GYA National Forests. An overall reduction of nonresident visitor use to the GYA of 33.4% is expected based on the survey of current winter visitors. This percent reduction is a net change. It takes into account visitors who said they would visit more often in this circumstance, and those who said they would visit the same, but shift their use to other areas of the GYA (e.g., from the parks to the national forests). This means that total visitation to GYA national parks and to adjacent national forests by nonresidents could decrease by that amount. Visitation numbers are unavailable for national forests, but an across the board decrease of 33.4% could offset or exceed local displacement of park use. Within the context of an overall decrease in nonresident use, there could be a redistribution of those nonresident visitors who continue to come to the GYA. Based on survey results, this amounts to about 65 snowmobile trips daily distributed among all the GYA forests. Considering total existing use on GYA forests, this amount would appear to be insignificant.

The USFS is concerned that increased use on forests as a result of displaced park use could inordinately affect the forests in areas and during times that are critical for wildlife (spring bear emergence, lynx, wolverines, nesting bald eagles, moose winter range).[81]

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[80] There is no quantified estimate of total use on Togwotee Pass. The worst-case scenario is that a portion of the 56,000 annual snowmobile passengers no longer using the West Entrance would come to the Shoshone as well as the other west GYA forests, and not reenter the parks.

[81] Considering that there is no recent forest data regarding the current condition that would indicate any concern about present use on the forests regarding wolverines, eagles or lynx, there appears to be a suggestion that only use displaced from the parks is of concern. It should be noted that all forests also indicate that use is increasing on NF lands, such that without any changes in park management there would still be a concern about such impacts.

Any displaced use that causes local increases near denning habitat for bears may be of concern during both the season and the spring use period.[82]

Beaverhead-Deerlodge National Forest. An overall decrease of 33.4% in nonresident use of both park and forest lands in the GYA is expected based on the survey of current winter visitors. In this event, there would be no net increase in use of the forest, and quite possibly a decrease. The amount of use associated with local residents would remain, or increase to the extent it no longer occurs in the parks.

Bridger-Teton National Forest. The USFS states that permittees on the Bridger-Teton NF with snowmobile use have already asked about additional use days for the CDST and other trails near Togwotee (where use is at capacity now). Requests have been received from outfitters who currently don't use that area but are looking for someplace to take clients if their use in YNP is curtailed. The forest is apparently over capacity in winter sports now in the Togwotee area, the Gros Ventre, and upper Green River. Places used less frequently a few years ago, such as Horse Creek in the Wyoming Range and the Greys River, are under increasing demand. Even without any management changes in the parks, use levels that are compatible with the desired experience and setting are being surpassed.

An overall decrease of 33.4% in nonresident use of both park and forest lands in the GYA is expected, based on the survey of current winter visitors. In this event, there would be no net increase in use of the forest, and quite possibly a decrease thus relieving the current impacts stated by the USFS. The amount of use associated with local residents would remain, or increase to the extent it no longer would occur in the parks.

Caribou-Targhee National Forests. The Targhee NF states concerns about an increase in users and their expectation for groomed trail riding experiences. There are concerns about possible increased demand for outfitted rides and about an increase in the displacement of off trail users that currently access the area from the south and east. The USFS states that users would stop in the Ashton-Island Park area to access the backcountry rather than travel to West Yellowstone. Other increases in use could result from people coming to the area for experiences similar to those currently available in the park.

An overall decrease of 33.4% in nonresident use of both park and forest lands in the GYA is expected, based on the survey of current winter visitors. In this event, there would be no net increase in use of the forest, and quite possibly a decrease thus relieving the current impacts stated by the USFS. The amount of use associated with local residents would remain, or increase to the extent it no longer would occur in the parks.

[82] The worst-case scenario indicated by the Forest Service is that the total snowmobile visitation in the three park units would be displaced to adjacent lands on all GYA national forests. The average annual visitation is about 84,000 snowmobile passengers through the all Yellowstone entrances and within Grand Teton. This equates to an average daily number of snowmobile passengers over the season of about 1000 to be distributed among the forests. Visitation data for all the forests is unavailable for comparison purposes.

Custer National Forest. The USFS states that additional vehicles associated with snowmobile users would likely be parked at trailhead locations and create increased demands for parking facilities. Some additional car and truck traffic would occur along plowed roads to trail heads. Many of these trails traverse big game winter range and some additional vehicle-large animal collisions could occur. The period of snowmelt is expected to increase by an additional 10 to 14 days on roads on which the snow is compacted by snowmobiles versus areas where no snow compaction occurs. Also, the forest is concerned that the Pryor Mountains could receive some additional use by snowmobiles. Most use would be expected to follow existing trails or occur in existing play areas. Displaced snowmobile activity would not be expected to go to the Ashland or Sioux Ranger Districts.

An overall decrease of 33.4% in nonresident use of both park and forest lands in the GYA is expected, based on the survey of current winter visitors. In this event, there would be no net increase in use of the forest, and quite possibly a decrease thus relieving or offsetting impacts of concern to the USFS noted above. The amount of use associated with local residents would remain, or increase to the extent it no longer would occur in the parks.

Gallatin National Forest. Effects of large amounts of use displaced to the forest could be substantial: creating potential impacts to wintering big game and threatened and endangered species; exacerbating already growing recreation health and safety issues and trespass into closed areas; taxing existing infrastructure; and heightening recreation user conflicts.

An overall decrease of 33.4% in nonresident use of both park and forest lands in the GYA is expected, based on the survey of current winter visitors. In this event, there would be no net increase in use of the forest, and quite possibly a decrease thus relieving or offsetting impacts of concern to the USFS noted above. The amount of use associated with local residents would remain, or increase to the extent it no longer would occur in the parks.

Shoshone National Forest. The USFS is concerned that this alternative could close Pahaska Lodge (located outside YNP's East Entrance) during the winters. Pahaska Lodge now has a considerable number of year-around employees, which allows it to maintain a stable and conscientious work force. Forcing this operation to a summer-only operation would cause considerable disruption for the owners and employees. The Pahaska/East Entrance is also the location of the majority of Park County's nordic skiing trail system. Pahaska gets the majority of its overnight use from snowmobilers, those starting at the East Entrance or those coming from the West Entrance to stay overnight and returning. Without snowmobiler overnight lodging or rentals, there is a high likelihood that the Nordic opportunities in the Pahaska area would also close.

The Shoshone NF is also concerned that use on Togwotee Pass and the CDST area would greatly increase. Increased use would exceed current infrastructure capacity (see Bridger-Teton NF alternative G discussion) and exacerbate current identified conditions of crowding and nonmotorized use displacement. Reconstructing or creating additional facility capacity would be an extreme and unfinanced burden for the USFS.

A decrease of 33.4% in nonresident use of both park and forest lands in the GYA is expected, based on the survey of current winter visitors. In this event there would be no net increase in the use of the forest, and possibly a decrease thus relieving or offsetting impacts of concern to the USFS. The amount of use associated with local residents would remain, or increase to the extent that it no longer would occur in the parks. The USFS indicates there would be a strong potential for increased snowmobile use on the Bighorn NF.

Effects on Other Federal Lands

As described in the Chapter III, 5% of the GYA within other federal agency jurisdictions (BLM, USFWS, and Bureau of Reclamation(BOR)). Lands under these jurisdictions typically are not adjacent to the national parks. The potential impacts of programmatic changes in national park management are low. Jurisdictional BOR lands associated with Jackson Lake and Jackson Lake Dam would not be affected in any alternative more than now. Alternatives that reduce or eliminate motorized use on Jackson Lake would be beneficial from the standpoint of reducing any present impacts on BOR lands. The National Elk Refuge abuts GTNP along its southeastern boundary. Because of the timing of elk migration in the winter use season, none of the alternatives would have an adverse impact greater than that which presently may exist. Current snowmobile use in the GYA occurs on some BLM lands, for example, in places along the CDST. Most BLM lands lie outside the areas that are capable of annually supporting snowmobile use because of unsuitable snow. Changes in management represented by the range of alternatives in this EIS would not affect marginally available snowmobiling on BLM lands. Generally, any impacts on the national forests (should they occur) would buffer effects on other federal lands, which do not have the capability to support great amounts of winter recreation on snow.

Effects on Tribal Lands and Governments

As described in the Chapter III, 4% of the GYA is within the jurisdiction of tribal or American Indian governments. These lands are not immediately adjacent to the national parks, and they are not legally accessible to the general public. The potential for physical impacts on changes in national park management are low. These lands would not be subject to any redistribution of use, nor would they appear to be indirectly affected by possible impacts on national forests. Generally, impacts on the forests would buffer effects, if any, on tribal lands or governments.

Direct and Indirect Effects on States and Counties

As described in the Chapter III, 3% of the GYA is state-owned lands. Some Montana state land sections are intermingled with Gallatin NF lands north of YNP. See *Effects on the State of Montana* below. Five counties are affected through gateway communities for the three park units. In the area described as the GYA, 24% is in private ownership. However, very little of that private land directly abuts YNP, GTNP, or the Parkway. Private inholdings constitute less than 1% of the GTNP land base. Most of the private lands lie within the exterior boundaries of adjacent national forests in areas that are marginally suited for oversnow motorized use. As such, they would not directly or indirectly be affected by any of the alternatives being considered. Through the scoping period, and in the large volume of comments on the DEIS, no concerns or issues were raised about possible impacts on private lands.

Effects on the State of Wyoming

There would be no impacts on state lands or private lands in Wyoming adjacent to the parks. The NPS determined that there would be no impacts on these lands based on the best available information about how overall use from nonresident visitors to the GYA would either remain the same or decline through the range of alternatives. Any state or private land near winter uses would have similar or less pressure. No such effects were identified by the State of Wyoming.

Alternative A

The State of Wyoming identified no impacts associated with alternative A. The NPS notes that a number of statements made regarding air, water, and wildlife apply to the existing condition, not to what may happen as a result of other alternatives.

Alternative B

Water Quality. The State notes that any alternative involving an increase in road use and maintenance in the parks could affect surface waters during spring runoff. The State further notes that the parks should consider impacts to surface waters due to plowing, sanding, or improper snow removal, and that snow storage sites should be carefully sited so that seepage and runoff do not go directly into surface or ground water. Storage areas should be engineered to capture pollutants in melt water. These observations apply basically to water quality within the parks, which is evaluated in the water quality section for each alternative. The State does not express concern about impacts on waters of the

State outside the parks. Given the State's concern regarding the content of plowed, stored snow, and its potential to affect runoff, there is equal concern regarding pollutants from oversnow vehicles in the stored, compacted snow on groomed surfaces. Miles of groomed surfaces are immediately adjacent to surface waters, as reflected in the risk analysis for each alternative under water resources.

Air Quality. The State notes that the proposed snowmobile emission threshold may not be achievable. If it is not, the State also says, the result could be the total elimination of snowmobiles from the parks, as we know them today by 2008-2009. The NPS asserts that this is not a statement of effects on air quality, but rather on the willingness of industry and State to acknowledge there is a problem. The State expresses no concern about air quality impacts in the park because there are no documented violations of State pollution standards. The Park Service's assessment is that the intent of this alternative to improve air quality in the parks would improve air quality in the State.

Wildlife. The State does not expect a "significant" effect on wildlife management east of YNP since population sizes of bison and elk within the park are more of a factor than is accounted for by winter use planning. Both motorized and nonmotorized winter recreation are of concern in the Jackson area. Impacts within GTNP are discussed in the wildlife section for each alternative. The State suggests additional closures be applied. The State also notes that elimination of snowmobiles on Jackson Lake would unjustly limit recreational fishing on the lake. The NPS notes that this action would also eliminate a source of pollution that would go directly into surface water, and that access for fishermen would still be allowed by other means.

Recreation. In its written comments, the State of Wyoming provided an assessment of impacts on snowmobile recreation in the park. The NPS, as the manager for this use in national parks, has performed this assessment and disclosed the consequences under *Visitor Access and Experience* for alternative B, in Chapter IV. No impacts have been identified for State lands in Wyoming, or private lands in Wyoming adjacent to the parks.

Economics. Economic impacts on the State of Wyoming are considered and disclosed in *Economic Effects*, Chapter IV.

Alternative C

Water Quality. Potential impacts expressed by the State are the same as in alternative B.

Air Quality. No impacts were identified by the State, other than a positive effect with the proposed reduction in snowmobile emissions. The NPS assumes that this statement is based on the requirement for the use of bio-based fuels. However, in many respects, alternative C is similar to alternative B, so impacts noted for that alternative by the State also apply to this alternative.

Wildlife. The State does not expect a "significant" effect on wildlife management to the east of YNP since population sizes of bison and elk within the park are more of a factor than is accounted for by winter use planning. The State notes that both motorized and nonmotorized winter recreation are of concern in the Jackson area. Impacts within GTNP are discussed in the *Wildlife* section for each alternative. The State suggests additional closures be applied to areas where nonmotorized activities occur.

Recreation. The State notes that plowing the road from West Yellowstone to Old Faithful will cause a loss of opportunity for overnight stays in West Yellowstone by individual and commercial users from the South, North, and East Entrances. A number of other impacts within the park are disclosed in the *Visitor Access and Experience* section for alternative C. No impacts have been identified for State lands in Wyoming, or private lands in Wyoming adjacent to the parks.

Economics. Economic impacts on the State of Wyoming are considered and disclosed in the *Economic Effects* section of the EIS.

Alternative D

Water Quality. Potential impacts expressed by the State are the same as in alternative B.

Air Quality. Potential impacts expressed by the State are the same as in alternative B.

Wildlife. Potential impacts expressed by the State are the same as in alternative B.

Recreation. The State notes that closure of the East Entrance of YNP would adversely affect motorized recreation opportunities in northwest Wyoming as most of other lands within the snowbelt are designated wilderness and therefore off-limits. NPS use figures indicate that this would affect an average of 36 snowmobiler days, and peak day usage of 64. Not only are many areas unavailable on the Shoshone NF because they are in wilderness, they are also unavailable due to lack of reliable snow and prohibitive terrain. The Custer NF to the north is largely unused by snowmobiles for the same reasons. Other impacts noted by the State are disclosed in *Visitor Access and Experience* sections for alternative D, Chapter IV.

Economics. The State notes that Flagg Ranch would experience a significant negative impact. It also notes that the impact could be minimized or eliminated if the parks and the ranch could work together to convert Flagg Ranch to a destination site. With the Grassy Lake route, this could provide an improved interior experience for snowmobile users and facilitate a potential net gain in revenues. This is the expressed rationale of NPS in proposing such an alternative feature, along with other positive aspects. The NPS agrees that, like the current experience offered at Old Faithful, there is a special experience involved in access to destinations via oversnow means. Other economic impacts on the State of Wyoming are considered and disclosed in *Economic Effects*, Chapter IV.

Alternative E

Water Quality. Potential impacts expressed by the State are the same as in alternative B.

Air Quality. The State notes the likelihood of positive effects on air quality issues through establishment of an advisory committee. The NPS notes that this is a tacit agreement that air quality issues exist, but that they would not be addressed directly. The establishment of such a committee would not directly improve air quality.

Wildlife. Potential impacts expressed by the State are the same as in alternative B.

Recreation. The State notes that closure of the CDST would adversely affect motorized recreation opportunities in the western United States as the vast majority of other lands within the snowbelt is designated as wilderness and therefore off limits. The NPS disagrees with this assessment, as shown elsewhere in this document. The CDST in GTNP is used only marginally, and that is primarily for access into YNP. This opportunity remains, and a shuttle service would be provided to transport CDST users from the GTNP's east boundary to Flagg Ranch. The NPS agrees that the experience would be changed, but the opportunity remains. Other impacts noted by the State are disclosed in V*isitor Access and Experience* for alternative D, Chapter IV.

Economics. Economic impacts on the State of Wyoming are considered and disclosed in *Economic Effects,* Chapter IV.

Alternative F

Water Quality. Potential impacts expressed by the State are the same as in alternative B.

Air Quality. The State notes that there would be a positive effect on air quality by adopting new technology as it becomes available.

Wildlife. Potential impacts expressed by the State are the same as in alternative B.

Recreation. Many of the State's observations about recreation impacts are disclosed in *Visitor Access and Experience* for alternative F, Chapter IV. Other comments by the State follow. Closing the road from West Yellowstone to Old Faithful, Norris to Mammoth, and from Madison to Norris would cause a loss of capacity for overnight stays in West Yellowstone and at Mammoth by individual and commercial users from the South and East Entrances. Eliminating the CDST and Grassy Lake Road would adversely affect motorized recreation opportunity in Wyoming and GTNP, as well as in the western United States. These trails help link independent trail systems to create a unique snowmobile recreation opportunity unequaled west of the Mississippi River. This closure would destroy the connecting link to snowmobile trail systems in the states of Idaho and Montana. See previous alternative: alternatives E and F are the same for GTNP.

Economics. Economic impacts on the State of Wyoming are considered and disclosed in the *Economic Effects* section of the EIS.

Alternative G

Water Quality. Potential impacts expressed by the State are the same as in alternative B. The Park Service's assessment is that the risk of impacts to water quality would be decreased by eliminating a major source of pollution in the parks' snowpacks. See impacts in the *Water Resources* section for this alternative, Chapter IV.

Air Quality. The State notes that there would be a positive effect on air quality by allowing mass transit oversnow vehicles only.

Wildlife. Potential impacts expressed by the State are the same as in alternative B. Because of concerns expressed by the State, as discussed in Chapter III, recommended mitigation has been added into alternative F.

Recreation. The State notes that eliminating the snowmobile experience in the parks will greatly reduce recreation visitation. Also that eliminating the CDST would adversely affect motorized recreation opportunity in Wyoming and GTNP, as well as in the western United States. The results of the winter use survey indicate that nonresident winter visitation to the GYA would decrease by 33.4% in this alternative. Much of this visitation loss would be attributed to snowmobilers who would go elsewhere. The Park Service's assessment is that there would most likely be replacement visitation from a national market of people who would come to the GYA and recreate, partly owing to the new opportunities and experiences offered in the parks in this alternative.

Economics. Economic impacts on the State of Wyoming are considered and disclosed in *Economic Effects*, Chapter IV.

Effects on the State Of Montana

Alternative A

The State of Montana identified no impacts associated with alternative A. However, the State expresses concerns about effects for all alternatives as follows: "Montana Department of Fish, Wildlife and Parks owns important wildlife habitat in the heart of the Gallatin Canyon. These lands lie in a checkerboard arrangement with the Gallatin National Forest. Any of the alternatives that propose closing access to the park from West Yellowstone could lead to impacts on important and sensitive wildlife winter ranges in the Gallatin Canyon. These lands provide important winter habitat for elk, moose, and bison. These lands are primarily situated from the Gallatin Canyon park entrance north to the Porcupine drainage and also includes land in the Taylor Fork. Montana Department of Fish, Wildlife and Park's effectiveness in managing winter recreation is directly influenced by Gallatin National Forest management due to the checkerboard pattern." The NPS assumes that the State means closing access to snowmobiles, because access is provided from West Yellowstone in all alternatives but

alternative F. No impacts have been identified specifically for State lands or private lands in Idaho adjacent to the parks.

The NPS determines that there would be no significant impacts on other State or private lands. This is based on the best available information from the winter use survey about how overall use from nonresident visitors to the GYA would either remain the same or would decline through the range of alternatives. Any State or private land near winter uses would have the same or less pressure.

Alternative B

The State notes that under alternative B plowing the road from West Yellowstone to Old Faithful would be disruptive to West Yellowstone's local economy and established visitor service system. Based on field experience and trails program administration, the State foresees a scenario where the level of visitation in the West Yellowstone area by the snowmobiling public will remain level or increase regardless of whether alternative B is implemented. According to the State, several areas exist in which significant negative impacts are expected to occur outside the park as a result of implementing alternative B.[83]

Wildlife. The State notes that snowmobilers would likely be diverted to national forest lands surrounding the YNP and West Yellowstone. The State is concerned that elk winter range in the Hebgen and Taylor Fork areas, which have seen little or no use, would be significantly impacted if large numbers of snowmobilers were diverted away from the park and onto the adjacent national forest lands. These winter ranges are important to maintaining Montana's elk populations, and are more sensitive compared to the groomed road from West Yellowstone to Old Faithful. The Park Service's estimate of displaced use is given at the beginning of this section.

In this context the best information available indicates that use in the GYA would decline by 18.4% thus relieving pressures on adjacent lands. If this scenario occurs, there could be an economic impact as the State suggests (assuming no replacement visitation). However, if snowmobilers stay in West Yellowstone and use adjacent lands creating an inordinate impact on wildlife, then there would be no economic effect. The two hypotheses are not consistent.

The State indicates that the area north of Hebgen Lake, known as the "Hebgen Face" near Kirkwood and Red Canyon, is designated winter range and has a resident elk population through the winter. In the past this area has experienced little conflict between wildlife and snowmobilers. The concerns expressed above may exacerbate impacts to elk on this winter range. Also the State feels that a potential result would be a flood of snowmobile travel north through Cabin Creek to Carrot Basin and into the Taylor Fork drainage. Several outfitted and private snowmobile groups may try to travel through the Taylor Fork winter range to connect with the Buck Ridge area and then on into Big Sky. Last,

[83] All the following listed impacts are expressed by the State of Montana using an assumption of total displaced use from the parks to adjacent lands. See the use displacement scenarios at the beginning of this section.

according to the State, any substantial increases in the number of snowmobilers trying to reach Big Sky from Wapiti Y, (Taylor Fork drainage) by any number of routes, may significantly impact bear denning sites. Cache Creek, Beaver Creek, and the Yellow Mules have known grizzly bear denning sites.

The State notes that during this period, use of the roads by bison increases, and bison more readily move longer distances and could exit the park more easily than on groomed snowmobile trails. They believe there would be a tunnel effect created by winter plowing, encouraging bison movement out of the park and complicating bison management in West Yellowstone and Horse Butte. The State recommends including mitigation provisions for the plowing option, such as clearing exit lanes at key trail break off points for bison and elk, or modifying snow removal methods to eliminate an accumulation of snow along side the road system. The Park Service's analysis (See the analysis of impacts on bison and ungulates for alternative B) indicates that bison make little use of groomed surfaces by bison to exit the park, and such mitigation is already included.

The State is concerned about the potential for any substantial and unexpected increase in snowmobile use north of the park boundary. Travel management concerns in the Gallatin Canyon would become a major focus for the State and the Gallatin NF. The State says that riding from West Yellowstone to the Taylor Fork drainage, many snowmobilers want to continue their travel onto Big Sky. Also snowmobilers choose to travel out of the Taylor Fork drainage using the plowed access road to Highway 191. The use of the maintained road is illegal under Montana statute. Using the barrow pit along Highway 191, snowmobilers travel north, and at times travel on the pavement of the highway, to Buck Ridge trailhead. From this point they can easily access the Big Sky area for services such as gas, food, and lodging. Snowmobiles also travel the return route, resulting in several recent near-miss accidents. As regrettable as these circumstances are, they appear to be outside the jurisdiction of the park, and would continue apart from any future management change (alternative) that the park may implement.

Alternative C

The State offers the same comments as in B regarding the plowed section of road.

Alternatives D and E

The State offers no impact analysis for these two alternatives.

Alternative F

The State reiterates comments from alternative B regarding their suggestions to mitigate air quality impacts at the West Entrance. See also the discussion under alternative A.

Alternative G

The State notes that this alternative would place additional stress on "some of the most sensitive natural resource areas north of the park," which currently receive high and increasing amounts winter snowmobile recreation activities. The NPS notes that there

are no specific statements of impact supporting this conclusion. Assuming the State is referring to lands on the Gallatin NF, the reader is referred to the earlier section regarding impacts on national forest lands. Regarding State lands, refer back to *Effects on the State of Montana* in this section.

Effects on the State of Idaho

No impacts have been identified specifically for State lands or private lands in Idaho adjacent to the parks. The NPS determines that there would be no significant impacts on these lands, based on the best available information about how overall use from nonresident visitors to the GYA would either remain the same or decline through the range of alternatives. Any State or private land that lie in close proximity of winter uses would similarly have the same or less pressure.

Alternative A

The State presents no impacts associated with current management.

Alternatives B through G

The State notes it is likely that a plowed road in alternatives B and C from West Yellowstone to Old Faithful will result in additional pressure on snowmobile trail opportunities in Idaho. Presently the Fremont County snowmobile trail system only has three snowmobile trail groomers to maintain 400 miles of trail. An additional influx of snowmobiles from West Yellowstone would place more wear on existing Fremont County snowmobile trails. The State says that some of these trails are already at their maximum level of use, and are groomed once weekly.

The State indicates that alternative G would displace 100% of the snowmobile visitors to the parks who would either recreate on adjacent lands or not come to the GYA. The State says that eliminating access to Flagg Ranch would disconnect visitors from the CDST in Wyoming and 20 miles of trail that represent a unique experience. Also they indicate that this lack of access eliminates groomed snowmobile access to Cave Falls, and that snowmobilers would still use this route, which is within two miles of the park boundary. The State's opinion is that alternative G has irreversible and irretrievable consequences, including loss of personal freedom for winter visitors, loss of opportunity for visitors who cannot ski or snowshoe, loss of opportunity to view YNP by snowmobile, and loss of Idaho's version of the Grand Loop experience. In addition the State feels that the elimination of snowmobiling would cause increased safety problems outside the parks from congestion and trail deterioration.

In this context the best information available indicates that use in the GYA would decline by 18.4% in alternative B and 33.4% in alternative G, thus relieving pressures on adjacent lands. If either scenario occurs, there could be an economic impact as the State suggests (assuming no replacement visitation). However, if snowmobilers stay in West Yellowstone or in Idaho and use adjacent lands, creating additional safety problems as stated, then there would be no economic effect. The two hypotheses are not consistent.

Effects on Teton County, Wyoming

The NPS determined that there would be no significant impacts on lands within the jurisdiction of Teton County. This is based on the best available information from the winter use survey about how overall use from nonresident visitors to the GYA would either remain the same or would decline through the range of alternatives. Any state or private land near winter uses would have the same or less pressure.

Alternative A

According to the County, there would be no significant recreation or economic impacts.

Alternative B

The County states that there is the potential for a significant increase in visitation to YNP through the South Entrance as a result of eliminating oversnow access from West Yellowstone. Their opinion is that this could result in an increase of rental sleds both in Jackson as well as at Flagg Ranch. The County also thinks it likely that the amount of commercial guiding originating in Teton County would increase. The County did not estimate the dollar amount of impact, not knowing potential visitation numbers, infrastructure constraints, or commercial permit restrictions.

The County's opinion is that eliminating snowmachines on the Teton Park inside road should not have a significant economic impact to Teton County because the area is mostly used locally, and states it could have an economic benefit to Teton County by drawing more skiers to the area.

Teton County believes that relocating the CDST to a year-round pathway should provide economic benefits to Teton County by drawing more users to the area. In addition it recommends opening the trail to commercial use to provide additional economic benefit to the county.

Alternative C

The County states that relocating the CDST to a utility corridor from Moran to Flagg should greatly improve both the safety of the trail as well as recreational experience for snowmobilers in GTNP. Further, if the trail were open to commercial users it could draw significantly more users and benefit the county economically.

The County indicates the potential for a significant increase in visitation to YNP through the South Entrance as a result of eliminating oversnow access from West Yellowstone. The County states that this would result in an increase of rental sleds both in Jackson as well as at Flagg Ranch, and an increase in the amount of commercial guiding originating in Teton County.

Alternative D

The county states that relocating the CDST to the utility corridor from Moran to Flagg would greatly improve trail safety and recreational experience for snowmobilers in GTNP. It recommends opening the trail to commercial use to provide additional economic benefit to Teton County.

The County believes that closing the road north of Colter Bay to wheeled-vehicles and opening it to snowmobiles could have adverse and beneficial impacts. By eliminating the ability to stage commercial and individual snowmobile trips from Flagg Ranch, the trip to Old Faithful may be too long for most users for a day trip. This could significantly reduce both the number and ability of visitors from Teton County to experience YNP via snowmobile in one day. Conversely, according to the County, closing this section of road would provide an improved snowmobile experience in GTNP. They state that if commercial guides were permitted to stage trips out of Colter Bay, use within GTNP could rise dramatically.

The county's opinion is that eliminating snowmobiles on the Teton Park Road should not have a significant economic impact to Teton County because the area is mostly used locally. The County states it could have an economic benefit to Teton County by drawing more skiers to the area.

Teton County states that relocating the CDST to a utility corridor would provide economic benefits to Teton County by drawing more users to the area, and that opening the trail to commercial use would provide additional economic benefit to the county.

The County states that closing the road north of Colter Bay to motor vehicles could have significant negative economic impacts to Teton County. It indicates that Flagg Ranch currently rents over 5,000 snowmobiles per year to visitors who enter YNP. If the road were closed, visitors would either need to rent their sleds at Colter Bay or be shuttled to Flagg Ranch via snowcoach. In addition 12 concessioners offer guided snowmobile tours into YNP via the South Entrance. According to the county, the trip to Old Faithful may be too long to stage from Colter Bay and could result in a loss of about $671,000. The county suggests that if the concessioners were allowed to stage out of Colter Bay, visitors could experience GTNP and perhaps YNP, and concessioners would recoup most of those costs.

Alternative E

The County's opinion is that eliminating snowmachines on the Teton Park inside road would not have a significant economic impact to Teton County because the area is mostly used locally. The County states it could have an economic benefit to Teton County by drawing more skiers to the area.

The County's opinion is that eliminating all motorized vehicles on Jackson Lake and closing the CDST could cause impacts to Teton County. They State that without the trail, the only local opportunity to snowmobile in a national park would be a trip into YNP.

Alternative F

The County's observations on recreation impacts are the same as in alternative C.

The County states that eliminating access from West Yellowstone and Mammoth could results in a significant increase in visitation to YNP through the South Entrance. Further, it believes this could result in an increase of rental sleds both in Jackson as well as at Flagg Ranch, and that commercial guiding originating in Teton County likely would increase.

Alternative G

The County's opinion is that eliminating snowmachines on the Teton Park inside road would not have a significant economic impact to Teton County because the area is mostly used locally. The County states it could have an economic benefit to Teton County by drawing more skiers to the area.

The County's opinion is that eliminating all motorized vehicles on Jackson Lake and closing the CDST could cause impacts to Teton County. They State that without the trail, the only local opportunity to snowmobile in a National Park would be a trip into YNP.

The County suggests that this alternative lacks opportunities for groomed trail nordic skiing. The County states that there is a lack of public recreation opportunities and that the NPS is ignoring this need.

Closing the road north of Colter Bay to wheeled-vehicles and opening it to mass transit oversnow vehicles could have both significant adverse as well as beneficial impacts, according to the county. It states that by eliminating the ability to stage commercial and individual snowmachine trips from Flagg Ranch, this would eliminate the ability of visitors from Teton County to experience YNP via snowmobile. Current commercial outfitters as well as Flagg Ranch would be impacted significantly. The county also believes that, conversely, providing oversnow mass transit may draw new visitors to Teton County that prefer this type of recreation and atmosphere and create economic benefit.

Effects on Gallatin County, Montana

Gallatin County indicated that its survey of businesses in the County would be used to determine overall economic impacts. The County offers no specific assessments of impacts for each alternative. Economic impacts on the County are considered and addressed in the socioeconomic effects section of this document. The NPS determines that there would be no significant impacts on lands within county jurisdiction, based on the best available information about how overall use from nonresident visitors to the GYA would either remain the same or decline through the range of alternatives. Any State or private land near winter uses would have the same or less pressure.

Effects on Park County, Montana

Input from this cooperating agency does not provide an assessment, by alternative, of socioeconomic impacts. It notes that alternative B would have a devastating effect on the economy of West Yellowstone, which is not located in Park County. Park County indicates that it does not have a booming economy and that wages and employment have declined. The results of a survey conducted with businesses in Park County have been reviewed. Related economic impacts are considered and addressed in the socioeconomic effects section of this document. From the results supplied with Park County's comments on the DEIS, it would appear that important conclusions are difficult to ascertain. The survey is predicated on either the closure of the park (which is not an alternative) or closure to snowmobiles (alternative G). The listing of results does not allow determination of whether the winter visitors in question are snowmobilers or people who ski or travel by snowcoach. For example, the results list lost sales if YNP "winter visitors" were prohibited – this presumes closure of the park. Also it is difficult to determine, from the questions asked about winter business closures, which of the businesses would close during the winter whether or not park management could change.

The NPS determined that there would be no significant impacts on lands within county jurisdiction, based on the best available information about how overall use from nonresident visitors to the GYA would either remain the same or decline through the range of alternatives. Any state or private land near winter uses would have the same or less pressure.

Effects on Fremont County, Idaho

Information provided by this cooperating agency includes a report on the economic importance of the winter season to the County. It states that the county provides a variety of winter recreation opportunities, and that it provides a connector for important winter destination areas including the parks, West Yellowstone, and Flagg Ranch. The County's winter population increases due to annual snowmobiler days of 300,000, and 40,000 days attributed to other recreation users. As background, the county notes that pressure on the local trail system (400 miles of groomed trail) and related facilities increases when YNP closes for the season. It experiences 1,200 more snowmobilers per weekend following the closure. Specific to alternative G, which closes the Grassy Lake Road to snowmobile use, the county believes that without groomer access to fuel at Flagg Ranch, it would be unable to groom two high-use trails of about 67 miles. Similarly, snowmobiles would not have access to fuel in trail experiences. The County also states that some opportunities near, or perhaps on, the park from the Idaho side would continue to be used by snowmobilers, and this would necessitate additional enforcement effort by the NPS.

Leaving the Grassy Lake Road open for snowcoach use mitigates the county's concerns to some degree. The need for grooming the road surface remains. This would facilitate the grooming of trails on adjacent lands.

The NPS determined that there would be no significant impacts on lands within county jurisdiction, based on the best available information about how overall use from nonresident visitors to the GYA would either remain the same or would decline through the range of alternatives. Any state or private land near winter uses would have the same or less pressure.

Effects on Park County, Wyoming

This cooperating agency did not identify specific impacts, by alternative, on the County or private lands within it. The NPS determined that there would be no significant impacts on lands within the County jurisdiction, based on the best available information about how overall use from nonresident visitors to the GYA would either remain the same or decline through the range of alternatives. Any state or private land near winter uses would have the same or less pressure.

Cumulative Effects on Adjacent Lands

Effects analysis on adjacent lands, as constituted in this EIS, is inherently a cumulative impacts analysis. Cumulative impacts are defined as the effects of the proposed action, added to the past, present, and reasonably foreseeable impacts in the area of concern. The determination of cumulative impacts is required in an EIS, but the potential for cumulative impacts is not a CEQ regulated constraint on the eventual decision. In other words, impacts may be incurred by virtue of a decision as long as they are not in violation of a law, and if they are disclosed properly, considered, and mitigated (if possible).

Framework for Analysis

This analysis is conducted by identifying the area of concern for a resource, determining all impact sources on the resource within the area, and then assessing the additive impact of the proposed action on that resource and the total cumulative impact. The frame of reference for this analysis is as follows:

1. Since the major source of impact would be potential displacement of snowmobile use from national parks to national forests in the GYA, the context for the issue is how use might change in the GYA. The primary change would be in relation to numbers of visitors from outside the GYA, and how they would react to alternatives that affect snowmobile access to the parks. Use and access by residents could be locally redistributed; as it may affect total use in the GYA, it could only decrease as a result of the alternative changes. The NPS assumes it would remain within the GYA; that is, local users would continue to use the GYA as at present. They could go to other GYA areas, described as “local redistribution” in this analysis.
2. Existing forms of recreation access and opportunity in the parks could directly affect alternatives and alternative features.
3. Some of the people who may be affected by alternatives or alternative features might be displaced to adjacent lands. These are indirect or secondary effects, which are removed in time or space from the source of impact.
4. Some of the use that is displaced to adjacent lands could cause further impacts on those lands or their resources. These are secondary or tertiary effects, which are removed in time or space.

5. The additional use on adjacent lands is added to the existing use on those lands, concurrent with increasing use from other sources. This is the total cumulative impact.

Areas and Resources of Concern

In this analysis the State of Montana and the national forests have expressed concerns about potential impacts of various alternatives on resources in those jurisdictions. Wyoming and Idaho have not directly expressed such concerns, although both allude to changes in recreation within those states. The resources of concern include recreational opportunity and experience (including associated facilities: trails and trailheads); and wildlife (including threatened and endangered species). The area of concern is that which is subject to potential displaced snowmobile use; this is the entire GYA area outside the parks that is capable, suitable, and available each year to support seasonal snowmobile use. This area is defined and mapped in the GYCC Multi-Agency Winter Visitor Use Assessment (1999).

Source of Impact from the Proposed Action

The source of impact for all concerns expressed by cooperating agencies is the displacement of winter recreation use, primarily snowmobiles, associated with identifiable features in the range of alternatives. These are: plowing the road from West Yellowstone to Old Faithful (alternatives B and C); closing the North and West Entrances (alternative F); closing the East Entrance (alternative D); removing the CDST (alternatives E and F); and closing all park units to snowmobiles (alternative G). The USFS expressed concern about backcountry closures in YNP in alternative F, and removing skiing opportunities from Colter Bay to Flagg Ranch (alternatives D and G). Alternative-specific scenarios of displacement were developed and supplied to the USFS at its request. The NPS used information available in the DEIS and the winter visitor survey to assess generally how many people (in different user groups) would continue to visit the GYA relative to various park management changes.

The scenarios used by NPS are displayed at the beginning of the section entitled *Direct, Indirect, and Cumulative Effects on Adjacent Lands* and in Appendix G. They are dependent on the winter visitor survey results developed by Duffield and Neher (2000a) for this EIS. In short, use of the best available information about what current winter visitors would do shows that overall visitation in the GYA by nonresidents (80% of the visitation) could decrease substantially in alternatives B, C, F, and G. Visitation would remain the same in A and E, but decline slightly in D. Visitation to the GYA affects both national parks and national forests.

Past, Present, and Reasonably Foreseeable Impact Sources in the Areas of Concern

Montana, Idaho (Fremont County), and the USFS all were concerned about use (primarily snowmobiles) being displaced from the park units and added to the use that

already exists in their jurisdictions.[84] General statements are provided by those cooperating agencies about current use at a threshold, crowding and demand on facilities and popular areas, safety, displacement of nonmotorized users, and important winter habitat for a variety of ungulate species. Other issues relating to the indirect, secondary, and tertiary effects of use displaced from the parks includes denning grizzly bears, spring bear emergence, nesting bald eagles, and lynx habitat.

All such concerns for national forests were expressed as conflicts and mapped in the multi-agency assessment for winter visitor use in the GYA. A summary of these concerns is found under alternative A in the section entitled *Direct, Indirect, and Cumulative Effects on Adjacant Lands* and in Appendix G. A statement of concern from Montana may be found under alternative A in the section on Montana. Effects on Fremont County, Idaho, above, speak to current pressures on its trail system. For cumulative effects analysis, regarding these adjacent lands, it appears that either the current level of impact is high or concern exists about greater use in areas of currently low density use. All these entities also state that the foreseeable impacts due to winter use on their lands will increase, because of the present rate of growth in the sport. The Targhee NF notes an annual 4% to 5% increase. Therefore, the environmental baseline for assessing cumulative impacts on adjacent lands must account for: current high level of impacts and conflicts in some areas, with increasing trends in use.

Total Cumulative Impact

Management changes in the three park units could result in local redistribution of use which, added to current use and demand, could cumulatively impact resources or values on adjacent lands (given the characterizations of current condition by the USFS, Montana, and Fremont County, Idaho). These impacts might include: further stress on facilities and infrastructure, habitats, and deteriorating recreation experiences and opportunities in some areas outside the parks.

- For the USFS, identified areas of high use conflict[85] would presumably increase in magnitude, extent, and duration (Island Park, Gallatin Canyon, Togwotee Pass, Beartooth Plateau, Cooke City, et al.). Conflict areas identified as being low or moderate in intensity could become worse. Additional areas not previously identified as being of concern could arise.
- For Montana, winter ungulate habitat in Gallatin Canyon could be further impacted, with resultant stress on individual animals and overall negative impacts on populations.
- For Idaho, the Fremont County trail system would experience further demand and crowding resulting in a decline in visitor experience and increased grooming expense.
- In all areas motorized use would tend to affect desired experiences of nonmotorized users and displace that use from ever-decreasing areas of opportunity.

[84] In contrast, the State of Wyoming expressed no such concerns. Its overriding assumption in all economic and recreation analyses is that the snowmobiles will no longer come to the GYA in most management change scenarios.
[85] See assessment of alternative A for Effects on National Forest Lands, and the Winter Visitor Use Management Assessment as cited therein.

The NPS assessment of total cumulative impact on adjacent lands in the GYA includes the following considerations.

- The major source of impact is potential displacement of snowmobile use from national parks to national forests in the GYA. The context for this issue is how use might change overall in the GYA. The primary change would be in relation to visitors from outside the GYA and how they would react to alternatives that affect snowmobile access to the parks. As documented throughout this section. This visitation would be expected to decline substantially in alternatives B, C, F, and G. It would remain the same or decline slightly in A, D, and E.
- Use and access by residents could be locally redistributed, but it is generally accounted for within the current condition. The NPS assumes it would remain within the GYA; that is, local users would continue to use the GYA in the same amount as at present but they could go to other areas (described as "local redistribution" in this analysis). Local redistribution scenarios are hypothesized at the beginning of the *Direct, Indirect, and Cumulative Effects on Adjacent Lands* section.[86] In alternatives B, C, F, and G, the total decline in visitation to the GYA would more than offset any local redistribution increases – unless resident use comprises most of the current total use.
- The USFS in its assessment of winter use identified management actions that could be taken to relieve conflict areas on national forest lands. Some forests identified unused or minimally used lands, which could be made more accessible by developing parking or trailhead facilities. There may be unused capacity on forests to absorb local redistribution.
- In the context of cumulative effects, the proposed action may not be, and arguably should not be, the only focus of mitigation or change in management. National forests are governed by forest plans and other constraining rules, regulations and agreements that prescribe or specify management actions in relation to resource conditions or, for example, habitat needs. The USFS indicates that not all plans directly or consistently address species requirements or changed conditions (winter use, newly listed species). However, plans, strategies, and guidelines must be followed for lynx, bears, wolves, eagles, or other currently listed species for each forest.
- NEPA (CEQ Regulations) does not require that an EIS discuss remote and conjectural consequences, and that decisions need not be made on the basis of possible, but speculative, effects.[87]
- An EIS is adequate if it provides discussion of direct and secondary impacts and conflicting scientific judgments regarding cumulative effects.[88]

Alternative A

Cumulative impacts have been ascertained, considering existing and reasonably foreseeable direct and indirect effects on adjacent lands to the degree necessary. Environmental effects that are easily identified are disclosed in detail, and effects that cannot readily be ascertained are nonetheless discussed sufficiently.[89] This alternative would not displace additional use from the parks to adjacent lands, while impacts of current use would continue on adjacent lands at the present level.

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[86] Forest Service views a worst-case scenario to be appropriate, where worst-case represents displacement of all current users in the parks to adjacent lands. For reasons presented at the beginning of the adjacent lands section, NPS believes the best available information is presented through the survey of current visitors and that a worst-case scenario remains subject to too many assumptions. FS' worst-case is refuted by the visitor survey.

[87] *Sierra Club v. Hodel*, 544 F.2d 1036, 1039 (9th Cir. 1976), et al.

[88] *Environmental Defense Fund, Inc. v. Hoffman*, 566 F.2d 1060 (8th Cir. 1977), et al.

[89] *Citizens for Environmental Quality v. U.S.*, 731 F.Supp. 970, 995 (D. Colo 1989) held that for effects not readily ascertained, detailed discussion is not contemplated under NEPA.

Alternative B

By virtue of the closure of YNP's West Entrance to snowmobiles, local use could be redistributed to adjacent lands, along with a percentage of nonresident visitors who state they would return to the GYA in the circumstances posed by alternative B. The NPS estimates this amount to be about 6,700 snowmobiler trips over the season, or 75 snowmobile trips daily. The overall cumulative impact would be a decrease in use on adjacent lands because of an 18.4% reduction in nonresident visitation to the GYA. The 75 trip redistribution per day, divided between adjacent lands on the west side of YNP (where 300,000 snowmobiler days are currently experienced) would be negligible. Users displaced from the Teton Park Road and the surface of Jackson Lake average 45 to 50 snowmobiler trips per day, who would either enter YNP or go elsewhere on the Targhee, Shoshone, or Bridger-Teton National Forests. Some displaced users would enter the parks at other gateways and not impact adjacent lands. The level of congestion and conflicts currently identified on the west side of YNP could improve due to lower use by nonresident snowmobilers.

Alternative C

Total cumulative impact would be the same as that described in alternative B. The late season plowing of the Mammoth to Madison road segment could further displace local use by 1,700 visitor trips during February and March to adjacent lands near Gardiner and Cooke City. Again, this could be offset by a total nonresident reduction in use in the GYA of 18.4% in terms of total cumulative impact.

Alternative D

By virtue of closing YNP's East Entrance to snowmobiles, use that could be displaced to elsewhere in the GYA amounts to about 3,300 snowmobiler visits over the season, or an average of 40 snowmobiler trips per day that could go to other gateways or to national forest lands. Users displaced from the Teton Park Road and the surface of Jackson Lake, which amounts to an average of 45 to 50 snowmobile trips per day combined, would either enter YNP or go elsewhere on the Targhee, southern Shoshone, or Bridger Teton National Forests. By virtue of a 4.4% reduction in total visitation by non-GYA residents, the total cumulative impact on adjacent lands would decline slightly. Due to local redistribution and uncertainty in use numbers, the overall cumulative impact in the GYA would be indistinguishable from the current condition.

Alternative E

This alternative would not reduce visitation by nonresidents. Local use in GTNP would be displaced by the closure of the Teton Park Road and the CDST segment within the park. Use on the CDST is almost exclusively destined for YNP, most of it being staged from Flagg Ranch. In alternative E, this opportunity remains available, so this amount of use would likely not be displaced to adjacent lands. Users displaced from the Teton Park Road and the surface of Jackson Lake, which amounts to an average of 45 to 50 snowmobile trips per day combined, would either enter YNP or go elsewhere on the Targhee, southern Shoshone or Bridger-Teton National Forests. As a percent of use on

the latter two forests, this would not appear to be significant. The overall cumulative impact in the GYA would be indistinguishable from the current condition.

Alternative F

By virtue of closing YNP's West and North Entrances, local use could be redistributed to adjacent lands, along with a percentage of nonresident visitors who state they would return to the GYA in this use scenario. The NPS estimates this amount to be about 4,000 snowmobiler trips over the season; or 50 snowmobile trips daily. The overall cumulative impact would be a decrease in use on adjacent lands because of a 24.6% reduction in nonresident visitation to the GYA. The 50 trip redistribution per day, divided between adjacent lands on the west and north sides of YNP would be negligible. Users displaced from the Teton Park Road and the surface of Jackson Lake would amount to an average of 45 to 50 snowmobile trips per day, either entering YNP or going elsewhere on the Targhee, Shoshone, or Bridger Teton National Forests. Some local displaced use would enter the parks at other gateways and not impact adjacent lands. The level of congestion and conflicts currently identified on all adjacent lands could improve due to lower use by nonresident snowmobilers.

The NPS has estimated that the closure of YNP to backcountry nonmotorized use could displace 844 skiers per year. Based on the winter use survey results, about 5% of these users would or may continue to visit the GYA to engage in this use. In this alternative using the survey assumptions, an estimated 42 skiers annually would be displaced to surrounding national forests or to GTNP. This would not appear to represent a significant impact on adjacent national forests.

Alternative G

By virtue of closing the three park units to snowmobiles, total visitation to the GYA by those who live outside the five-county area would be reduced by 33.4%. Local use could be redistributed to adjacent lands, along with a percentage of nonresident visitors who state they would return to the GYA in this use scenario. The NPS estimates this amount to be about 5,230 snowmobile trips over the season, 65 snowmobile trips daily. This level of redistribution would appear to be easily absorbed in the total use for all national forests in the GYA. The overall cumulative impact would be a decrease in use on adjacent lands because of a 33.4% reduction in nonresident visitation to the GYA (which is 80% of the current winter visitation). This reduction is a net change. It takes into account visitors who said they would visit more often in this circumstance, and those who said they would visit the same, but shift their use to other areas of the GYA (e.g., from the parks to the national forests).

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

In the context of the proposed action, short-term local uses would be those actions that could be implemented under the alternatives for programmatic park plans. The EIS planning effort addresses and discloses effects of alternative strategies for long-term management. The plan to be arrived at in the Record of Decision will set goals and objectives for management based on the alternatives evaluated in the EIS. Technically, no site-specific activities are approved through this process (*Decision to be Made*) and other discussions of programmatic planning in Chapter I). They would require additional environmental analysis before implementation.

All the activities implied in the EIS alternatives could be considered local and short term, in that they are specific to the three park units and are reversible actions. Long-term productivity is construed as the continued existence of the natural resources of the parks, at a sustainable and high level of quality, so that they can retain their inherent value and be enjoyed by the public. Depending on the magnitude, extent, and duration of impacts caused by short-term uses, long-term productivity could be affected.

The analysis in this DEIS has shown few impacts from possible short-term uses that would affect long-term productivity as defined. It is the function of monitoring and mitigation, incorporated into park management, to ensure no such impacts result from implementation. Adaptive management is a dominant theme in two alternatives (alternatives B and E). Adaptive management addressed this relationship (monitoring and management) directly and programmatically. Otherwise every alternative would induce short-term effects on a variety of experiential values or resources that would persist for as long as the impacting activity is undertaken. Programmatic changes in opportunities affecting visitor experience and use (the “enjoyment” part of the mission) would continue for the duration of plan implementation.

Four areas of potential long-term impacts are identified in the analysis.

- Continued management with unregulated backcountry use in GTNP could, without mitigation, further the decline of the bighorn sheep population in the park in conjunction with other impacts.
- The cumulative effect of all park recreational uses on geothermal features could, without mitigation, cause a long-term decline in this resource.
- The cumulative effect of all park recreational use could, without mitigation, affect listed threatened and endangered species or species of special concern.
- The cumulative effect of air pollutants, including continued emissions from 2-stroke engines stored in winter snowpacks, could be routed into aquatic systems and stored biologically or physically. Over time this would represent a change in intrinsic natural park values associated with those systems. The possible extent of such a change, or the amount of indirect impact relative to any existing standard, cannot be determined at this time.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible commitment of resources is defined as the loss of future options. The term applies primarily to the effects of using nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods. It also could apply to the loss of an experience as an indirect effect of a "permanent" change in the nature or character of the land.

An irretrievable commitment of resources is defined as the loss of production, harvest, or use of natural resources. The amount of production foregone is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume production. An example of such a commitment would be the loss of cross-country skiing opportunities consequent to a decision allocating an area to snowmobile use only. Should the decision be changed, skiing experiences, though lost in the interim, would be available again.

From an economic or social perspective, there would be no irreversible commitment of resources from any of the alternative actions. However, alternatives to the current management situation that change recreational opportunities or affect visitors by displacing them from accustomed usage, would involve irretrievable losses. By the nature of alternative actions, those losses would be balanced by a gain in some other opportunity or resource benefit. Any perceived losses or tradeoffs in recreational opportunities would have both social and economic consequences that would be irretrievable, but not irreversible.

For example, the plowing of the road from West Yellowstone to Old Faithful in alternative B would cause an irretrievable but not irreversible loss of snowmobiling and snowcoach experiences along that section of road. Secondary effects of this decision could be the irretrievable loss of income to businesses in West Yellowstone dependent on these uses. The loss would not be irreversible because new business opportunities could be available in providing for the alternative modes of access to Old Faithful by bus and shuttle.

By virtue of the alternative actions, which are fully within the protective orientation of the national park mission, and the analysis of effects from them, there would be no irretrievable commitments of any resources. No environmental consequences have been determined that involve the permanent loss of a resource or jeopardy to the existence of any species on the basis of the proposed actions alone. Were it indicated that the presence of existing or proposed levels of snowmobile trail use could cause grizzly bear mortality, then there would be a risk of irreversible and irretrievable commitment of resources. As stated, no such impacts were determined in this analysis.

The proposed action and alternatives prescribe changes from the existing condition for different mixes of winter visitor experience. The changes are intended to address the purpose and need for action described in Chapter I, while sharply defining the public's issues about the proposal. In some alternatives, the consequences of those changes

improve the quality or condition of the parks' experiential values and resources. This includes improving values like air quality, sound versus natural quiet, wildlife species and habitat, and recreation experiences (motorized and nonmotorized) whose quality is dependent on those values. The achievement of such improvements is accompanied by some tradeoff in another aspect of winter recreation such as loss of access (motorized and nonmotorized), altering available modes of transport, redistribution of use, or regulating types of equipment allowed. All these changes or tradeoffs would be associated with an irretrievable loss of the kind indicated. Conversely, for alternatives that optimize access and provide a full range of winter recreation activities, there would be tradeoffs representing irretrievable losses in types and qualities of other visitor experiences. For the range of alternatives a variety of irretrievable resource commitments would be made, but none would be irreversible.

UNAVOIDABLE ADVERSE IMPACTS

The reader is referred to the previous two summary discussions. It should be clear from these discussions that every alternative, including continuation of the current management plan, would result in some impacts. Impacts for alternatives disclosed in Chapter IV range from major adverse to major beneficial relative to alternative A. Impacts are discussed for human health and safety, the economic and social environment, physical and biological resources, and the experiential environment of the three parks. These elements are interrelated and interdependent, as is the nature of any ecosystem process and the human role in it. Therefore, the alternatives taken together display consequences, tradeoffs, benefits, impacts, and opportunity costs in a way that reveals the interdependent working of human and natural park systems.

This means that, considering the human use and enjoyment function (i.e., recreation), an adverse impact from one perspective is often a benefit from another. Therefore, this discussion dismisses further consideration of visitor experience and social concerns, recognizing that there would be unavoidable adverse impacts (from minor to major) across the range of alternatives and the associated range of human perceptions.

Potential unavoidable adverse economic impacts on the regional economy are readily discussed for several alternatives, especially due to the local loss of motorized, oversnow opportunities in the parks. None of these impacts could be considered irreversible or long term in the context of the total economy. For some individual businesses, the effects may be more drastic. It is, however, in the nature of business to start or change course based on economic self-interest and survival. Long-term economic impacts are not easy to determine because of this dynamic, and because the business world is adaptable and creative. So, as indicated in the analysis, it is possible that the negative regional impacts of some alternatives could be offset by a change in the type and mix of visitors coming to the parks.

Potential unavoidable adverse impacts on physical and biological resources are disclosed throughout the range of alternatives. These include impacts on air quality, wildlife

displacement and habituation, water resources, and natural quiet. For the most part, any such impacts are short term (for the duration of the impact cause) and minor. Other possible minor to moderate impacts would be mitigated or avoided by the features of the alternatives or the recommended mitigation measures expressed in specific analyses.

Current impacts on human health and safety represent a major part of the purpose and need for action. Considering the existing condition described in Chapter III, most alternatives represent an attempt to improve factors relating to health and safety. The focus on health and safety is three-pronged: air quality and emissions from snowmachines; motor vehicle accidents and behavior of various recreating user groups; and inherent risks of winter recreation (avalanches). The desired impact is beneficial in reducing these factors. Allowing the range of winter recreational use and access, which is implicit in the purpose and need, carries with it unavoidable potential for accidents.

Unavoidable impacts are referred to in the beginning of *Effects Common to all Alternatives*, Chapter IV. These result from winter use of the parks at any level, and they include impacts on: natural soundscape; wildlife (collisions, displacement); safety; and visitor experience.

CUMULATIVE IMPACTS ANALYSES

Assumptions and Methodology

The alternative programs or plans describe actions that are either larger in scale addressing programmatic direction, or they are represented as examples of activities that could occur. Generally, before such actions could be implemented, further site-specific environmental analysis would be necessary. Therefore, this DEIS evaluates cumulative impacts in the context of programmatic actions proposed in the alternatives, and definitive cumulative impact analysis would be conducted later when site-specific proposals are made and site-specific effects are determined.

Cumulative impacts analysis considers the degree to which any direct or indirect effects from proposed actions adds to or detracts from the possible effects of other past, present, or reasonably foreseeable actions. Since effects of actions are specific to each resource, the types of actions and overall nature of impacts considered in this analysis are disclosed by resource. Each resource is associated with a specific area of concern, and with impact sources that could affect the resource within that area. If an action or an alternative could have a direct or indirect effect on the resource, then this effect is considered additively with the effects of other impact sources. Conversely, if an action does not have a direct or indirect effect on a resource, no additive cumulative effect exists.

The *Cumulative Impact* section for each resource expresses the magnitude of the additive impact of any direct or indirect effects for an alternative, if any, relative to the total impact in the area of concern. Programmatically, the alternatives share the same mix of activities, but to greater or lesser degrees. Therefore, the alternatives do not vary greatly

in terms of general cumulative impacts. Where variations do occur between alternatives, they are noted.

Geothermal Features

Area of Concern. The area of concern includes all geothermal features within the boundaries of YNP. It does not include GTNP or the Parkway.

Potential Impact Sources. The nature of the concern is surface damage to geothermal features. Surface damage can occur from trampling by wildlife and by pedestrian visitor use in the summer. Acts of vandalism that add litter and other materials to thermal features tend to destabilize the physical function of these important resources. Decisions from other park planning projects such as the Commercial Services Plan may add additional visitor use to geothermal areas throughout the year. Overall, the use trend is increasing in the foreseeable future.

Additional Impact of the Proposed Actions. Under current winter use management, minor direct adverse impacts could occur to features near the groomed surfaces for both motorized and nonmotorized uses. Backcountry thermal features sustain minor adverse impacts from skiers. Certain individual features may be at risk, but not predominantly associated with winter recreational use. Under alternative B, there may be increased impacts to the Old Faithful area if winter pedestrian use increases due to enhanced access for this type of visitor. Similarly, in alternative C, with an increase in the type and amount of use and longer seasons, wildlife use of geothermal winter ranges could be moderately affected. In alternative F, since there would be the potential for fewer adverse impacts to geothermal features located along roads closed to use, the overall cumulative impact would be less. In alternative G, there may less overall impacts with the use of mass transit and interpretive opportunities throughout the park. The additive impacts of winter use appear to be relatively small compared to other existing impact sources. The total cumulative effect for all alternatives lies in the range of acceptable impacts with continued administration, trail location, and education. Without mitigation, there could be long-term adverse impacts on individual geothermal features from all impact sources.

Water Resources

Area of Concern. The area of concern includes all watershed areas contributing to water resources within the three national park units. Most surface water hydrologic systems for these park lands originate within the national parks and flow outward onto land owned by other entities. Exceptions to this include headwater streams flowing into Yellowstone Lake from the southeast, and into GTNP from the east. These arise out of predominantly wilderness headwaters on the Bridger-Teton NF. Some of the inflows to GTNP flow through private land inholdings or adjacent private lands. The area of concern is delimited to the outflow boundaries of watersheds from the national parks.

Potential Impact Sources. Current impact sources within the national parks that may affect water resources during the winter include emissions from 2-stroke engines that are

deposited in snow and ice packs. Other winter sources include emissions from wheeled-vehicles that operate on open roads within the parks and backcountry nonmotorized uses that generate human wastes. During other seasons, deposition of petroleum products onto road surfaces from large volumes of traffic can be washed as stormwater into connected surface water systems. Land management activities within parks such as road reconstruction and domestic livestock grazing (GTNP), sand and gravel sources, water use and treatment facilities, and backcountry summer use are also possible impact sources.

Other activities in the park contribute to decreases in water quality and may negatively affect aquatic resources. According to the GTNP Park Resource Management Plan (NPS 1985 and 1995) and the recent Water Resources Scoping Report for GTNP (Mott 1998), water resource issues in the park include high visitor use in the backcountry that results in human fecal contamination, illegal dumping of sewage from boats. Other issues are irrigation practices and water flows and discharge of sewage effluents to ground water.

Snowmobile emissions would appear to add a small increment of pollution to other more significant water quality impacts. In YNP inadequate facilities for dealing with sewage are of great concern, and efforts are underway to improve them.

Impact sources from upstream watersheds on adjacent national forest lands do not generally include timber harvest, road construction, or impacts from other legitimate multiple uses of those lands. Since the contributing watersheds are mostly in wilderness, sources could include summer backcountry recreation, wildfire burned areas, and grazing. Private lands adjacent to GTNP could contribute domestic waste, runoff from grazed lands and roads connected to the stream systems. There are no foreseeable changes to this scenario, other than the possibility of lost open space on private lands in or adjacent to GTNP.

Additional Impact of the Proposed Action. Under current winter use management, there has been no measurable impact to water resources or aquatic environments. Therefore, there is no demonstrable addition to the total cumulative impact from other possible sources. The only identifiable potential for additive impact is associated with aquatic mechanisms that could trap non-biodgradable petroleum products, such as lake and reservoir sediments and riparian vegetation. There is no evidence this occurs, but future monitoring should incorporate this study as an objective. In alternative B no net change in cumulative impact would occur. However, there may be a decrease in possible adverse impacts on the Madison River from 2-stroke emission pollutants, as well as an increase in turbidity from sand washing off roadways and entering connected streams. In alternative C, additional amounts of sand could enter the Madison watershed from the Gibbon River when the road along the Gibbon River is plowed. However, fewer pollutants may enter the same watershed because 2-stroke engines will use this road segment one month less in the winter. In alternative D a marginal improvement to the parks' watershed could occur in the long term as reduced emission standards are required for 2-stroke engines in the year 2008-2009. In alternative G elimination of snowmobiles

in the three park units could significantly reduce the risk of degrading water quality or affecting aquatic resources in these headwater watershed areas.

Based on current information, the additive impact on water resources from winter use in all alternatives would not add significantly to overall cumulative impacts. The ability of motorized winter users to purchase bio-based fuels and lubricants in and near the parks may be marginally beneficial by reducing deposition of pollutants into snowpacks. Recommended mitigation is to move some roads away from paralleling rivers to disconnect impact sources from hydrologic systems. The overall cumulative effect of all sources over time has a long-term impact by changing the inherent quality or value of aquatic resources.

Air Quality

Area of Concern. The area of concern includes the airshed described by all three park units and by adjacent Class I areas on national forests. Although ambient air pollution generated at great distances beyond the park boundaries are a concern relative to air quality in the park, it is unreasonable to consider the whole of the western United States as an area of concern. Additional pollution comes from regional industry located within 150 km of the park. Industries include oil and gas processing, power plants, and industrial combustion. Levels of nitrates found in YNP's snowpack can be related to regional industry (Ingersol et al. 1997). Relative to these and other more distant ambient sources, any additional pollution contributed through winter recreational use in the parks is negligible.

Potential Impact Sources. Current impact sources within the parks that could affect park air resources during the winter include emissions from 2-stroke engines and other motorized wheeled-vehicles (or internal combustion engines) that operate on open roads within the parks, as well as wood-burning stoves. During other seasons, human-related sources of pollution include motor boats, gasoline powered maintenance equipment, recreational vehicles, busses, generators, ambient sources, automobiles, campfires, and road material processing equipment. Forest fires in both parks and national forests impact air quality during the summer and fall seasons. There is no known connection between potential sources of air pollution in the winter and potential sources in the summer. Therefore, these sources are not additive as cumulative effects. Effects on vegetation, or other air quality related values from auto emissions are largely hypothetical. Such an impact could be attributed to the large amount of summer automobile use when plants are actively respiring. In alternative G elimination of snowmobiles could significantly reduce the risk of degrading air quality related values in these Class I areas.

Additional Impact of the Proposed Actions. In YNP and GTNP obvious visual effects of air pollution are usually short term and local. The cumulative effect of winter use, added to other possible sources of pollution in the parks, is considered to be short term and localized around parking destination and staging areas, entrance stations, and attractions such as Old Faithful. Effects other than visibility are of concern in these local areas, including health impacts. In alternative B the application of "cleaner" technology could result in a net reduction of cumulative impacts within the area of concern. This would also be true of other alternatives that apply new technology aimed at meeting EPA emission regulations. Conversely, in alternative C any increased use without implementing new "clean" technology would continue present trends with air quality impacts; that is, continued short-term and local negative impacts on visibility and air quality parameters affecting human health. In any alternative, when ambient air quality levels exceed existing standards, plans to correct the situation would be developed and implemented.

Wildlife

Bison

Area of Concern. The area of concern is that which is used by bison for wintering and seasonal migration. Generally, the area includes the corridor and adjacent available winter forage areas in the northern area of YNP and into Montana, and the western corridor along the Firehole and Madison River. The bison issues are mostly beyond the scope of this analysis, and are being addressed in the Bison Management Plan/EIS referred to in *Other Plans and Environmental Analyses*, Chapter I.

Potential Impact Sources. Since the area of concern is tied to bison winter habitat, impact sources include winter uses — motorized and nonmotorized — that displace bison from that particular habitat or render the habitat unusable for them. Activities such as trail grooming that facilitate bison movement in the winter (with less energy expenditure) also facilitate the recreational uses that can stress bison and cause higher energy expenditures. Bison movement along groomed and open roads can lead to the complex economic and social issue of migration to lands beyond park boundaries. Bison have been shown, however, to leave the park more in response to a variety of circumstances, and often not on groomed surfaces. For further evaluation of impact sources refer to the Bison Management Plan/EIS. Actions being considered in the Bison EIS include closing sections of road to winter motorized use and limiting bison use of groomed surfaces.

Additional Impact of the Proposed Actions. Proposed actions may be subject to decisions made in the Bison Management EIS/Plan. For consideration of the total cumulative impact on bison, and how winter use contributes to it, this analysis incorporates the Bison Management EIS and Plan. Refer also to the disclosure of direct and indirect effects earlier in this chapter.

Ungulates other than Bison

Area of Concern. The area of concern includes habitat for various species within the three park units and other seasonal habitat beyond the parks' boundaries. Ungulate species are migratory and some herd units will disperse onto adjacent jurisdictions and land ownerships primarily for winter habitat and forage.

Potential Impact Sources. Other impact sources include those that might occur on adjacent lands. This includes conflicts with other human use activities such as ranching, hunting, and general recreation. Development on private lands, loss of open space habitat, or road construction on other federal jurisdictions are other possible sources. Within the parks, similar actions represent impact sources — housing and road construction, grazing in GTNP, as well as increased recreational use. The most relevant impact sources are those, which occur during the winter, on or off the parks.

The bighorn sheep herd in the Teton Range is declining. In 1999 the Bridger-Teton NF concurred with its permittee, Jackson Hole Mountain Resort, to allow skiing outside the ski area boundary. This makes skiing more accessible in areas occupied by wintering bighorn sheep, and contributes downward pressures on the population.

Habitat losses through development on private lands or road construction on other federal jurisdictions can affect herds that occupy the national parks seasonally. In some cases such losses may render the herds more dependent upon habitat within the parks that is marginally less effective for survival during harsh winters. In this situation, the presence of other impact sources within the parks is critical to herd survival.

Additional Impact of the Proposed Actions. The direct and indirect effects described for winter uses in the parks are key limiting elements for cumulative impacts. Stressed animals or herds whose winter forage options have become limited are likely to be affected cumulatively, through the additional impacts imposed by winter recreation use in the parks. Alternatives that limit all winter recreational use to trails away from thermal areas and close backcountry areas would decrease adverse cumulative impacts on ungulates. Backcountry nonmotorized uses could exacerbate unmitigated, long-term impacts on bighorn sheep in GTNP. In alternative G closure of backcountry areas important as bighorn sheep habitat would help reduce the total cumulative effect.

Federally Protected Species

The type of cumulative effects analysis for federally protected species required in an EIS differs from that required in a Biological Assessment (BA). In a BA cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area. Future federal actions that are unrelated to the proposed action are not considered (FWS 1998). In an EIS cumulative effects include all reasonably foreseeable future actions regardless of what agency (federal or nonfederal) undertakes such other actions (40 CFR § 1508.7).

Areas of Concern. For threatened and endangered species, the areas of concern include:

- The GYA grizzly bear recovery area.
- Existing effective wolf habitat within the three park units.
- Juxtaposed bald eagle nesting and forage areas within the three parks.
- Lynx habitat within the parks.

Potential Impact Sources. Potential impact sources within the areas of concern include any developed facilities or opportunities for human conflict with any of these species when they are present. In the winter this includes any human use near dens, nests, or food sources. For example, impacts to predator species are linked with impacts to ungulates.

Additional Impacts of the Proposed Actions. Potential winter impacts are not considered additive to other impacts that occur at other times and places within the area of concern. Therefore, cumulative impacts equate to those direct and indirect effects from winter use disclosed for these species earlier in this chapter. Most alternatives include activities that take place while bears are inactive for the winter. Therefore any conflicts associated with bears would be minor. Therefore, the additional impact under any alternative would be minor or negligible.

Ungulate management in the parks may affect availability of prey and wolves overall. The draft Bison Management EIS/Plan could affect wolves by reducing its prey base through management removals. In terms of the additional impact of winter use, all alternatives would have negligible or minor impacts on wolves.

Eagle populations are increasing in the GYA under the influence of, or unaffected by, current land management. Additional impacts of the winter use alternatives in the area of concern would be minor or negligible. Nest areas are currently protected in all the parks.

Lynx habitat within the area of concern is fragmented under existing management. None of the alternatives contribute to any greater fragmentation. The effects under existing management are minor or negligible — actions in other alternatives would not add to this condition and could improve it. Existing management includes various practices and measures that mitigate potential habituation and mortality.

Species of Special Concern

Areas of Concern. For all species of special concern, the area considered for cumulative impact assessment, is the collective habitat within the boundaries of the three park units.

Potential Impact Sources. Land use development, including additional commercial services development within the park units, impacts the survival of wolverine and fisher populations. Future road construction or developments in YNP as outlined in the Commercial Services Plan may occur in ungulate winter range. Road construction within YNP could further fragment wolverine and fisher use of home ranges. Commercial developments in ungulate winter range could affect carcass availability, and decrease

available habitat to wolverines and fishers. Hunting and habitat destruction outside the parks has impacted trumpeter swans.

Additional Impacts of the Proposed Actions. In YNP, increased backcountry skiing in remote, high elevation areas could cause displacement of wolverines into less suitable habitats. In YNP this is mitigated in the alternatives (B, D, and E) that limit backcountry skiing to designated routes and trails only; the impact is eliminated in alternative F, which closes the backcountry. In GTNP closures to protect bighorn sheep may be of benefit to wolverines as well. Additional impacts of winter use under all other alternatives are no greater than those occurring under current management. All alternatives would have minor or negligible impacts. Alternatives D and F could improve habitat by removing oversnow trails for motorized use that tend to fragment winter habitat.

Sound

Areas of Concern The area considered for cumulative impact assessment, is the natural soundscape within the boundaries on three park units.

Potential Impact Sources Since individual sources of sound are transient and short lived, the potential cumulative impact on the winter soundscape is those sounds occurring during that time. Sounds other than those that naturally occur in the park units during the winter include the sound of wheeled vehicular traffic along open roads, the sound of oversnow vehicles on groomed routes, aircraft overflights, and sounds attendant to facility developments open in the winter.

Additional Impacts of the Proposed Actions Where open facilities coincide with roads and oversnow motorized activities, the natural soundscape is impacted. There are such areas in the parks where the total cumulative effect is such that it renders the natural soundscape to be seldom evident for most of a winter day.

Cultural Resources

There would be no new cumulative impacts to cultural resources as a result of the continuing existing management.

For All Other Alternatives. Proposed construction could put archeological resources at risk. Such impacts would be mitigated to the fullest extent possible through avoidance and/or data recovery. A loss of historic fabric in structures that undergo adaptive rehabilitation could occur. The construction of visitor facilities, trailheads and trails, or camping sites could intrude upon potential cultural landscapes.

GLOSSARY

Act: The National Environmental Policy Act, as amended (42 U.S.C. 4321, et seq.) which is also referred to as "NEPA." (40 CFR §1508.2)

Activity: Action, measures, or treatments that are undertaken which directly or indirectly produce, enhance or maintain forest and rangeland outputs, or achieve administrative or environmental quality objectives.

Ambient sources: As applied to air quality, or natural soundscape, ambient sources are those that make up the background characteristics or the environmental baseline. They are sources of emissions or sound that are not generated locally, but rather at a distance and are unrelated to local sources of emissions or sounds.

Bear-human conflict: In the parks, conflicts include injury or death to humans or livestock, damage to property, or the obtaining of human food. Conflicts outside of the parks also include damage to orchards, gardens, and beehives.

Bear-human confrontation: Interactions between humans and bears that include bluff charges or other threatening behaviors, or result in the displacement of bears in response to humans.

Categorical Exclusion: A category of actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a Federal agency in implementation of these regulations (40 CFR §1507.3) and for which, therefore, neither an environmental assessment nor an environmental impact statement is required. (40 CFR §1508.4)

CEQ: Council on Environmental Quality.

CFR: Code of Federal Regulations.

Connected Actions: (40 CFR §1508.25) Actions are connected if they:

(i) Automatically trigger other actions that may require environmental impact statements.

(ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.

(iii) Are interdependent parts of a larger action and depend on the larger action for their justification.

Cooperating Agency: Any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment. The selection and responsibilities of a cooperating agency are described in 40 CFR §1501.6. A State or local agency of similar qualifications or, when the effects are on a reservation, an Indian Tribe, may by agreement with the lead agency become a cooperating agency. (40 CFR §1508.5)

Council: The Council on Environmental Quality established by Title II of the Act. (40 CFR §1508.6)

Cumulative Actions: Actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement. (40 CFR §1508.25)

Cumulative Impact: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR §1508.7)

Decision Document: A record of decision, decision memo, or decision notice.

Decision Memo: A concise written record of the responsible official's decision to implement an action that has been categorically excluded from documentation in an environmental impact statement or environmental assessment.

Decision Notice: A concise written record of the responsible official's decision based on an environmental assessment and a finding of no significant impact.

Displacement — Recreation: The movement of recreation visitors from a preferred recreation site or area due to conflicts with other users, crowding, or management action.

Displacement — Wildlife: Wildlife movement away from areas of human activity. Displacement may be temporary (until the activity ceases) or long-term. Long term displacement results in avoidance of certain habitats, and consequently may be especially adverse.

Ecosystem: Living organisms (biotic) together with their non-living (abiotic) environment, both forming an interactive system within an identifiable space or area.

Effects: (40 CFR 1508.8) These include:

(a) Direct effects, which are caused by the action and occur at the same time and place.

(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

(c) Cumulative, see cumulative impact.

Endangered Species: Any species (flora or fauna) classified by the U.S. Department of the Interior as being in danger of extinction throughout all or a significant portion of its range (not including insects determined to be pests).

Enjoyment: As used in NPS Management Policies, “enjoyment” means to derive benefit (including scientific knowledge) or inspiration from a park, and includes enjoyment both by people who directly experience the park and by those who appreciate it from afar.

Environmental Analysis: An investigation of a proposed action and alternatives to that action and their direct, indirect, and cumulative environmental impacts; the process which provides the necessary information for reaching an informed decision and the information needed for determining whether a proposed action may have significant environmental effects and determining the type environmental document required.

Environmental Assessment: (40 CFR §1508.9)

(a) a concise public document for which a Federal agency is responsible that serves to:

   (1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.

   (2) Aid an agency's compliance with the Act when no environmental impact statement is necessary.

   (3) Facilitate preparation of a statement when one is necessary.

(b) Shall include brief discussions of the need for the proposal, of alternatives as required by section 102(2)(E), of the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.

Environmental Document: Includes the documents specified in 40 CFR §1508.9 (environmental assessment), 40 CFR §1508.11 (environmental impact statement), 40 CFR §1508.13 (finding of no significant impact), and 40 CFR §1508.22 (notice of intent). (40 CFR §1508.10)

Environmental Impact Statement (EIS): A detailed written statement as required by section 102(2)(C) of the Act (40 CFR §1508.11). May be a Draft EIS (DEIS) that has been published and is available for public comment, or a Final EIS (FEIS) that has been produced following the public comment period. The primary purpose of an EIS is to serve as an action-forcing device to insure that the policies and goals defined in the Act are infused into the ongoing programs and actions of the Federal Government. It shall provide full and fair discussion of significant environmental impacts and shall inform the decision makers and the public of the reasonable alternatives, which would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data.

Environmentally Preferable Alternative: An alternative that best meets the goals of section 101 of the National Environmental Policy Act and required by 40 CFR §1505.2(b) to be identified in a record of decision. Ordinarily, this is the alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. In some situations, there may be more than one environmentally preferable alternative.

Extraordinary Mitigation: Mitigation measures that are above and beyond the standard mitigation required for a particular activity. Standard mitigation is often inferred by agency standards and/or guidelines, and generally must be applied under any circumstances, or is represented by generally accepted practices such as soil and water conservation measures.

Federal Agency: All agencies of the Federal Government. It does not mean the Congress, the Judiciary, or the President, including the performance of staff functions for the President in his Executive Office. (40 CFR §1508.12)

Finding of No Significant Impact (FONSI): A document by a Federal agency briefly presenting the reasons why an action, not otherwise excluded (40 CFR §1508.4), will not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared. It shall include the environmental assessment or a summary of it and shall note any other environmental documents related to it (40 CFR §1501.7(a)(5)). (40 CFR §1508.13)

Floodplains: As defined by EO 11988, as amended, lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a 1% or greater chance of flooding in any given year.

Flush: An immediate, short-term behavioral response to disturbance that includes flight or running from a perceived threat.

Habituation: The process by which an animal becomes desensitized to a particular stimulus. In this document, habituation refers to wildlife that have lost their innate wariness of humans, usually in response to a positive association such as obtaining food. Animals typically habituate to stimuli that are predictable and nonthreatening, such as highway traffic and routine sounds.

Human Environment: Shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment…This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment. (40 CFR §1508.14)

Impairment: As used in NPS Management Policies, The "impairment" means an adverse impact on one or more park resources or values that interferes with the integrity of the park's resources or values, or the opportunities that otherwise would exist for the enjoyment of them, by the present or a future generation. Impairment may occur from visitor activities, NPS activities in managing a park, or activities undertaken by concessioners, contractors, and others operating in a park. As used here, the impairment of park resources and values has the same meaning as the phrase "derogation of the values and purposes for which these various areas have been established," as used in the General Authorities Act.

Interdisciplinary Team: A group of individuals with skills from different resource areas. An interdisciplinary team is assembled to develop environmental analysis for a proposed action, in accordance with NEPA.

Irretrievable: A term that applies to the loss of production, harvest, and consumptive or nonconsumptive use of natural resources. For example, recreation experiences are lost irretrievably when an area is closed to human use. The loss is irretrievable, but the action is not irreversible. Reopening the area would allow a resumption of the experience.

Irreversible: A term that describes the loss of future options. Applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time.

Issue: A point of debate about the environmental effects of a proposed action. See also Significant Issue.

Jurisdiction by Law: Agency authority to approve, veto, or finance all or part of the proposal (40 CFR §1508.15). See also cooperating agency.

Lead Agency: The agency or agencies preparing or having taken primary responsibility for preparing the environmental impact statement. (40 CFR §1508.16) This also applies to environmental assessments. See also, joint lead agencies (40 CFR §1506.2(4)(c)).

Legislation: A bill or legislative proposal to Congress developed by or with the significant cooperation and support of a Federal agency, but does not include requests for appropriations. The test for significant cooperation is whether the proposal is in fact predominantly that of the agency rather than another source. Drafting does not by itself constitute significant cooperation. Proposals for legislation include requests for ratification of treaties. Only the agency that has primary responsibility for the subject matter involved will prepare a legislative environmental impact statement. (40 CFR §1508.17)

Major Federal Action: (40 CFR §1508.18) Includes actions with effects that may be major and which are potentially subject to Federal control and responsibility. Major reinforces but does not have a meaning independent of significantly (40 CFR §1508.27). Actions include the circumstance where the responsible officials fail to act and that failure to act is reviewable by courts or administrative tribunals under the Administrative Procedure Act or other applicable law as agency action.

(a) Actions include new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; new or revised agency rules, regulations, plans, policies, or procedures; and legislative proposals (40 CFR §1506.8, §1508.17). Actions do not include funding assistance solely in the form of general revenue sharing funds, distributed under the State and Local Fiscal Assistance Act of 1972, 31 U.S.C. 1221 et seq., with no Federal agency control over the subsequent use of such funds. Actions do not include bringing judicial or administrative civil or criminal enforcement actions.

(b) Federal actions tend to fall within one of the following categories:

(1) Adoption of official policy, such as rules, regulations, and interpretations adopted pursuant to the Administrative Procedure Act, 5 U.S.C. 551 et seq.; treaties and international conventions or agreements; formal documents establishing an agency's policies which will result in or substantially alter agency programs.

(2) Adoption of formal plans, such as official documents prepared or approved by federal agencies which guide or prescribe alternative uses of Federal resources, upon which future agency actions will be based.

(3) Adoption of programs, such as a group of concerted actions to implement a specific policy or plan; systematic and connected agency decisions allocating agency resources to implement a specific statutory program or executive directive.

(4) Approval of specific projects, such as construction or management activities located in a defined geographic area. Projects include actions approved by permit or other regulatory decision as well as Federal and federally assisted activities.

Mitigation (40 CFR §1508.20):

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.

NEPA Process: All measures necessary for compliance with the requirements of section 2 and Title I of NEPA.

Notice of Intent: A notice that an environmental impact statement will be prepared and considered. (40 CFR §1508.22)

Park Resources and Values: Resources and values of a park whose conservation is essential to the purposes for which the area was included in the national park system, including both the Organic Act's fundamental purpose for all parks, as supplemented and clarified by the General Authorities Act, and any additional purposes stated in a park's establishing legislation or proclamation. Under the Organic Act and the General Authorities Act, these resources and values always include, but are not limited to, all of the following, to the extent they are present in the park: the biological and physical processes that created the park and continue to act upon it; scenic features; natural landscapes; natural sounds and odors; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites and structures; museum collections; native plants and animals; clear daytime vistas and night skies. The term also includes opportunities to experience enjoyment of the above resources and values, to the extent that can be done without impairing any of them.

"Park resources and values," as used in Management Policies, do not include any attributes of a park whose conservation is not essential to the purposes for which a park was designated. For example, the term does not include non-native species or man-made structures that are not historic or prehistoric, unless their conservation is essential to a specific additional purpose for which an individual park was established.

Preferred Alternative: The alternative(s) which the agency believes would best fulfill its statutory mission and responsibilities, giving consideration to environmental, social, economic, and other factors and disclosed in an environmental impact statement.

Programmatic EIS: An environmental impact statement designed to evaluate the relative effects of alternative plans or programs that will guide or prescribe alternative uses of Federal resources, upon which future agency actions will be based.

Programmatic Plan: A major Federal action, developed through the NEPA process, upon which future agency actions will be based. An EIS is normally written to provide choices for prescriptions and connected or related actions, whose eventual decision is the selected plan. See Major Federal Action.

Proposal: Exists at that stage in the development of an action when an agency subject to the Act has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated... A proposal may exist in fact as well as by agency declaration that one exists. (40 CFR §1508.23)

Proposed Action: A proposal made by the lead agency to authorize, recommend, or implement an action to meet a specific purpose and need (see proposal).

Public Comment: Comments provided by interested or potentially affected parties on an environmental document during an official comment period, as required in NEPA.

Scope: The range of actions, alternatives, and impacts to be considered in an environmental impact statement. (40 CFR §1508.25)

Scoping: The procedure by which the agency identifies important issues and determines the extent of analysis necessary for an informed decision on a proposed action. Scoping is an integral part of environmental analysis.

Significant Issue: (see "issue")... An issue that explicitly links the proposed action (or a feature of the proposal) to a potential environmental effect. Significant issues are those that are determined to be "deserving of study" (40 CFR §1500.4, §1501.7, and §1502.14) within the context of the purpose and need for action, and can therefore become the basis for an alternative to the proposed action.

Significantly: This term includes both context and intensity (40 CFR §1508.27):

(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

(2) The degree to which the proposed action affects public health or safety.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Similar Actions: Actions which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. (40 CFR §1508.25)

Site-specific Actions: Actions that are specific and focused to a defined and limited place and time. In the context of an analysis, site-specificity usually refers to the analysis of a specific project in a defined geographic area, such as a construction project. Such projects are normally done in order to achieve the goals and objectives that are defined in a plan that has been approved through NEPA in a "programmatic EIS" and record of decision. See Programmatic EIS. See Major Federal Action.

Soundscape: The natural ambient soundscape is the aggregate of all the natural sounds that occur in parks, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The natural ambient sound level — that is, the environment of sound that exists in the absence of human-caused noise — is the baseline condition, the standard against which current conditions in a soundscape will be measured and evaluated.

Special Expertise: Statutory responsibility, agency mission, or related program experience. (40 CFR §1508.26). See also Cooperating Agency.

Tiering (40 CFR §1508.28): The coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basinwide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared. Tiering is appropriate when the sequence of statements or analyses is:

(a) From a program, plan, or policy environmental impact statement to a program, plan, or policy statement or analysis of lesser scope or to a site-specific statement or analysis.

(b) From an environmental impact statement on a specific action at an early stage (such as need and site selection) to a supplement (which is preferred) or a subsequent statement or analysis at a later stage (such as environmental mitigation). Tiering in such cases is appropriate when it helps the lead agency to focus on the issues that are ripe for decision and exclude from consideration issues already decided or not yet ripe.

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