

APPENDIX A

CONSULTATION AND COORDINATION WITH THE COOPERATING AGENCIES

INTRODUCTION

By special agreement as provided under 40 CFR §1501.6 and §1508.5, the National Park Service (NPS), the lead agency in this Environmental Impact Statement (EIS), has collaborated with nine cooperating agencies in the EIS process: 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. The Council on Environmental Quality (CEQ) regulations for implementing National Environmental Policy Act (NEPA) define a cooperating agency as any agency that has jurisdiction by law or, in this case, special expertise for proposals covered by NEPA. See Chapter I for further discussion of cooperating agency involvement and their identified areas of expertise. The Memorandums of Agreement for all agencies were published in the Draft Environmental Impact Statement (DEIS), Volume II, Appendix I. The following timetable illustrates the extent to which the NPS interacted with cooperating agencies subsequent to The Fund for Animals lawsuit.

Table 1. Timetable of events

| Date | Event/Action |
|----------------|---|
| 12/1997-1/1998 | The NPS grants cooperating agency status to three adjoining states, five adjoining counties and USFS. [†] |
| 2/1998 | Cooperators asked to submit comments on whether to produce a General Management Plan or a Winter Use Plan. |
| 2/13/1998 | First Winter Use Cooperators Meeting held in Bozeman (News Release). |
| 4/14/1998 | Federal Register "Notice of Intent" on <i>Winter Use Plans/EIS</i> published (News release 4/15/1998). |
| 4/30/1998 | Conference call with cooperators. |
| 5/22/1998 | Meeting with all cooperators in Jackson, Wyoming. |
| 6/1/1998 | Cooperators consulted on dates and locations for scoping meetings, invited to attend. |
| 6/14-7/16/1998 | Open house scoping meetings held at 16 locations across country (News Releases 6/4, 6/15 and 7/1/1999). |
| 7/18/1998 | Scoping process ends on <i>Winter Use Plans/EIS</i> . |
| 7/31/1999 | Cooperators asked to review the draft study design, draft sample plan and draft questionnaire for economic study. At request of the State agencies, The NPS contracts with three experts designated by the states to provide peer review of the study and draft report. |
| 8/5/1998 | Conference calls with all cooperators. |
| 8/12/1998 | Hard copies of all scoping comments provided to cooperators upon their request. |
| 8/26-27/1998 | Meeting with cooperators in Cody, Wyoming. |
| 9/3/1998 | Copies of <i>YNP[†] Winter Survey (1997-1998)</i> and report <i>Social Conditions of Winter Use in YNP (1997)</i> sent to cooperators. |
| 9/11/1998 | Draft scoping content summary analysis and copies of documents, which define the NPS mission and goals sent to cooperators. |
| 9/29/1998 | <i>Preliminary Bibliography for Winter Use Research</i> sent to cooperators. |
| 10/1/1998 | Final summary of issues identified during scoping sent to cooperators. |
| 10/14-16/1998 | Alternatives Concept Workshop with cooperators held in Idaho Falls. |
| Fall 1998 | Deputy Regional Director Mike Snyder agrees to Paul Kruse request to allow |

| Date | Event/Action |
|------------|---|
| | cooperators 5 working days response time on any request for input from the NPS. |
| 11/20/1998 | Four draft preliminary winter use alternatives released to cooperators for review and input. |
| 12/7/1998 | Comments due from cooperators on draft preliminary winter use alternatives. |
| 12/18/1998 | Clifford Hawkes letter to cooperators setting tentative 1/25/1999 date for release of draft alternatives to cooperators. |
| 1/27/1999 | Regional Director John Cook letter to cooperators regarding delay in release of draft winter use alternatives. |
| 2/26/1999 | Regional Director John Cook letter to cooperators regarding continued delay in release of draft winter use alternatives. |
| 3/5/1999 | Department of Justice (DOJ) request extension of deadlines for Draft Plans/EIS, Final Plans/EIS and ROD. |
| 3/23/1999 | The Fund for Animals agrees to extension of deadlines, but with stipulations the NPS finds unacceptable. |
| 4/2/1999 | Regional Director John Cook letter to the NPS Director Stanton requesting release of draft alternatives to cooperators. |
| 4/19/1999 | Draft Winter Use alternatives released to cooperators for review and input. |
| 5/19/1999 | Revised <i>Winter Use Plans/EIS</i> timeline sent to cooperators. |
| 5/24/1999 | Comments due from cooperators on draft winter use alternatives. |
| 6/16/1999 | Regional Director John Cook response letters to cooperators regarding comments on draft alternatives. |
| 6/24/1999 | Preliminary <i>Draft Winter Use Plans/EIS</i> released to cooperators for review and comment. |
| 6/28/1999 | Paul Kruse response to YNP Superintendent Finley's 5/18 response to Senators Burns, Enzi, Craig, & Crapo. |
| 7/1/1999 | Comments due from the NPS and cooperators on preliminary <i>Draft Winter Use Plans/EIS</i> . |
| 7/7/1999 | YNP Superintendent Finley requests 45-day extension for release of <i>Draft Winter Use Plans/EIS</i> . |
| 7/28/1999 | Letter from Superintendent Finley to Paul Kruse responding to Kruse June 28 letter: define CAs roles, clarify EIS schedule and timeframes, and clarify sharing of socio-economic information. |
| 7/30/1999 | <i>Draft Winter Use Plans/EIS</i> posted to Internet for public review and comment. |
| 8/10/1999 | Letter from Wyoming Governor Geringer to the NPS Intermountain Regional Director John Cook requesting 30-day extension of comment period until Nov. 15. |
| 8/17/1999 | Letter to Wyoming Governor Geringer from the NPS Intermountain Regional Director John Cook responding to August 10 letter: granting 30-day extension of comment period. |
| 8/23/1999 | CAs provided with raw data from "Winter 1998-99 Visitor Survey Yellowstone, GTNP [†] , and the GYA [†] " |
| 8/25/1999 | Printed copies of <i>Draft Winter Use Plans/EIS</i> available. |
| 9/28/1999 | Close of public review and comment period on <i>Draft Winter Use Plans/EIS</i> . |
| 9/29/1999 | Letter from Wyoming County Commissioners Association to Superintendent Finley about resolution passed by Association in support of Revised Alternative E. |

| Date | Event/Action |
|---------------|---|
| 10/12/1999 | Fax to CAs regarding extension of comment period on DEIS to 12/01/1999 and letter to CAs to re-confirm meeting times/locations for public hearings on EIS/Plans. |
| 10/18/1999 | "Draft Report Winter 1998-99 Visitor Survey Yellowstone, GTNP, and the GYA: Analysis and Results" released to CAs, with request for comments. |
| 10/22/1999 | Letter to CAs regarding extension of comment period on DEIS to 12/01/1999. |
| 11/02/1999 | Letter from Park County, Wyoming requesting hearing in St. Anthony, Idaho and requesting original DEIS document. |
| 11/03/1999 | Letter from Paul Kruse to NPS Director Stanton regarding CA counties' complaint about release of ARD report on the air quality in YNP without providing the report to the CAs for review prior to release to the public. |
| 11/24/1999 | Letter from Superintendent Finley to Charles Johnstone, Park County, Wyoming commissioners, responding to November 2, 1999 commissioners' letter: deny additional public hearing in St. Anthony, Idaho and clarify that no known amendments to DEIS made in Washington D.C. |
| 11/30/1999 | Fax/letter to CAs regarding extension of comment period on DEIS to December 15 |
| 12/08/1999 | Letter from Bill Paddleford, Teton County, Wyoming commissioner, regarding concerns about socio-economics impacts |
| 12/13-14/1999 | Letters to Superintendent Finley from Park County, Montana and Park County, Wyoming requesting explanation of comment period extension, copies of comments, list of winter use studies completed or to be completed and study abstracts, and all extension requests and approvals |
| 1/26/2000 | Letter from Kim Raap, Wyoming CA representative, requesting copies of comments; update of comment tally; list of winter use studies and status, funding sources for studies, study designs; information on the NPS use of 4-stroke Arctic Cat snowmobiles |
| 2/11/2000 | "Draft Report Summer 1999 Visitor Survey Yellowstone, GTNP, and the GYA: Analysis and Results" released to CAs with request for their comments |
| 2/25/2000 | Fax to CAs to inform them of 03/10/2000 CA meeting in Jackson, Wyoming |
| 3/02/2000 | Report: "Air Quality Concerns Related to Snowmobile Usage in National Parks" released to CAs before public release |
| 3/13/2000 | Meet with cooperating agencies in Jackson, Wyoming, to inform them of the preferred alternative leaning, and process on comment analysis. Invitation to cooperators to comment. Cooperating agencies provided with copies of comments |
| 3/22/2000 | Letter to Don Barry, Assistant Secretary of the Interior for USFWS [†] and Parks, from Governors Kempthorne, Racicot, and Geringer as the three states' formal response on revised alternative G from the March 13 CA meeting |
| 3/23/2000 | Draft meeting notes from March 13 CA meeting sent for review to CAs, Pam Buline, field representative for Wyoming Senator Craig Thomas |
| 4/04/2000 | Report: "Draft Report National Phone Survey of Attitudes Toward Management of YNP" released to CAs, with request for their comments |
| 4/04/2000 | Cooperating Counties letter to Don Barry, Assistant Secretary, as formal comments on revised alternative G from the March 13 CA meeting |
| 4/12/2000 | CAs mailed additional comment letters that were not available at the March 13 meeting |
| 4/18/2000 | Fax and letter with three page detailed description of revised alternative G to CAs, as requested at May 18, 2000 CA meeting |

| Date | Event/Action |
|-----------|---|
| 4/24/2000 | Kim Raap, State of Wyoming, letter to Steve Iobst requesting items to be put on agenda of May 18 CA meeting |
| 4/25/2000 | Winter entrance statistics sent to Paul Kruse per his request |
| 5/12/2000 | Comment summaries and executive summary of comments on DEIS sent to CAs |
| 5/12/2000 | Final Report: "Winter 1998-99 Visitor Survey Yellowstone, GTNP, and the GYA" released to CAs |
| 5/18/2000 | Meeting with all cooperators in Bozeman, Montana |
| 5/22/2000 | Annual "National Parks Day" meeting with the Community of Cody, Wyoming to discuss the Winter Use Plan and the direction the national parks are heading with regard to snowmobile use |
| 5/24/2000 | Draft meeting notes from May 18 CA meeting sent for review to CAs, Dalles Scholes-field representative for U.S. Senator Enzi, and Todd O'Hair-field representative for Congressman Hill |
| 6/5/2000 | Copies of preliminary FEIS [†] mailed to cooperating agencies for review |
| 6/27/2000 | Comments from cooperating agencies on preliminary FEIS due |

[†]USFS=U.S. Forest Service; YNP=Yellowstone National Park; GTNP= Grand Teton National Park; GYA=Greater Yellowstone Area; USFWS=U.S. Fish and Wildlife Service; CA=Cooperating Agencies.

Other meetings that pertained to Winter Use are described below.

Since 1995, Yellowstone National Park (YNP) has been party to an agreement sponsored by the Gallatin County, Montana Commissioners "Concerning a Coordinated Ecosystem Approach to Planning in Gallatin County" that includes the U.S. Forest Service (USFS), Bureau of Land Management, City of Bozeman, Montana Fish, Wildlife, and Parks, and the Montana Department of State Lands. Park staff usually attends the thrice-yearly meetings, and winter use has been a typical update or discussion subject at most sessions since mid-1997.

Superintendents from Grand Teton and Yellowstone National Parks, Forest Supervisors from the Gallatin, Targhee-Caribou, Beaverhead-Deerlodge, Bridger-Teton, Shoshone, and Custer National Forests, and the Manager of the National Elk Refuge are part of the Greater Yellowstone Coordinating Committee (GYCC). The interagency winter use assessment was sponsored by the GYCC, and the new Winter Use Plan and EIS have been discussed since 1998.

THE DRAFT PRELIMINARY ALTERNATIVES

The alternatives for this EIS were formulated by the NPS in accordance with the CEQ Regulations to use the proposals of cooperating agencies "to the maximum extent possible consistent with its responsibility as lead agency." A series of alternative concepts workshops were held with the cooperating agencies and NPS representatives on the local and regional levels (40 CFR §1501.6(a)(2)). On October 14-16, 1998, the NPS hosted an alternatives concept workshop in Idaho Falls, Idaho. Representatives from all nine cooperating agencies were broken into five interagency teams that also included the NPS representatives. The primary role of the NPS representatives was to provide technical expertise in areas such as park operations and wildlife management. Teams were provided with documents regarding the dictates of federal law and Park Service mission and policy. Groups clarified the issues identified through the scoping process and formulated and mapped their own set of management actions and alternatives.

At the conclusion of the workshop, a representative presented each group's alternatives concepts to the entire assembly. Final presentations were recorded on two audiotapes that were subsequently transcribed. The following is a list of ideas for actions that emerged from that workshop with the cooperating agencies. Ideas have been categorized by goal and/or subject.

COOPERATING AGENCY ALTERNATIVES CONCEPTS

Increase access and affordability through road plowing:

- Plow the road from West Yellowstone, Montana to Old Faithful with no snowmobile route alongside
- Plow the road from West Yellowstone to Old Faithful with snowmobile route alongside
- Plow the road from West Yellowstone to Old Faithful and allow mass transit (snowcoach) only throughout the rest of the park
- Plow the roads from Madison to Norris, West Yellowstone, Montana to Old Faithful
- Do not plow the road from Colter Bay to Flagg Ranch (groomed snowmachines route instead)
- Plow the Teton Park Road from Moose to Jackson Lake Junction

Encourage/discourage use by season or time:

- Lengthen the winter season
- Allow only snowcoaching and skiing during the last two weeks of season
- Keep roads open only during daylight hours

Encourage/discourage use by grooming or maintenance levels:

- Maintain all groomed surfaces more frequently for improved visitor experiences
- Groom Grassy Lake Road more frequently
- Groom Grassy Lake Road less frequently
- Groom west side routes less frequently
- Groom fewer ski trails
- Do not groom ski trails in either park
- Attach grooming machine to the back of snowcoaches

Encourage/discourage use levels via facilities:

- Initiate overnight lodging at Canyon/Lake/Jackson Lake Lodge
- Provide additional low-cost accommodations at Old Faithful
- Reduce overnight accommodations at Old Faithful
- Create a backcountry hut system
- Upgrade/create additional warming huts/restrooms
- Concentrate amenities at entrance points to the parks--Center of parks provide a "wilderness island experience"

Increase diversity of opportunities:

- Introduce motorized and nonmotorized zones to Yellowstone Lake
- Initiate sleigh rides at Mammoth Hot Springs
- Groom campground roads for skiing
- Groom ski trails near major destination areas in both parks
- Do not groom Teton Park Road and Moose-Wilson Road—allow only nonmotorized use there
- Open Grassy Lake Road to outfitters

Encourage/discourage use by adding, changing, and/or eliminating additional/alternative motorized routes:

- Create new route through Bechler area to Old Faithful

- Open Potholes area to motorized use
- Open off-trail motorized play areas at Jackson Lake, the Parkway, and the southwest quadrant of YNP below the Continental Divide
- Move the Continental Divide Snowmobile Trail (CDST) to utility corridor
- Open utility corridors at Slough Creek to motorized use
- Open utility corridors at Yellowstone Lake to motorized use
- Close the CDST through Grand Teton National Park (GTNP)

Initiate and/or encourage alternative transportation, such as mass transportation:

- Create a “hyper-car” alternative (similar to monorail) to destination points
- Remove snowmobiling, institute oversnow mass transit only
- Create subsidized oversnow shuttle to increase access and affordability

Wildlife closures/restrictions to use:

- Prohibit recreation in winter wildlife range
- Prohibit stopping/getting off machines or leaving trail/designated routes
- Allow hunting by Native Americans to curb ungulate populations
- Allow skiing in winter range, mitigate through education
- Post wildlife migrations daily, adjust visitor use patterns/routes accordingly
- Eliminate ski trail at Blacktail Plateau

Adaptive management:

- Utilize adaptive wildlife management

General:

- Physically separate motorized from nonmotorized uses
- Prohibit motorized use on Jackson Lake
- Prohibit snowplanes on Teton Park Road
- Work with states and local communities to coordinate visitor recreation opportunities

Require clean and quiet machines:

- Phasing concept:
2000/2001 ethanol/methanol and synthetic fuels only sold in park;
2001/2002 green machines required for all commercial trips;
2008/2009 all green machines
- Phasing concept:
2 to 5 years alternative fuels and lubes;
5 years direct two-stroke and alternative fuels and lubes;
10 to 20 electric or hybrid fuel cell;
- Require clean, quiet machines on all park roads
- Increase emphasis on emission and sound controls
- Continue to use today’s emissions and sound standards
- Require clean, quiet snowmachine use on Jackson Lake and West Thumb
- Require clean, quiet motorized use on Teton Park Road
- Initiate a progressive 5 year sound abatement program
- Mandate new technology as it becomes available

Implement permits, reservations, and/or fees through the following mechanisms:

- Differential pricing: e.g., reduce entrance fees during slower seasons
- Fee increases to manage use levels
- Use limitations (number of visitors)

- Permit/reservation system
- Safety certification
- A cap on snowmobile numbers at current levels of use

After the October alternatives concepts workshop, representatives from the NPS held similar workshops with the NPS employees at the local and regional levels. From the meetings, representatives formulated an initial set of draft preliminary alternatives based on the concepts and ideas generated at all the workshops and during public scoping.

COOPERATING AGENCY ALTERNATIVES CONCEPTS INCLUDED IN THE INITIAL DRAFT PRELIMINARY ALTERNATIVES

Many innovative suggestions or comments by the cooperating agencies were incorporated into the purpose and need for action. While formulating the draft preliminary alternatives, representatives of the NPS reviewed all of the management actions listed above, as well as those suggested by the NPS employees in workshops held in YNP and GTNP for:

- a) relevance to the purpose, need, and scope of the document,
- b) contribution to its goals, and
- c) accordance with the dictates of federal law and the Park Service mission

Many of the ideas generated at the workshop were included in the draft preliminary alternatives that were distributed to the cooperating agencies on November 20, 1998. Below is a list of those ideas, indexed according to the letter-name of the draft preliminary alternatives in which they appeared.¹

Sixty-eight percent of the ideas generated at the alternatives concept workshop that were within the scope of the purpose and need of this EIS, and could potentially help to resolve that need, appeared in the initial set of draft preliminary alternatives.

Increase access and affordability through road plowing (4 of 7):

- Plow the road from West Yellowstone, Montana to Old Faithful and allow all-wheeled vehicles with no snowmobile route alongside; A
- Plow the road from West Yellowstone to Old Faithful and allow all-wheeled vehicles with snowmachine route alongside; A
- Plow the roads from Madison to Norris, West Yellowstone, Montana to Old Faithful; A
- Do not plow the road from Colter Bay to Flag Ranch (groomed snowmachines route instead); B, C

Encourage/discourage use by season or time (2 of 3):

- Allow only snowcoaching and skiing during last two weeks (changed to “month,” in certain area) of season; A
- Keep roads open only during daylight hours; B, C (lower nighttime limit), D

¹ The initial set of draft preliminary alternatives (released November 20, 1998) included four alternatives, and the revised set (released April 19, 1999) included seven. The alternatives common to the two sets are similar but not identical. The three remaining alternatives in the revised set include a no action alternative and two alternatives whose elements were drawn from the initial set of alternatives. The two alternatives sets generally correspond as follows, with the initial set listed first: A=C, B=D, C=E, and D=F. These letters correspond to the initial set of draft preliminary alternatives, rather than the letter-names of the revised draft preliminary alternatives.

Encourage/discourage use by grooming or maintenance levels (3 of 7):

- Maintain all groomed surfaces more frequently for improved visitor experiences; A
- Groom Grassy Lake Road less frequently; B
- Groom Grassy Lake Road more frequently; A

Encourage/discourage use levels via facilities (1 of 6):

- Upgrade/create additional warming huts/restrooms; A, B

Increase diversity of opportunities (2 of 6):

- Groom campground roads for skiing; A, B
- Groom ski trails near major destination areas in both parks A, B

Encourage/discourage use by adding, changing, and/or eliminating additional/alternative motorized routes (3 of 7):

- Move the CDST to utility corridor (or away from road); A, B
- Open utility corridors in Lake/Fishing Bridge area to motorized use; A
- Close the CDST through GTNP (provide shuttle service); C

Initiate and/or encourage alternative transportation, such as mass transportation (1 of 3):

- Create subsidized oversnow shuttle to increase access and affordability; B

Wildlife closures/restrictions to use (2 of 6):

- Prohibit recreation in winter wildlife range; C, D
- Prohibit stopping/getting off machines or leaving trail/designated routes; D

Adaptive management (1 of 1):

- Utilize adaptive wildlife management; C

General (2 of 4):

- Separate uses; A, B
- Prohibit motorized use on Jackson Lake; C, D

Require clean and quiet machines (4 of 7):

- Phasing concept; A, B, D
 - 2000/2001 ethanol/methanol and synthetic fuels only sold in park (changed to 2001/2002 to allow grace period for implementation);
 - 2001/2002 green machines required for all commercial trips (changed to 2002/2003 to allow grace period for implementation);
 - 2007/2008 all green machines
- Require clean, quiet machines on all park roads; B, D
- Increase emphasis on emission and sound controls; A, B, C
- Mandate new technology as it becomes available; C

Implement permits/reservations/fees:

- Implement safety program; B

**IDEAS CONSIDERED BUT NOT INCLUDED IN THE INITIAL DRAFT
PRELIMINARY ALTERNATIVES**

Ideas that were considered but not incorporated into the initial draft preliminary alternatives fell into four categories.

- A. Outside the scope of the purpose and need of this EIS and/or within the scope of a concurrent EIS,

- B. Outside the scope of the purpose and need for this EIS and/or illegal according to federal statute or Executive Order,
- C. Outside the scope of a programmatic plan, or
- D. Not effective means for resolving the need and meeting the objectives of this EIS (see the NPS Director's Order 12, Sec. 207(B), "Reasonable Alternatives").

Ideas that fall into each category are discussed below.

A. Management actions outside the scope of the purpose and need of this EIS and/or within the scope of a concurrent EIS:

- 1. Initiate overnight lodging at Canyon/Lake/Jackson Lake Lodge
- 2. Provide additional low-cost accommodations at Old Faithful
- 3. Reduce overnight accommodations at Old Faithful
- 4. Create a backcountry hut system
- 5. Initiate sleigh rides at Mammoth Hot Springs
- 6. Open the Grassy Lake Road to outfitters

Because all of these actions refer to activities or services to be conducted in the park by private parties charging a fee, they specifically fit the definition of commercial services, and so would be more appropriately addressed in a Commercial Services Plan (CSP). The CSPs for all three park units are currently in process. This also becomes clear in examining the purpose, need, and scope of each plan; whereas the scope of the Winter Use Plans/EIS requires that it focus on "desired resource conditions and experiences, rather than on the details of how they should be achieved," the CSP is specifically designed to determine a) what types of services and facilities are appropriate to the National Park, and b) what levels of appropriate services and facilities are necessary to serve visitors (Project Agreement, Winter Use Plans/EIS for Yellowstone and Grand Teton National Parks and the John D Rockefeller, Jr., Memorial Parkway; Grand Teton Commercial Services Plan; Draft Yellowstone Commercial Services Plan, 1/8/98). Further, the current draft preliminary winter use plans alternatives are consistent with the management action in the Commercial Services Plan, and some of the ideas listed here are currently being analyzed in the Environmental Assessment which will accompany the CSPs.

B. Management actions outside the scope of the purpose and need for this EIS and/or illegal according to federal statute or Executive Order:

- 1. Create new route through Bechler area to Old Faithful
- 2. Open Potholes area to motorized use
- 3. Open off-trail motorized play areas at the Potholes, the Parkway, and the SW quadrant of YNP below the Continental Divide
- 4. Allow hunting by Native Americans in order to curb ungulate populations

Because the area suggested for development in management action 1 has been recommended for wilderness designation, implementation of that action would constitute a violation of several

federal statutes and policies that govern the NPS.² Section 6:3 of the NPS Management Policies states that:

The Park Service will take no action that would diminish the wilderness suitability of an area recommended for wilderness study or for wilderness designation until the legislative process has been completed.

Executive Order (EO) 11644 (Amended 11989) states that:

(4) Areas and trails shall not be located in officially designated wilderness or primitive areas. Areas and trails shall be located in areas of the National Park system, Natural areas or National Wildlife Refuges and Game Ranges only if the respective agency head determines that off road vehicle use in such locations will not adversely effect their natural, aesthetic, or scenic values.

The Code of Federal Regulations (CFR 1, Sec. 2.18) states that:

The use of snowmobiles is prohibited, except on designated routes and water surfaces that are used by motor vehicles or motorboats during other seasons. Routes and water surfaces designated for snowmobile use shall be promulgated as special regulations. 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.

Implementation of actions 2 and 3 would similarly violate EO 11644 (Amended 11989) and 36 CFR 1, Sec. 2.18. Park staff members also believe that these actions could lead to serious adverse resource impacts, particularly in geothermal areas. It is possible that some of these management actions would be contrary to the Purpose and Need statement of this plan, which states that “winter recreation within Grand Teton and Yellowstone National Parks should complement or remain subordinate to the unique aspects of each landscape within the ecosystem” (Project Agreement, Winter Use Plans/EIS for Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway).

Implementation of action 4 would constitute a violation of 36 CFR 1, Sec. 2.2, which prohibits hunting in the National Parks except for the JDRMP. Instituting this action is also beyond the scope of this EIS, as it would require the establishment of a wildlife carrying capacity for YNP, a topic that would be more appropriately addressed in a resource or wildlife management plan.

C. Management actions outside the scope of a programmatic plan:

1. Attach grooming machines to the back of snowcoaches
2. Implement differential pricing. For instance, reduce entrance fees during slower seasons
3. Implement fee increases to manage use levels

² Related to the subject of human development, the federal Wilderness Act (1964) defines “wilderness” as “an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable” (Wilderness Act, 78 Stat. 987, 1964).

As outlined in the Director's Order 2: Park Planning, there are four levels of planning in which the NPS engages: General Management, Strategic, Implementation, and Annual Performance. The scope of this document places it within the category of General Management Planning, which focuses on "why the park was established and what resource conditions and visitor experiences should be achieved and maintained over time" (Director's Order 2: Park Planning; USDOl; May, 1998, p5). Because they deal specifically with methods by which goals could be achieved, the management actions listed here would be more appropriately considered in an Implementation Planning document. According to the NPS planning policy, "implementation planning will usually tier from a general management plan, or its equivalent, and it will analyze and describe specific actions and locations for meeting a plan objective. As is outlined in its Purpose and Need and Scope, this EIS is designed to develop a programmatic plan for achieving long-term goals rather than establishing site specific actions or actions that do not require EIS analysis for approval (such as speed limits, signing or enforcement actions).

D. Management actions that were determined ineffective for meeting the objectives of this EIS:

1. Groom west side routes less frequently
2. Introduce motorized and nonmotorized zones to Yellowstone Lake
3. Open utility corridors at Slough Creek to motorized use
4. Groom fewer ski trails
5. Do not groom ski trails in either park
6. Allow skiing in winter range; mitigate through education
7. Post wildlife migrations daily, adjust visitor use patterns/routes accordingly
8. Create a backcountry hut system
9. Create a "hyper-car" alternative (similar to monorail) to destination points
10. Prohibit snowplanes on Teton Park Road
11. Create a "wilderness island" experience

Management actions 1 and 2 would not effectively contribute to the goals of the EIS because their implementation would pose significant safety risks to park visitors. Due to the volume of visitors entering the park from the West Entrance (48% of all winter recreational visitors from December 1994-March 1999), action 1 could cause dangerously poor road conditions, and make even periodic grooming very difficult (Monthly Travel Data Reports, YNP Visitor Services Office). Action 2 is impracticable because the Lake's many thermal features and rapidly changing ice conditions make it unsafe for winter use activities. In spite of YNP's extreme climate, some areas of Yellowstone Lake remain ice-free throughout the winter. For instance, at Mary Bay/Sedge Bay, hydro-thermal vents, some located only 20 feet beneath the Lake's surface, produce hot springs of 80 degrees Fahrenheit which often prevent the Lake from ever freezing over near the shoreline (Charles Remsen, J. Val Klump, Jerry Kaster, Robert Paddock, Patrick Anderson, & James Maki, "Hydrothermal Springs and Gas Fumaroles in Yellowstone Lake, Yellowstone National Park, Wyoming" *National Geographic Research* 6(4): 509-515 (1990); Jerry Kaster, J. Val Klump, & Charles Remsen, "Sub-lacustrine Fumarole Communities in Yellowstone Lake: Naturally-Occurring Hydroponic System" Final Report, National Geographic Society Grant No. 3170-85, University of Wisconsin—Milwaukee Center for Great Lakes Studies, (no date), 2-4). West Thumb is another highly active thermal area, and geothermal studies conducted during the 1980s indicate that hydro-thermal springs may be a widespread

phenomenon throughout the Lake (Kaster, Klump, & Remsen, “Sub-lacustrine Fumarole Communities in Yellowstone Lake,” 4). In the winters of both 1997-98 and 1998-99, the Lake inexplicably froze and then thawed in the middle of the winter (Will Rizzo, “Park officials ponder unfrozen lake” *Livingston Enterprise*, February 17, 1999).

Because Slough Creek is accessed via the plowed road that runs between Gardiner and Cooke City, Montana, potential snowmobilers would have to trailer their machines for 24-29 miles in order to take a very brief ride. The Slough Creek area has several other drawbacks, including:

- The area has been identified by biologists as important wildlife winter range
- Snow cover is unreliable at its lower elevation
- Other utility corridors were proposed for this use in the initial draft alternatives

Actions 4, 5, 6, and 7 were proposed as ways to reduce impacts to wildlife. However, because research has found that animals better adapt to well-defined areas of concentrated use than to intermittent use patterns, none of these actions would produce a significant benefit toward realizing this goal. Action 7 is being explored on a seasonal basis, but is problematic due to the difficulty of tracking wildlife on a daily basis. Also, evidence of grooming for visitor use can remain on the snow surface for lengthy periods, and so redirecting visitor use on a daily would appear to represent a greater impact on wildlife.

Constructing a series of backcountry huts and connecting trails would appear to be inconsistent with management prescription 11 for this EIS, which addresses backcountry areas where use is permitted. Prescription 11 states not only that backcountry areas must have “no facilities,” but also must “generally appear natural and untouched by humans,” with “little to no evidence of resource modification” (Management Prescriptions matrix for Draft Preliminary Winter Use Alternatives). Facilities for overnight lodging are included only in prescription 1, which addresses destination areas. It is questionable at this time whether these additional facilities would be utilized to such an extent as to justify their addition. In winter 1996-97, the existing 10-yurt camp at Canyon logged only 418 user days, and only 114 backcountry permits were issued (YNP Concessions Office, YNP Backcountry Office). Should the demand arise for this use, temporary yurt facilities could be considered for other areas and administered through concession plans following additional environmental analysis.

Although the benefits of action 9 might eventually prove to be attractive and substantial, the NPS must consider cost-effective alternatives for this EIS. Implementation costs of action 9 would be enormous, and because a hyper-car system would require year-round implementation, this action would be best addressed in a general management plan. Also, YNP’s topography is not as conducive to the implementation of such a system as is the topography of other parks where rail systems have already been installed. For instance, in certain parts of the park such as Sylvan Pass, the permanent elevated track of the system would be highly vulnerable to occasional avalanches. As a result, safety considerations and maintenance costs (on top of the initial building and implementation costs) would be major concerns. This management action is technically and economically unfeasible at the current time (see the NPS Director’s Order 12, Sec. 207(B), “Reasonable Alternatives”).

The idea of creating a “wilderness island” experience (action 11) was considered for incorporation into the alternatives, but determined to be undesirable because of a considerable increase in the cost of visitor access to the park. Individuals without personal snowmobiles would pay for two forms of transport; a full day’s snowmobile rental as well as a snowcoach tour.

However, elements of this concept have been incorporated into several of the alternatives. Alternatives C and D separate uses through timing and zoning, and alternative F closes park roads at sunset. Visitors engaging in nighttime activities in YNP would also have to spend the night in the Park’s interior under alternative F.

COOPERATING AGENCY COMMENTS ON PRELIMINARY ALTERNATIVES

Cooperating agency representatives were asked to submit their comments on the draft preliminary alternatives by December 7, 1998. Those comments appear below:

- Accompany road closures with road openings
- Assess possible changes in recreational use and distribution under each alternative
- Assess possible use/demand changes in gateway communities under each alternative
- Change “biodegradable lubricants” to “synthetic low-emission lube oils”
- Change “ethanol/methanol” to “10% ethanol blend”
- Change “hypercar” to “cybercar”
- Clarify all concept statements
- Clarify that alternative A will maximize *opportunities*, not *use*
- Clarify why the NPS might consider re-opening roads to snowcoaches only in D
- Clarify/improve proposed methods of measuring decibel and emissions levels
- Consider effects on National Forests if dirty sleds and February traffic are displaced to them
- Define “natural quiet”
- Define “unnatural wildlife migrations”
- Develop an alternative D for GNTP
- Develop more nonmotorized trails
- Discuss ideas which were eliminated because they were judged to be implementation questions
- Discuss ideas which were eliminated because they were judged to be illegal or beyond the scope of the EIS
- Do not close the CDST from the east boundary to Colter Bay
- Do not introduce subsidized snowcoach service
- Ensure that any plowing of the road from West Yellowstone to Old Faithful is accompanied by a snowmobile trail alongside it
- Establish a strategy for resolving user conflicts
- Establish backcountry huts
- Establish measurable and scientific standards for management
- Establish quantitative measures which express the essential elements of the EIS’s purpose, and allow for comparison between the current state and those which would be provided under the alternatives
- Establish wildlife carrying capacity
- Expand lodging and eating facilities to include Lake, Canyon, and Grant Village
- Form cooperative associations with gateway communities in order to fully inform visitors about the range of winter recreational opportunities
- Give CA’s the opportunity to review/comment upon/repeat results of all scientific studies related to road closures

- Increase internal facilities
- Justify East Entrance closure
- Justify nighttime road closure
- Let the cooperating agencies decide whether illegality is actually an impediment to consideration
- Make GTNP's alternative C into D, make new C or make alternative B into C, create new B
- Move closing the Grassy Lake Road to alternative D
- Move closure of Jackson Lake to alternative D
- Move nighttime road closure to alternative C, nighttime speed limit to B
- Move the East Entrance road closure action to alternative D
- Offer alternative which leaves CDST in road ditch
- Open Dunraven Pass
- Open the CDST and Grassy Lake Roads to outfitters
- Provide a full-scale no action alternative for examination
- Provide more detail about the proposed location of interior campsites and new warming huts
- Reconsider the idea of reducing lodging at Old Faithful
- Remove part in A about limiting February travel from Fishing Bridge to Norris snowcoaches
- Remove part in A about plowing from Madison to Mammoth
- Remove references to the nearby availability of places where people can engage in activities similar to those which would be prohibited in the parks
- Separate consideration of water quality, emissions, and sound issues
- Specify how visitor uses will be separated
- Specify issues/needs being addressed under each alternative
- Specify what indicators and standards will be used for determining visitor carrying capacity, and how those standards would guide implementation
- Speculate about what effects might result from adaptive management possibilities
- Stop "hiding behind the CFR"
- Vary season length

The comments of the cooperating agencies proved helpful as the NPS continued to revise the alternatives. The following changes were not necessarily a direct response to suggestions made by the cooperating agencies, but they address the agencies' input at this stage. The parenthetical addition in each bulleted comment indicates a change that NPS made.

- Change "biodegradable lubricants" to "synthetic low-emission lube oils" (*language changed*)
- Change "ethanol/methanol" to "10% ethanol blend" (*language changed*)
- Clarify all concept statements (*clarified/expanded*)
- Clarify that alternative A will maximize opportunities, not use (*language changed from "access" to "opportunities"*)
- Clarify why the NPS might consider re-opening roads to snowcoaches only in D (*language changed to reflect consideration of unspecific "reopening"*)
- Clarify/improve proposed methods of measuring decibel and emissions levels, do not rely on automobile standards (*clarified, changed*)
- Define "natural quiet" in alternative B (D) (*language eliminated*)
- Do not introduce subsidized snowcoach service (*element eliminated*)
- Form cooperative associations with gateway communities in order to fully inform visitors about the range of winter recreational opportunities (*alternatives B, C, D, F, and G all now include language about forging partnerships with gateway communities in efforts to inform visitors about the full range of available winter recreation opportunities*)

- Provide a full-scale no action alternative for examination (*Provided by revised alternative A*)
- Provide more detail about the proposed location of interior campsites and new warming huts (*provided*)
- Separate consideration of water quality, emissions, and sound issues (*separated*)
- Vary season length (alternatives B and C both include this element)

Many of the remaining comments involved issues that are addressed above. Other comments requested that the sort of analysis provided in the Draft EIS be provided within the text of the alternatives. Other comments request unconditional implementation of suggestions that have been dismissed with rationale by the NPS (such as the comment that a plowed road from West Yellowstone to Old Faithful “must” be accompanied by a snowmobile trail alongside it).

FORMULATION OF ALTERNATIVES

The preliminary draft alternatives were the focus of a January 1999 workshop process called “Choosing by Advantages.” Participants included the NPS representatives from local (YNP), regional (Denver Service Center), and national (Washington, D.C.) offices. CBA is a decision-making process based on advantages of different alternatives for a variety of factors or goals. The advantages are weighed and summarized to help identify the preferred alternative. In the “Choosing by Advantages” (CBA) process, the work group assigns a quantitative value to each element of each existing alternative in terms of its relative advantage over all of the parallel elements from other alternatives. (In this case, the original alternatives were evaluated in terms of visitor enjoyment and opportunity, resource protection, effects on local communities, and safety). The elements are evaluated in terms of lifecycle costs. Finally, each alternative is assigned a total score that is charted onto an axis against its projected lifecycle costs. Desirable alternatives feature high total scores and low lifecycle costs. In this case, the preliminary draft alternative with the highest total score also had the highest projected lifecycle cost. The NPS drew from existing alternatives to:

- Replace the highest-scoring alternative’s most costly elements with less costly elements which were designed to fulfill similar needs but were not substantially lower in score than the more expensive elements which they replaced, and
- Ensure that the best combinable ideas from each alternative were included in the Preferred alternative.

Alternative B resulted from this process, and combines ideas and elements of the four preliminary draft alternatives to provide the most benefit for the dollars expended over time.

The revised draft preliminary alternatives still contain many ideas from both the initial alternatives and the October cooperating agencies workshop. Following is a list of ideas generated at the cooperating agencies workshop which were included in the revised preliminary alternatives, indexed according to the letter-name of the revised draft preliminary alternative/s in which they appeared. The proportion of ideas appearing in the revised draft preliminary alternatives to the total number of ideas generated in each category has been noted. Based on these numbers, 76% of the ideas generated at the workshop (which were within the scope of the purpose and need of this EIS and could potentially help to resolve that need) appeared in the revised draft preliminary alternatives. [Note: This number increases when overlapping suggestions and those which were either outside the scope of this document or contrary to federal

statute are excluded from the calculation.] However, these numbers have been included only as representations and not quantitative indicators.

Increase access and affordability through road plowing (3 of 7):

- Plow the road from West Yellowstone, Montana to Old Faithful and allow all-wheeled vehicles with no snowmobile route alongside; B, C
- Plow the roads from Madison to Norris, West Yellowstone, Montana to Old Faithful; C
- Do not plow the road from Colter Bay to Flagg Ranch (groomed snowmachines route instead); D

Encourage/discourage use by season or time (3 of 3):

- Allow only snowcoaching and skiing during last two weeks (changed to “month,” in certain area) of season; C
- Keep roads open only during daylight hours; B, D, E (lower nighttime limit), F, G
- Lengthen the season; B, C

Encourage/discourage use levels via facilities (1 of 6):

- Upgrade/create additional warming huts/restrooms; B, C, D, G

Increase diversity of opportunities (2 of 6):

- Groom campground roads for skiing; B, C
- Groom ski trails near major destination areas in both parks; B, C, D, G

Encourage/discourage use via adding/changing/eliminating additional/alternative motorized routes (3 of 7):

- Move the CDST to utility corridor (or away from road); B, C, D
- Open utility corridors in Lake/Fishing Bridge area (changed to Norris) to motorized use; C
- Close the CDST through GTNP (provide shuttle service); E, F

Initiate/encourage alternative/mass transportation (1 of 3):

- Limit oversnow motorized travel to snowcoaches; G

Wildlife closures/restrictions to use (2 of 6):

- Prohibit recreation in winter wildlife range; B, D, E, F
- Prohibit stopping/getting off machines or leaving trail/designated routes; F

Adaptive management (1 of 1):

- Use adaptive wildlife management; B, E

General (3 of 4):

- Separate uses; C, D
- Prohibit motorized use on Jackson Lake; B, E, F, G
- Work with gateway communities to inform visitors of the full range of winter recreation opportunities; B, C, D, F, G

Require clean and quiet machines (4 of 7):

- Phasing concept: B, D 2000/2001 ethanol/methanol and synthetic fuels only sold in park (changed to 2001/2002 to allow grace period for implementation); 2001/2002 green machines required for all commercial trips (changed to 2002/2003 to allow grace period for implementation); 2007/2008 all green machines
- Require clean, quiet machines on all park roads; B, D, F, G
- Increase emphasis on emission and sound controls; B, C, D, F, G

- Mandate new technology as it becomes available; B, F, G

Implement permits/reservations/fees (2 of 6):

- Implement safety program; B, D
- Implement reservation system; B

Two important elements of the initial draft preliminary alternatives that did not appear in the revised draft preliminary alternatives included a) plowing the road from West Yellowstone to Old Faithful and establishing a snowmobile route alongside the road, and b) instituting a subsidized snowcoach system. Both these ideas have attractive aspects. It was determined, however, that establishing such a bi-modal transportation route on the West Yellowstone-Old Faithful road would create safety hazards. The cost of both grooming and plowing on the road from West Yellowstone would be twice as costly as current operations. The lifecycle costs of a subsidized snowcoach system made that action similarly unfeasible (see the NPS Director's Order 12, Sec. 207(B), "Reasonable Alternatives").

The revised preliminary draft alternatives were distributed to the cooperating agencies on April 20, 1999 for a review during the comment period. The Agencies were required to submit their comments, as well as analyses of impacts in their specific areas of expertise, to the NPS by May 24, 1999. In response to this deadline, Senators Conrad Burns, Michael Crapo and Larry Craig sent a letter of request to the NPS Director Robert Stanton expressing their desire that the Agencies be allowed more time for review, comment, and production for analysis. Because of the tight, court-dictated time schedule governing the EIS, the NPS was unable to honor that request.

APPENDIX B

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APPENDIX C

LEGISLATION, EXECUTIVE ORDERS, REGULATIONS, AND POLICY

**An Act to Set Apart a Certain Tract of Land Lying Near the
Headwaters of the Yellowstone River as a Public Park,
Approved March 1, 1872 (17 Stat.32)**

Public park
established near
headwaters of
Yellowstone River.

Boundaries. (R.S.,
sec. 2474.)

(Amended by 45 Stat.
1435 and 46 Stat.
320.)

Certain persons
locating, etc., therein,
to be trespassers.

Secretary of Interior
to have control of
park; to make rules
for its care.

(Supplemented by 39
Stat. 535, as
amended.)

(R.S., sec. 2475.)

May grant certain
leases and expend
proceeds thereof.

Amended by 39 Stat.
535, as amended.

Shall prevent wanton
destruction of fish and
game and remove
trespassers.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the tract of land in the Territories of Montana and Wyoming, lying near the head-waters of the Yellowstone River, and described as follows, to wit, commencing at the junction of Gardiner's river with the Yellowstone river, and running east to the meridian passing ten miles to the eastward of the most eastern point of Yellowstone lake; thence south along said meridian to the parallel of latitude passing ten miles south of the most southern point of Yellowstone lake; thence west along said parallel to the meridian passing fifteen miles west of the most western point of Madison lake; thence north along said meridian to the latitude of the junction of the Yellowstone and Gardiner's rivers; thence east to the place of beginning, is hereby reserved and withdrawn from settlement, occupancy, or sale under the laws of the United States, and dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people; and all persons who shall locate or settle upon or occupy the same, or any part thereof, shall be considered trespassers and removed therefrom. (U.S.C., title 16, sec. 21.)

SEC. 2. That said public park shall be under the exclusive control of the Secretary of the Interior, whose duty it shall be, as soon as practicable, to make and publish such rules and regulations as he may deem necessary or proper for the care and management of the same. Such regulations shall provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition. The Secretary may in his discretion, grant leases for building purposes for terms not exceeding ten years, of small parcels of ground, at such places in said park as shall require the erection of buildings for the accommodation of visitors; all of the proceeds of said leases, and all other revenues that may be derived from any source connected with said park, to be expended under his direction in the management of the same, and the construction of roads and bridle-paths therein. He shall provide against the wanton destruction of the fish and game found within said park, and against their capture or destruction for purposes of profit. He shall also cause all persons trespassing upon the same after the passage of this act to be removed therefrom, and generally shall be authorized to take all such measures as shall be necessary or proper to fully carry out the objects and purposes of this act. (U.S.C., title 16, sec. 22.)

**An Act to Establish a New Grand Teton National Park in the
State of Wyoming, and for Other Purposes, Approved
September 14, 1950 (64 Stat. 849)**

Grand Teton National
Park, Wyo.

16 U.S.C. Sec. 406-
406b Revisions.

National Elk Refuge,
Lands from Jackson
Hole National
Monument.

Teton National
Forest, Lands from
Jackson Hole
National Monument.

Grand Teton National
Park.

Rights-of-way, etc.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, for the purpose of including in one national park, for public benefit and enjoyment, the lands within the present Grand Teton National Park and a portion of the lands within the Jackson Hole National Monument, there is hereby established a new "Grand Teton National Park". The park shall comprise, subject to valid existing rights, all of the present Grand Teton National Park and all lands of the Jackson Hole National Monument that are not otherwise expressly provided for in this Act, and an order setting forth the boundaries of the park shall be prepared by the Secretary of the Interior and published in the Federal Register. The national park so established shall, so far as consistent with the provisions of this Act, be administered in accordance with the general statutes governing national parks, and shall supersede the present Grand Teton National Park and the Jackson Hole National Monument. The Act of February 26, 1929 (45 Stat. 1314), and any other provisions of law heretofore specifically applicable to such present park or monument, are hereby repealed: *Provided*, That no further extension or establishment of national parks or monuments in Wyoming may be undertaken except by express authorization of the Congress. (16 U.S.C. Sec. 406d-1 and note, 431a, 451a.)

SEC. 2. The following-described lands of the Jackson Hole National Monument are hereby made a part of the National Elk Refuge and shall be administered hereafter in accordance with the laws applicable to said refuge...

SEC. 3. The following-described lands of the Jackson Hole National Monument are hereby made a part of the Teton National Forest and shall be administered hereafter in accordance with the laws applicable to said forest...

SEC. 4. With respect to those lands that are included by this Act within the Grand Teton National Park—

- (a) the Secretary of the Interior shall designate and open rights-of-way, including stock driveways, over and across Federal lands within the exterior boundary of the park for the movement of persons and property to or from State and private lands within the exterior boundary of the park and to or from national forest, State, and private lands adjacent to the park. The location and use of such rights-of-way shall be subject to such regulations as may be prescribed by the Secretary of the Interior;

amount of annual taxes last assessed and levied on the land, together with any improvements thereon, by public taxing units in such county, less any amount, to be determined by the Secretary of the Interior, which may have been paid on account of taxes for any period falling within such fiscal year. For each succeeding fiscal year, until twenty years elapse, there shall be paid on account of such land an amount equal to the full amount of taxes referred to in the preceding sentence, less 5 per centum of such full amount for each fiscal year, including the year for which the payment is to be made: *Provided*, That the amount payable under the foregoing schedule for any fiscal year following the approval of this Act shall not become payable until the end of such first full fiscal year.

(b) As soon as practicable after the end of each fiscal year, the amount then due for such fiscal year shall be computed and certified by the Secretary of the Interior, and shall be paid by the Secretary of the Treasury: *Provided*, That such amount shall not exceed 25 per centum of the fees collected during such fiscal year from visitors to the Grand Teton National Park established by this Act and the Yellowstone National Park. Payments made to the State of Wyoming under this section shall be distributed to the county where the lands acquired from private landowners are located and in such manner as the State of Wyoming may prescribe. (16 U.S.C. Sec. 406d-3.)

Program for
conservation of elk.

SEC. 6. (a) The Wyoming Game and Fish Commission and the National Park Service shall devise, from technical information and other pertinent data assembled or produced by necessary field studies or investigations conducted jointly by the technical and administrative personnel of the agencies involved, and recommend to the Secretary of the Interior and the Governor of Wyoming for their joint approval, a program to insure the permanent conservation of elk within the Grand Teton National Park established by this Act. Such program shall include the controlled reduction of elk in such park by hunters licensed by the State of Wyoming and deputized as rangers by the Secretary of the Interior, when it is found necessary for the purposes of proper management and protection of the elk.

Yearly plan.

(b) At least once a year between February 1 and April 1, the Wyoming Game and Fish Commission and the National Park Service shall submit to the Secretary of the Interior and to the Governor of Wyoming, for their joint approval, their joint recommendations for the management, protection, and control of the elk for that year. The yearly plan, recommended by the Wyoming Game and Fish Commission and the National Park Service shall become effective when approved by the Secretary of the Interior and the Governor of Wyoming, and thereupon the Wyoming Game and Fish Commission and the Secretary of the

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| Orders and regulations. | Interior shall issue separately, but simultaneously such appropriate orders and regulations as are necessary to carry out those portions of the approved plan that fall within their respective jurisdictions. Such orders and regulations, to be issued by the Secretary of the Interior and the Wyoming Game and Fish Commission, shall include provision for controlled and managed reduction by qualified and experienced hunters licensed by the State of Wyoming and deputized as rangers by the Secretary of the Interior, if and when a reduction in the number of elk by this method within the Grand Teton National Park established by this Act is required as a part of the approved plan for the year, provided that one elk only may be killed by each such licensed and deputized ranger. |
| Provision for controlled reduction. | Such orders and regulations of the Secretary of the Interior for controlled reduction shall apply only to the lands within the park which lie east of the Snake River and those lands west of Jackson Lake and the Snake River which lie north of the present north boundaries of Grand Teton National Park, but shall not be applicable to lands within the Jackson Hole Wildlife Park. After the Wyoming Game and Fish Commission and the National Park Service shall have recommended to the Secretary of the Interior and the Governor of Wyoming in any specified year a plan, which has received the joint approval of the Secretary of the Interior and the Governor of Wyoming, calling for the controlled and managed reduction by the method prescribed herein of the number of elk within the Grand Teton National Park established by this Act, and after the Wyoming Game and Fish Commission shall have transmitted to the Secretary of the Interior a list of persons who have elk hunting licenses issued by the State of Wyoming and who are qualified and experienced hunters, on or before July 1 of that year the Secretary of the Interior, without charge, shall cause to be issued orders deputizing the persons whose names appear on such list, in the number specified by the plan, as rangers for the purpose of entering the park and assisting in the controlled reduction plan. Each such qualified hunter, deputized as a ranger, participating in the controlled reduction plan shall be permitted to remove from the park the carcass of the elk he has killed as a part of the plan. (16 U.S.C. Sec. 673c.) |
| Deputized rangers. | |
| Acceptance of donated lands. | SEC. 7. The Secretary of the Interior is authorized to accept the donation of the following-described lands, which lands, upon acceptance by the United States, shall become a part of the national park... |
| Revocation of temporary withdrawals. | SEC. 8. All temporary withdrawals of public lands made by Executive order in aid of legislation pertaining to parks, monuments, or recreational areas, adjacent to the Grand Teton National Park as established by this Act are hereby revoked. (16 U.S.C. Sec. 406d-1.) |

Use of lands for
reclamation purposes,
etc. 43 U.S.C. Sec.
372 *et seq.*, Sec. III,
373b *et seq.*

Availability of funds.

SEC. 9. Nothing in this Act shall affect the use for reclamation purposes, in accordance with the Act of June 17, 1902 (32 Stat. 388), and Acts amendatory thereof or supplementary thereto, of the lands within the exterior boundary of the park as prescribed by this Act which have been withdrawn or acquired for reclamation purposes, or the operation, maintenance, rehabilitation, and improvement of the reservoir and other reclamation facilities located on such withdrawn or acquired lands. All provisions of law inconsistent with the provisions of this Act are hereby repealed to the extent of such inconsistency. The remaining unexpended balance of any funds appropriated for the present Grand Teton National Park and the Jackson Hole National Monument shall be available for expenditure in connection with the administration of the Grand Teton National Park established by this Act. (16 U.S.C. Sec. 406-3, 406-1 note.)

August 25, 1972
[S. 3150]

**An Act to Authorize the Secretary of the Interior to Establish
the John D. Rockefeller, Junior, Memorial Parkway, and for
Other Purposes. (Public Law 92-404)**

John D. Rockefeller,
Jr., Memorial
Parkway, Wyo.
Establishment

Notice and boundary
revisions, publication
in Federal Register

Land acquisition

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, (a) That for the purpose of commemorating the many significant contributions to the cause of conservation in the United States, which have been made by John D. Rockefeller, Junior, and to provide both a symbolic and desirable physical connection between the world's first national park, Yellowstone, and the grand Teton National Park, which was made possible through the efforts and generosity of this distinguished citizen, the Secretary of the Interior (hereinafter referred to as the Secretary) is authorized to establish the John D. Rockefeller, Junior, Memorial Parkway (hereinafter referred to as the "parkway") to consist of those lands and interests in lands, in Teton County, Wyoming, as generally depicted on a drawing entitled "Boundary Map, John D. Rockefeller, Junior, Memorial Parkway, Wyoming", numbered PKY-JDRM-20,000, and dated August 1971, a copy of which shall be on file and available for inspection in the Offices of the National Park Service, Department of the Interior. The Secretary shall establish the parkway by publication of a notice to that effect in the Federal Register, at such times as he deems advisable. The Secretary may make minor revisions in the boundary of the parkway from time to time, with the concurrence of the Secretary of Agriculture where national forest lands are involved, by publication of a revised drawing or other boundary description in the Federal Register.

(b) The Secretary shall also take action as he may deem necessary and appropriate to designate and identify as "Rockefeller Parkway" the existing and future connecting roadways within the parkway, and between West Thumb in Yellowstone National Park, and the south entrance of Grand Teton National Park: *Provided*, That any sections of the parkway located within Yellowstone National Park or Grand Teton National Park shall be administered and managed in the same manner and in accordance with the same regulations and policies as the other portions of such parks.

SEC. 2. Within the boundaries of the parkway, the Secretary may acquire lands and interests in lands by donation, purchase, exchange, or transfer from another Federal agency. Lands and interests in lands owned by the State of Wyoming or a political subdivision thereof may be acquired only by donation. Lands under the jurisdiction of another Federal agency shall, upon request of the Secretary, be transferred without consideration to the

Administration.

jurisdiction of the Secretary for the purposes of the parkway.

Hunting and fishing
regulations.

SEC. 3. (a) The Secretary shall administer the parkway as a unit of the national park system in accordance with the authority contained in the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1, 2-4), as amended and supplemented.

(b) The Secretary shall permit hunting and fishing within the area described by section 1(a) of this Act in accordance with applicable laws of the United States and the State of Wyoming, except that the Secretary may designate zones where, and periods when, no hunting or fishing shall be permitted for reasons of public safety, administration, or public use and enjoyment. Except in emergencies, any regulations of the Secretary pursuant to this section shall be put into effect only after consultation with the appropriate State fish and game department.

Appropriation.

(c) The lands within the parkway, subject to valid existing rights, are hereby withdrawn from location, entry and patent under the United States mining laws.

SEC. 4. For the purposes of this Act, there are authorized to be appropriated not more than \$25,000 for the acquisition of lands and interests in lands and not more than \$3,092,000 for development.

Approved August 25, 1972.

THE PRESIDENT

EXECUTIVE ORDER 11644

Use of Off-Road Vehicles on the Public Lands

An estimated 5 million off-road recreational vehicles—motorcycles, minibikes, trail bikes, snowmobiles, dune-buggies, all-terrain vehicles, and others—are in use in the United States today, and their popularity continues to increase rapidly. 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 toward the use of such vehicles on the public lands.

NOW, THEREFORE, by the virtue of the authority vested in me as President of the United States by the Constitution of the United States and in furtherance of the purpose and policy of the National Environmental Policy Act of 1969 (42 U.S.C. 4321), it is hereby ordered as follows:

SECTION 1. *Purpose.* It is the purpose of this order to establish policies and provide for procedures 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 those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various users of those lands.

SEC. 2. *Definitions.* As used in this order, the term:

(1) "public lands" means (A) all lands under the custody and control of the Secretary of the Interior and the Secretary of Agriculture, except Indian lands, (B) lands under the custody and control of the Tennessee Valley Authority that are situated in western Kentucky and Tennessee and are designated as "Land Between the Lakes" and (C) lands under the custody and control of Secretary of Defense;

(2) "respective agency head" means the Secretary of the Interior, the Secretary of Defense, the Secretary of Agriculture, and the Board of Directors of the Tennessee Valley Authority, with respect to public lands under the custody and control of each;

(3) "off-road vehicle" means any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain; except that such term excludes (A) any registered motorboat, (B) any military, fire, emergency, or law enforcement vehicle when used for emergency purposes, and (C) any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract; and

(4) "official use" means use by an employee, agent, or designated representative of the Federal Government or one of its contractors in the course of his employment, agency or representation.

SEC. 3. *Zones of Use.* (a) Each respective agency head shall develop and issue regulations and administrative instructions, within six months of the date of this order, to provide for administrative designation of the specific areas and trails on public lands on which the use of off-road vehicles may be permitted, and areas in which the use of off-road vehicles may not be permitted, and set a date by which such designation of all public lands shall be completed. Those regulations shall direct that the designation of such areas and trails will be based upon the protection of the resources of the public lands, promotion of the safety of all users of those lands. The regulations shall further require that the designation of such areas and trails shall be in accordance with the following—

THE PRESIDENT

(1) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, or other resources of the public lands.

(2) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats.

(3) 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, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.

(4) Areas and trails shall not be located in officially designated Wilderness Areas or Primitive Areas. Areas and trails shall be located in areas of the National Park system, Natural Areas, or National Wildlife Refuges and Game Ranges only if the respective agency head determines that off-road vehicle use in such locations will not adversely affect their natural, aesthetic, or scenic values.

(b) The respective agency head shall ensure adequate opportunity for public participation in the promulgation of such regulations and in the designation of areas and trails under this section.

(c) The limitations on off-road vehicle use imposed under this section shall not apply to official use.

SEC. 4. *Operating Conditions.* Each respective agency head shall develop and publish, within one year of the date of this order, regulations prescribing operating conditions for off-road vehicles on the public lands. These regulations shall be directed at protecting resource values, preserving public health, safety, and welfare, and minimizing use conflicts.

SEC. 5. *Public information.* The respective agency head shall ensure that areas and trails where off-road vehicle use is permitted are well marked and shall provide for the publication and distribution of information, including maps, describing such areas and trails and explaining the conditions on vehicle use. He shall seek cooperation of relevant State agencies in the dissemination of this information.

SEC. 6. *Enforcement.* The respective agency head shall, where authorized by law, prescribe appropriate penalties for violation of regulations adopted pursuant to this order, and shall establish procedures for the enforcement of those regulations. To the extent permitted by law, he may enter into agreements with State or local governmental agencies for cooperative enforcement of laws and regulations relating to off-road vehicle use.

SEC. 7. *Consultation.* Before issuing the regulations or administrative instructions required by this order or designating areas or trails as required by this order and those regulations and administrative instructions, the Secretary of the Interior shall, as appropriate, consult with the Atomic Energy Commission.

SEC. 8. *Monitoring of Effects and Review.* (a) The respective agency head shall monitor the effects of the use of off-road vehicles on lands under their jurisdictions. On the basis of the information gathered, they shall from time to time amend or rescind designations of areas or other actions taken pursuant to this order as necessary to further the policy of this order.

(b) The Council on Environmental Quality shall maintain a continuing review of the implementation of this order.

THE WHITE HOUSE
February 8, 1972.

[FR Doc. 72-2631 Filed 2-8-72; 12:29 pm]

FEDERAL REGISTER, VOL. 37, NO. 27—WEDNESDAY, FEBRUARY 9, 1972.

THE PRESIDENT

Executive Order 11889

May 24, 1977

OFF-ROAD VEHICLES ON PUBLIC LANDS

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in order to clarify agency authority to define zones of use by off-road vehicles on public lands, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), Executive Order No. 11644 of February 8, 1972, is hereby amended as follows:

Section 1. Clause (B) of Section 2(3) of Executive Order No. 11644, setting forth an exclusion from the definition of off-road vehicles, is amended to read " (B) any fire, military, emergency or law enforcement vehicle when used for emergency purposes, and any combat or combat support vehicle when used for national defense purposes, and" .

Sec. 2. Add the following new Section to Executive Order No. 11644:

* Sec. 9. Special Protection of the Public Lands.
(a) Notwithstanding the provisions of Section 3 of this Order, 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 PRESIDENT

" (b) Each respective agency head is authorized to adopt the policy that portions of the public lands within his jurisdiction shall be closed to use by off-road vehicles except those areas or trails which are suitable and specifically designated as open to such use pursuant to Section 3 of this Order." .

THE WHITE HOUSE
May 24, 1977

[FR DOC77-15122 Filed 5-24-77;1:43 pm]

FEDERAL REGISTER, VOL. 42, NO. 106—WEDNESDAY, MAY 23, 1977

NATIONAL PARK SERVICE REGULATIONS AND POLICY EXCERPTS

Proposed Revisions to NPS Management Policies

In January 2000 the National Park Service (NPS) solicited public comment on proposed revisions to its 1988 Management Policies, which underscore the preservation mandate of the NPS Organic Act and General Authorities Act. As the NPS was preparing this Environmental Impact Statement (EIS) for publication, it continued to revise the proposed policies and anticipated issuing the final policy revisions during summer or fall 2000. Excerpts of the proposed revisions are included below to provide the reader information on the policies that may guide the decision on winter use in Grand Teton National Park (GTNP), the John D. Rockefeller, Jr., Memorial Parkway (the Parkway), and Yellowstone National Park (YNP).

Proposed Policy Excerpts – Overall Management Mandates for the National Park Service

1.4.1 The Laws Generally Governing Park Management

The most important general direction for Park Service managers is provided by interrelated provisions of the NPS Organic Act of 1916, and the NPS General Authorities Act of 1970, including amendments to the latter law enacted in 1978.

The key management-related provision of the Organic Act is:

[The National Park Service] shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified . . . by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. (16 USC 1.)

Congress subsequently supplemented and clarified this through enactment of these key management-related provisions of the General Authorities Act, as amended:

Congress declares that the national park system, which began with establishment of Yellowstone National Park in 1872, has since grown to include superlative natural, historic, and recreation areas in every major region of the United States, its territories and island possessions; that these areas, though distinct in character, are united through their inter-related purposes and resources into one national park system as cumulative expressions of a single national heritage; that, individually and collectively, these areas derive increased national dignity and recognition of their superlative environmental quality through their inclusion jointly with each other in one national park system preserved and managed for the benefit and inspiration of all the people of the United States; and that it is the purpose of this Act to include all such areas in the System and to clarify the authorities applicable to the system. Congress further reaffirms, declares, and directs that the promotion and regulation of the various areas of the National Park System, as defined in section 1c of this title, shall be consistent with and founded in the purpose established by section 1 of this title, to the common benefit of all the people of the United States. 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, except as may have been or shall be directly and specifically provided by Congress. (16 USC 1a-1)

This section of Management Policies represents the Park Service's interpretation of these key statutory provisions.

1.4.2 Definitions

As used in Management Policies, the following terms have the meanings indicated.

“Enjoyment” includes 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.

The “impairment of park resources and values” 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.

“Park resources and values” are all 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, 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.

1.4.5 The NPS Obligation to Conserve Park Resources and Values

The Organic Act and the General Authorities Act establish a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment, and so applies all the time, with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek to find ways to conserve park resources and values. However, the laws do give the Service the management discretion to allow an impact to park resources and values when necessary and appropriate to fulfill the purposes of a park, including providing for enjoyment of it or conserving other park resources and values, so long as the impact does not constitute impairment of the affected resources and values.

1.4.6 The NPS Obligation to Provide for Public Enjoyment of Parks

The laws clearly establish that enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks.

Recognizing that the high-quality experience people expect and deserve in their national parks can be assured only if the superb quality of park resources and values is left unimpaired, Congress has provided that when there is an unavoidable conflict, conserving resources and values, not providing for enjoyment, is to be predominant. There are dual elements to the Organic Act's single fundamental purpose, but those elements are not equal. Rather, the Act is explicit that enjoyment of park resources and values is to be allowed only to the extent that can be done without impairing those resources and values. This, the cornerstone of the Organic Act, assures preservation both of a park's resources and values and of the American people's present and future opportunities for enjoyment of them.

1.4.7 The NPS Obligation to Prevent the Impairment of Park Resources and Values

Preserving park resources and values unimpaired is the core responsibility of NPS managers. Impairment of park resources or values is never permissible under the law, unless directly and specifically authorized by Congress. Any impact constituting an impairment is prohibited no matter how long the impairment would last—regardless of whether it would be a temporary, short-term, long-term, or permanent impairment.

1.4.8 Principles Guiding NPS Decisions on Conserving, Providing for the Enjoyment of, and Preventing Impairment of Park Resources and Values

In making decisions on how to conserve, provide for enjoyment of, and prevent impairment of park resources and values, NPS managers must be guided by the values expressed by Congress in the Organic Act and the General Authorities Act. This means that NPS managers, in making their management decisions, must assure the preservation of the high public value and integrity of the national park system; the national dignity of parks; the superlative environmental quality of parks; and the important role of parks in providing benefit and inspiration for all the people of the United States.

1.4.10 Reviewing and Remedying Existing Impairments of Park Resources and Values

When there is a reasonable question about whether ongoing activities have led or are leading to an impairment of park resources or values, NPS managers shall investigate and determine if there is, or will be, an impairment. If so, the managers shall take appropriate action, to the extent possible within NPS authorities and available resources, to remedy the impairment. If it is necessary to prohibit or limit a particular public use, the superintendent will ensure that the need for the action is fully explained to visitors and the general public.

SOUND AND NATURAL QUIET

Applicable Regulations

A search of ordinances and laws applicable to sound sources in the national parks showed that all current regulations apply only to the vehicle producing the sound, not to the receiver. That is, sound emission limits are set for snowmobiles and snowplanes, but not to sound levels from these vehicles at a specific location. There are no state or local sound ordinances that apply to snowmobile or snowplane sound within the park boundary.

36 CFR 2.18 Snowmobiles: This CFR specifies snowmobile maximum A-weighted pass-by sound levels at a distance of 50 feet under full throttle.

- For snowmobiles manufactured prior to July 1, 1973, the maximum level is 86 dB(A).
- For snowmobiles manufactured between July 1, 1973 and July 1, 1975, the maximum is 82 dB(A).
- For snowmobiles manufactured after July 1, 1978, the maximum is 78 dB(A).

36 CFR 7.21 Grand Teton National Park: This CFR specifies maximum sound emission levels at 50 feet under full throttle from snowmobiles at 78 dB(A) and from snowplanes at 86 dB(A).

36 CFR 7.22 John D. Rockefeller, Jr., Memorial Parkway: This CFR specifies maximum sound emission levels at 50 feet under full throttle from snowplanes at 86 dB(A).

Policy Excerpts

The following excerpts describe park service definitions and policies regarding sound and natural quiet in National Park Service areas.

NPS Management Policies of 1988 (chapter I, pages 3 - 4):

“The individual parks contain various tangible natural and cultural features such as animals, plants, waters, geologic features, historic buildings and monuments, and archeological sites. They also have intangible qualities such as natural quiet, solitude, space, scenery, a sense of history, sounds of nature, and clear night skies that have received congressional recognition and are important components of people’s enjoyment of parks. These NPS Management Policies use the terms resources and values to mean the full spectrum of tangible and intangible attributes for which parks have been established and are being managed.

These NPS Management Policies recognize that all parks are complex mixtures of values and resources, each with its own unique qualities and purposes, each requiring specific treatment in the development and implementation of management strategies and operational plans....The word ‘unimpaired’ plays an important role in the conservation of resources and providing for present-day public enjoyment. Both physical resources, such as wildlife and geological features, and intangible values, such as scenic vistas and solitude, may be impaired.....It is NPS policy to treat potential impairments in the same manner as known impairments.”

NPS Management Policies of 1988 (chapter IV, page 17):

The National Park Service will strive to preserve the natural quiet and the natural sounds associated with the physical and biological resources of the parks (for example, the sounds of the wind in the trees or of waves breaking on the shore, the howl of the wolf, or the call of the loon). Activities causing excessive or unnecessary unnatural sounds in and adjacent to parks, including low-elevation aircraft overflights, will be monitored, and action will be taken to prevent or minimize unnatural sounds that adversely affect park resources or values or visitors' enjoyment of them.

NPS Report on Effects of Aircraft Overflights on the National Park System, 1995 (Report to Congress):

(page 74): These policy statements [from NPS Management Policies] make clear the importance of natural quiet as a resource in many units of the National Park System. This resource is defined as the natural ambient sound conditions found in those units. It refers to the absence of mechanical noise, but accepts the 'self-noise' of park visitors. 'Self-noise' is the noise generated by the visitor - the tread of hiking boots on the trail, the creaking packframe, rattle of pots or pans, talking, etc.

(page 76): Conclusion 3.1: Preserving natural quiet is an integral part of the mission of the NPS. This is confirmed in law, policy, and the beliefs of NPS managers.

(page 78): What is Natural Quiet?: Parks and wildernesses offer a variety of unique, pristine sounds not found in most urban or suburban environments. They also offer a complete absence of sounds that are found in such environments. Together, these two conditions provide a very special dimension to a park experience.... Quiet itself, in the absence of any discernible source (especially man-made), is an important element of the feeling of solitude. Quiet also affords visitors an opportunity to hear faint or very distant sounds (such as animal activity, waterfalls, etc.). Such an experience provides an important perspective on the vastness of the environment in which the visitor is located, often beyond the visual boundaries determined by trees, terrain, and the like.... In considering natural quiet as a resource, the ability to hear clearly the delicate and quieter intermittent sounds of nature, the ability to experience interludes of extreme quiet for their own sake, and the opportunity to do so for extended periods of time is what natural quiet is all about.

(page 80): Conclusion 3.3: The quiet afforded in park settings is virtually in a range of its own, well below that which we experience in our normal daily routine.... What Are the Characteristics of Natural Quiet? Generally low sound levels, but with considerable variability over both time and location, characterize the ambient sound environments in many national parks. The rise and fall of the wind in a coniferous forest can change the ambient sound level over a matter of minutes at a single location. Likewise, the synchronized activity of insects such as crickets can produce substantial changes in the ambient sound environment as well. From one location to the next, the proximity of vegetation and water, the local insect population (and its normal diurnal activity patterns), and the location's susceptibility to winds can give rise to large differences in ambient sound levels.

(page 85): In developing an approach to preserve natural quiet, the NPS recognizes the following five important facts: 1. Natural quiet is a resource

for preservation within the NPS mandate. 2. The human auditory system is an excellent mechanism for determining the presence or absence of natural quiet. No available electronic device can duplicate human hearing for identifying audible sounds produced by non-natural sources. 3. The difficulty of preserving natural quiet is directly related to how quiet it is.... 4. Humans are not always aware of sounds that are audible.... 5. Park settings can provide levels of natural quiet so quiet that there is no sound to be heard except that generated by the listener - the sounds of walking, breathing, heart pumping, and blood flowing....

Excerpts from Proposed Revisions to NPS Management Policies

4.9 Soundscape Management

The National Park Service will preserve the natural ambient soundscapes of parks, which exist in the absence of human-caused sound. 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.

Some natural sounds in the natural ambient soundscape also are part of the biological or other physical resource components of the park. Examples of such natural sounds include:

- Sounds produced by such animals as birds, frogs, or katydids to define territories or aid in attracting mates;*
- Sounds produced by such animals as bats or porpoises to locate prey or navigate;*
- Sounds received by such animals as mice or deer to detect and avoid predators or other danger; and*
- Sounds produced by physical processes, such as wind in the trees, claps of thunder, or falling water.*

The Service will restore degraded soundscapes to the natural ambient condition wherever possible and will protect them from degradation due to human-caused noise.

Special Circumstances: *Using appropriate management planning, parks will identify what levels of human-caused sound can be accepted within the management purposes of parks. The frequencies, magnitudes, and durations of human-caused sound considered acceptable will vary throughout the park, being generally greater in developed areas and generally lesser in undeveloped areas. The Service will monitor in and adjacent to parks human activities that generate noise (undesirable human-caused sound) that adversely affects park soundscapes, including noise caused by mechanical or electronic devices. The Service will take action to prevent or minimize all noise that, through frequency, magnitude or duration, adversely affects the natural ambient soundscape or other park resources or values, or that exceeds levels that have been identified as acceptable to, or appropriate for, visitor uses at the sites being monitored.*

(See Use of Motorized Equipment 8.2.3, Overflights and Aviation Uses 8.4)

8.2.3 Use of Motorized Equipment

The variety of motorized equipment--including visitor vehicles, concessioner equipment, and Park Service administrative or staff vehicles and equipment--that operates in national parks has the potential to adversely impact park resources,

including the park's natural soundscape. In addition to their natural values, natural sounds, such as waves breaking on the shore, the roar of a river, and the call of a loon, form a valued part of the visitor experience. Conversely, the sounds of motor vehicle traffic, an electric generator, or loud music can greatly diminish the solemnity of a visit to a national memorial, the effectiveness of a park interpretive program, or the ability of a visitor to hear a bird singing its territorial song. Many parks that appear as they did in historical context no longer sound the way they once did.

The Service will strive to preserve or restore the natural quiet and natural sounds associated with the physical and biological resources of parks. To do this, superintendents will carefully evaluate and manage how, when, and where motorized equipment is used by all those--including park staff--who operate equipment in the parks. Uses and impacts associated with the use of motorized equipment will be addressed in park planning processes. Where such use is necessary and appropriate, the least impacting equipment, vehicles, and transportation systems should be used. 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.

(See Soundscape Management 4.9)

LEGISLATIVE DIRECTION, REGULATIONS AND POLICY ON CULTURAL RESOURCE MANAGEMENT

The National Park Service is mandated to preserve and protect its cultural resources through the Organic Act of 1916 (USC title 16) and such specific legislation as:

- The Antiquities Act of 1906 (16 USC 431),
- The National Historic Preservation Act of 1966, as amended (16 USC 470)
- The National Environmental Policy Act of 1969, as amended (42 USC 4321, 4331, 4332)
- The Archeological Resources Protection Act of 1979 (16 USC 470).

In addition the management of cultural resources would be guided by:

- The Advisory Council on Historic Preservation's implementing regulations regarding the "Protection of Historic Properties" (36 CFR 800)
- The Secretary of the Interior's Standards for the Treatment of Historic Properties (1995)
- Chapter V of the National Park Service's Management Policies (1988)
- The National Park Service's Cultural Resources Management Guideline (NPS-28, 1996).

As part of its cultural resource management responsibilities, the National Park Service strives to inventory and evaluate all cultural resources on lands under its jurisdiction. Section 110 of the National Historic Preservation Act (1966) requires that historic properties be identified and evaluated for their eligibility for listing on the National Register of Historic Places. Section 110 also stipulates that historic properties be managed in a way that preserves and protects their values, especially nationally significant values. Cultural resources, both within and outside of National Park Service

jurisdiction, that could potentially be affected by actions outlined in this plan were considered during this planning process.

Section 106 of the National Historic Preservation Act requires that federal agencies having direct or indirect jurisdiction over undertakings consider the effect of undertakings on resources. Resources may be either listed in or eligible for listing in the National Register of Historic Places. Agencies are also required to afford the state historic preservation officer(s) and the Advisory Council on Historic Preservation opportunities to comment. The National Park Service will continue to work with the aforementioned entities to meet the requirements of section 106. As stipulated by the October 1995 programmatic agreement among the National Conference of State Historic Preservation Officers, the Advisory Council on Historic Preservation, and the National Park Service, the following organizations were invited to participate in the planning process. Each entity had an opportunity to review and comment on the draft document:

- Wyoming, Montana, and Idaho State Historic Preservation Offices
- Advisory Council on Historic Preservation

The National Park Service will continue to consult with affiliated American Indian tribes. The NPS also will develop and accomplish its programs in a way that respects the beliefs, traditions, and other cultural values of the American Indian tribes who have ancestral ties to the lands encompassed by YNP, GTNP, and the Parkway. The necessity for consultations with American Indians arises from the historic and current government-to-government relationship of the federal government with American Indian tribes, particularly those that are federally recognized (Federal Register 1995, 9250-9255), and from the related federal trust responsibility to conserve tribal resources. Consultations with American Indians are also required for compliance with a variety of laws and other legal entities, such as presidential executive orders, proclamations, and memoranda; federal regulations; and agency management policies and directives. Examples are:

- The Indian Self-Determination and Education Assistance Act (1975)
- The American Indian Religious Freedom Act (1978 and as amended in 1994)
- The Native American Graves Protection and Repatriation Act (1990)
- National Historic Preservation Act (as amended in 1992)
- Presidential Memorandum of April 29, 1994, entitled "Government-to-Government Relations With Native American Tribal Governments"
- EO 13007 of May 24, 1996, entitled "Indian Sacred Sites."

Proposed Revisions to NPS Management Policies

The proposed revisions to the Management Policies underscore and reiterate NPS responsibilities for managing cultural resources within units of the National Park System.

LEGISLATIVE DIRECTION, REGULATIONS, AND POLICY ON MANAGEMENT OF VISITOR ACTIVITIES

NPS Management Policies address the management of visitor activities in parks:

The National Park Service will manage visitor use and whenever necessary regulate the amount and kind, and the time and place, of visitor activities. Any restrictions will be based on a determination by the superintendent that such measures are consistent with the park's enabling legislation and are needed either to prevent derogation of the values and purposes for which the park was established or to minimize visitor use conflicts.

The National Park Service will encourage recreational activities that are consistent with applicable legislation, that promote visitor enjoyment of park resources through a direct association or relation to those resources, that are also consistent with the protection of resources, and that are compatible with other visitor uses.

General regulations addressing aircraft use, off-road bicycling, hang-gliding, hunting, off-road vehicle use, and snowmobiling require that special regulations be developed before these uses may be authorized in parks.
(NPS Management Policies 8:1,2)

Snowmobile use is governed by Executive Order 11644 amended by 11989, "Use of Off-road Vehicles on Public Lands" (42 USC 4321), and in Alaska. The use of snowmobiles is prohibited except on designated routes and frozen water surfaces that are used during other seasons by motor vehicles and motorboats, respectively, or as otherwise specifically provided by federal statute. Routes and water surfaces may be designated for snowmobile use only in locations where there will be no significant adverse impacts on the park's natural, cultural, or scenic resources and values and in consideration of other visitor uses. Routes and water surfaces to be designated for snowmobile use will be identified in special regulations.
(NPS Management Policies 8:5)

Excerpts from proposed revisions to NPS Management Policies

8.1 [Use Of Park] General

Many different types of uses take place in the more than 375 parks that comprise the national park system. Some of those uses are carried out by the National Park Service, but many more are carried out by general park visitors, permittees, lessees, and licensees. The Service has the responsibility to manage all park uses and, when necessary, regulate their amount, kind, time and place.

The Organic Act, which created the National Park Service in 1916, directs the Service to conserve park resources "unimpaired" for the enjoyment of future generations. The 1970 National Park System General Authorities Act, as amended, prohibits the Service from allowing any activities that would cause derogation of the values and purposes for which the parks have been established. Taken together, these two laws impose on NPS managers a strict mandate to protect park resources and values.

Providing opportunities for public enjoyment is an important part of the Service's mission; but recreational activities and other uses may be allowed in parks only to the extent they can take place without causing impairment or derogation of a park's resources, values, or purposes. The only exception is when an activity that would cause impairment is directly and specifically mandated by Congress.

The fact that a park use may have an impact does not necessarily mean that it will impair park resources or values for the enjoyment of future generations. Impacts may have effects on resources and still be within the limits of the discretionary authority

conferred by the Organic Act. However, the Service will not knowingly authorize a park use that would cause adverse impacts unless it has been fully evaluated, appropriate public involvement has been obtained, and a compelling management need is present. In those situations, the Service will ensure that any adverse impacts are the minimum necessary, unavoidable, cannot be further mitigated, and do not constitute derogation or impairment of park resources and values.

Any discretionary uses allowed by the Service under the Organic Act will be resource-based, and non-consumptive of resources. Consumptive uses of park resources may be allowed only when they are:

- *Specifically authorized by federal law or treaty rights;*
- *Specifically authorized pursuant to other existing rights (such as a right retained by a donor of the land on which the use would occur); or*
- *Activities, such as fishing or berry picking, which have been found by the superintendent not to cause adverse impacts to park resources or values.*

It is especially important that consumptive uses be continually monitored to ensure that unanticipated and unacceptable adverse impacts do not occur.

When a use is mandated by law, but causes impairment of park resources or values, the Service will take appropriate management actions to minimize its adverse effects. When a use is authorized by law, but not mandated, and may cause impairment of park resources or values, the Service will mitigate the impacts to the point where they will not cause either impairment or significant adverse effects; or, if necessary, the Service will eliminate the activity.

All proposals for park uses will be evaluated for their consistency with applicable legislation, Executive orders, regulations, and policies, as well as for their actual and potential effects on park resources and values. They will also be evaluated in terms of their total costs to the Service, and the public benefits that will be derived. Park superintendents must continually examine all park uses and allow only those that meet the criteria listed in section 8.2.

Specific park uses will be guided by the following subsections, and must comply also with the other chapters of these Management Policies. The regulatory framework for implementing NPS policies governing use of the parks, and for determining when and where activities may be allowed, is found in 36 CFR Parts 2, 3, 4, 5, 7, 12 and 13. Procedures for implementing or terminating a restriction, condition, public use limit or closure within a park area are found in 36 CFR 1.5.

(See Park Management 1.4; also see Director's Order #12)

8.2 Visitor Use

To provide for public enjoyment of the parks, the National Park Service will encourage activities that

- *Are inspirational, educational, or healthful, and otherwise appropriate to the park environment;*
- *Will foster a continuing appreciation for park resources and values; and*
- *Will promote enjoyment through a direct association with, or relation to, park resources.*

The primary means of fostering and providing activities that meet these criteria will be the NPS interpretive and educational programs, which are described in detail in

chapter 7. The Service will also welcome the efforts of private sector organizations and entities to foster and provide activities that meet these criteria.

The Service will allow other uses that do not meet these criteria, provided they

- Are appropriate to the reason the park was established, and*
- Can be sustained without impairing park resources or values.*

Unless an activity is mandated by statute, the Service will not allow activities that

- Cause injury or damage to park resources; or*
- Be contrary to the purposes for which the park was established, or*
- Unreasonably impair the atmosphere of peace and tranquility maintained in wilderness, natural, historic, or commemorative locations within the park; or*
- Unreasonably interfere with the interpretive, visitor service, or other program activities, or with the administrative activities of the NPS; or*
- Substantially impair NPS concessionaire or contractor operations or services; or*
- Present a clear and present danger to public health and safety; or*
- Result in significant conflict with other existing uses.*

Management controls must be imposed on all park uses to ensure the uses remain acceptable. If and when a superintendent has a reasonable basis to believe an ongoing or proposed public use would cause impairment of park resources or values, the superintendent will either (1) temporarily or permanently close a specific area; or (2) prohibit a particular use; or (3) otherwise place limitations on the use to ensure that impairment does not occur.

Any closures or restrictions--other than those imposed by law--will be based on a written determination by the superintendent that such measures are (1) consistent with the park's enabling legislation, other applicable laws, and the NPS policies and procedures; and (2) are needed either to prevent impairment or derogation of park resources and values, or to minimize visitor use conflicts. When practicable, such restrictions will be based on the results of study or research, including (when appropriate) research in the social sciences. Any restrictions imposed will be fully explained to visitors and the public. Visitors will be given appropriate information on how to keep adverse impacts to a minimum, and how to enjoy the safe and lawful use of the parks.

8.2.3.2 Snowmobiles

Snowmobile use is a form of off-road vehicle use governed by Executive Order 11644 (as amended by Executive Order 11989) and, in Alaska, by provisions of ANILCA (16 USC 3121 and 3170). The use of snowmobiles is prohibited except on designated routes and frozen water surfaces that are used during other seasons by motor vehicles and motorboats, respectively, or as otherwise specifically provided by federal statute. NPS regulations implementing Executive Order 11644, as it applies to snowmobile use, are found in 36 CFR 2.18. Those regulations stipulate, among other things, that routes and water surfaces may be designated for snowmobile use only when:

- The use is consistent with a park's natural, cultural, scenic and esthetic values; and*

- *The use is consistent with the park's management objectives; and*
- *Safety considerations are satisfactorily addressed; and*
- *The use will not disturb wildlife or damage park resources; and*
- *Conflicts with other park uses can be minimized.*

NPS administrative use of snowmobiles will be limited to what is necessary to manage public use of snowmobile routes and areas; to conduct emergency operations; and to accomplish essential maintenance, construction, and resource protection activities that cannot be accomplished reasonably by other means.

(See Minimum Requirement 6.3.5, Management Facilities 6.3.10, General Policy 6.4.1)

8.6.5 Access to Private Property

The Park Service will allow access to the private property of adjacent landowners when such access is required by law. Commercial vehicles will be allowed access only in accordance with 36 CFR 5.6, "Commercial Vehicles." The Service will also consider allowing access when it would contribute in a material way to the park's mission, provided that the access would not cause impairment or derogation of park resources or values, or the purposes for which the park was established.

NPS Management Policies also address visitor experience with respect to natural quiet:

The National Park Service will strive to preserve the natural quiet and the natural sounds associated with the physical and biological resources of the parks (for example, the sounds of the wind in the trees or of the waves breaking on the shore, the howl of the wolf, or the call of the loon). Activities causing excessive or unnecessary unnatural sounds in and adjacent to parks, including low-altitude aircraft overflights, will be monitored, and action will be taken to prevent or minimize unnatural sounds that adversely affect park resources or values or visitors' enjoyment of them(NPS Management Policies 4:18).

Interpretive media, facilities, programs, and other activities are designed to enhance both resource protection and visitor enjoyment:

The National Park Service will conduct interpretive programs in all parks to instill an understanding and appreciation of the value of parks and their resources; to develop public support for preserving park resources; to provide the information necessary to ensure the successful adaptation of visitors to park environments; and to encourage and facilitate appropriate, safe, minimum-impact use of park resources (NPS Management Policies 7:1).

APPENDIX D

LETTER FROM U.S. FISH AND WILDLIFE SERVICE



United States Department of the Interior
FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001



ES-61411
TAR/W.02/WY (GTNPWntr.sp2)

February 22, 2000

Memorandum

To: Jack Neckels, Superintendent, Grand Teton National Park, Moose, Wyoming
From: Field Supervisor, Ecological Services, Cheyenne, Wyoming *Michael H. Long*
Subject: Species List - Winter Use Plan, Draft Environmental Impact Statement

Thank you for your telephone request of February 16 regarding a current species list for the Winter Use Plan and Draft Environmental Impact Statement (DEIS) for the Yellowstone and Grand Teton National Parks and John D. Rockefeller, Jr. Memorial Parkway.

In accordance with section 7(c) of the Endangered Species Act of 1973, as amended (Act), my staff has determined that the following threatened or endangered species, or species proposed for listing under the Act, may be present in the project area.

Listed and Proposed Species

| <u>Species</u> | <u>Status</u> | <u>Expected Occurrence</u> |
|---|--------------------------------|--|
| Canada lynx (<i>Lynx canadensis</i>) | Proposed | Resident of forested areas |
| Gray wolf (<i>Canis lupus</i>) | Experimental, non-essential | Potential resident. |
| Grizzly bear (<i>Ursus arctos horribilis</i>) | Threatened | Resident. |
| Bald eagle (<i>Haliaeetus leucocephalus</i>) | Threatened | Nesting. Winter resident. Migrant. |
| Whooping crane (<i>Grus americana</i>) | Experimental, non-essential | Resident. Migrant. |
| Ute Ladies'-tresses (<i>Spiranthes diluvialis</i>) | Threatened | Seasonally moist soils and wet meadows of drainages below 6500 feet elevation. |

Section 7(c) of the Act requires that a biological assessment be prepared for any Federal action that is a major construction activity to determine the effects of the proposed action on listed and proposed species. If a biological assessment is not required (i.e., all other actions), the lead

Federal agency is responsible for review of proposed activities to determine whether listed species will be affected. We would appreciate the opportunity to review any such determination document. If it is determined that the proposed activities may affect a listed species, you should contact this office to discuss consultation requirements. If it is determined that any Federal agency program or project "is likely to adversely affect" any listed species, formal consultation should be initiated with this office. Alternatively, informal consultation can be continued so we can work together to determine how the project could be modified to reduce impacts to listed species to the "not likely to adversely affect" threshold. If it is concluded that the project "is not likely to adversely affect" listed species, we should be asked to review the assessment and concur with the determination of not likely to adversely affect.

For those actions where a biological assessment is necessary, it should be completed within 180 days of receipt of a species list, but can be extended by mutual agreement between the lead agency and the Fish and Wildlife Service (Service). If the assessment is not initiated within 90 days of receipt of a species list, the list of threatened and endangered species should be verified with me prior to initiation of the assessment. The biological assessment may be undertaken as part of the agency's compliance of section 102 of the National Environmental Policy Act (NEPA), and incorporated into the NEPA documents. The Service recommends that biological assessments include:

1. a description of the project;
2. a description of the specific area potentially affected by the action;
3. the current status, habitat use, and behavior of threatened and endangered species in the project area;
4. discussion of the methods used to determine the information in item 3;
5. direct and indirect impacts of the project to threatened and endangered species;
6. an analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts from Federal, State, or private projects in the area;
7. measures that will reduce or eliminate adverse impacts to threatened and endangered species;
8. the expected status of threatened and endangered species in the future (short and long term) during and after project completion;
9. determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species;
10. determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species;
11. alternatives to the proposed action considered, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed action, and the reasons for not selecting those alternatives.
12. citation of literature and personal contacts used in the assessment.

A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare biological assessments. However, the ultimate responsibility for section 7 compliance

remains with the Federal agency, and written notice should be provided to the Service upon such a designation. We recommend that Federal agencies provide their non-Federal representatives with proper guidance and oversight during preparation of biological assessments and evaluation of potential impacts to listed species.

Section 7(d) of the Act requires that the Federal agency and permit or license applicant shall not make any irreversible or irretrievable commitment of resources which would preclude the formulation of reasonable and prudent alternatives until consultation on listed species is completed.

Regarding species proposed for listing, Federal agencies must determine whether any of their proposed activities are likely to jeopardize the continued existence of the species. If jeopardy is likely, that agency must confer with the Fish and Wildlife Service.

We will work with the lead Federal agency in the section 7 consultation process. The analysis of project impacts must assess direct impacts of the project, as well as those impacts that are interrelated to or interdependent with the proposed action. Impacts to listed species on non-Federal lands must be evaluated along with such impacts on Federal lands. Any measures that are ultimately required to avoid or reduce impacts to listed species will apply to Federal as well as non-Federal lands.

These preliminary scoping comments are made pursuant to the National Environmental Policy Act, the Endangered Species Act and Fish and Wildlife Coordination Act. Please keep this office informed of any developments or decisions concerning this project.

If you have any questions please contact Terry A. Root of my staff at the letterhead address or phone (307) 587-2216.

cc: Director, WGFD, Cheyenne, WY
Nongame Coordinator, WGFD, Lander, WY

APPENDIX E

**LETTER FROM
ADVISORY COUNCIL ON HISTORIC PRESERVATION**

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 12136 West Bayaud Avenue, #330
Lakewood, Colorado 80226

January 5, 1999

Sarah Creachbaum
Planner
Yellowstone National Park
United States Department of the Interior
P.O. Box 168
Yellowstone, WY 82414

RE: *Development of Winter Use Plans for Yellowstone and Grand Teton National Parks and
John D. Rockefeller Jr. Memorial Parkway in Wyoming, Montana, and Idaho*

Dear Ms. Creachbaum:

Thank you for providing our office with an early opportunity to review and comment on the draft preliminary alternatives for the referenced document. Based on our examination of the draft, we would like to offer the following recommendations for you to consider as you develop the plan.

Although the proposed draft alternatives are broad in scope, they seem to focus primarily on balancing visitor access with wildlife and natural resources management. In addition to addressing wildlife and natural resource issues, however, NPS is responsible for managing historic properties in accordance with the National Historic Preservation Act [16 USC 470(f)]. The NPS units subject to this draft document possess a large number of historic properties, including buildings, archaeological sites, cultural landscapes, and structures. Based on the information included in the Draft Preliminary Winter Use Alternatives, it is difficult to determine how historic properties may be affected by the proposed actions. As such, we recommend that the draft alternatives address cultural resources as well as wildlife and natural resources concerns. We believe visitor access should be balanced with the need to manage all of the Park's significant resources, including historic properties.

Once the draft plan is developed, we also recommend including language to convey that further consultation with the Wyoming, Montana, and Idaho SHPOs and the Council, as necessary, will be carried out pursuant to Section 106 of NHPA and the Nationwide Programmatic Agreement among NPS, the Council, and the National Conference of State Historic Preservation Officers for all those actions described in the document that may affect cultural resources, once plans for these activities become more specific.

If you have any questions regarding this matter, please contact me at (303) 969-5110. Thank you for your continued cooperation.

Sincerely,


Don L. Klima
Director
Office of Planning and Review

APPENDIX F

ANALYSIS OF ESTIMATED COSTS OF THE WINTER USE PLAN ALTERNATIVES

INTRODUCTION

This cost analysis represents an estimate of program and program maintenance costs that would be associated with each alternative. Its primary value is to illustrate the relative cost for each alternative as compared to the existing program. The cost summary for each alternative provides this comparison.

COSTS COMMON TO ALL ALTERNATIVES

Initial Costs

All alternatives include the cost of an additional rotary plow to assist with snow removal on the road between the North Entrance and Cooke City, to supplement spring opening, and for routine snow plowing within Grand Teton and the Parkway (excepting road segments which change in different alternatives). In addition all alternatives include the purchase of search and rescue equipment and replacing substandard, non-winterized housing. Recycling centers would be built at interior developed areas and weather stations would be placed at critical, avalanche prone locations. All alternatives include design, contract administration, and contingency costs for the construction projects, estimated at the National Park Service (NPS) standard of 35%.

Replacement Costs

The equipment that is proposed for replacement in all alternatives is the new equipment shown as purchased under the initial costs for each alternative. The replacement schedule for equipment is the desirable interval based on past performance. Only the new equipment is shown as being replaced. This underestimates the true cost of replacing all park winter-related equipment on a desirable schedule.

Annual Costs

The current funding levels include base (Operations of the National Park Service) funds as well as non-base money and fee demonstration money. The total annual cost of winter program management, including overhead expenses such as facility maintenance, utilities, and personnel and support services, was shown in the Draft Environmental Impact Statement (DEIS) to be approximately \$6,480,558 for Fiscal Year 1998 (in YNP). Incremental cost changes relate to estimates of initial costs and direct field expenses for implementing programs, as they would occur in each alternative. For Grand Teton and the Parkway, the comparable winter management budget was about \$3,033,000. For perspective, over the past five years Yellowstone has spent an average of \$1,924,400 directly on field-related winter operations. These are funds devoted to snowmobile use and road grooming, maintaining interior park buildings, visitor and resource protection, information, planning, and equipment replacement. A portion of Grand Teton's budget was allocated for implementation of the Continental Divide Snowmobile Trail (CDST).

Life Cycle Costs

A 10% surcharge was added to the annual costs for all alternatives to account for the additional supplies, administrative, and management support costs that the increased activities would require.

A 25-year period was used to calculate life cycle costs for all elements, except for the advisory committee. The advisory committee was set at 10 years since all alternatives that call for use of a committee identify a sunset in about 2008.

COST SUMMARIES FOR EACH ALTERNATIVE

Alternative A: No Action

The Yellowstone winter operation, as it currently exists, has some significant shortfalls. The no action alternative addresses these shortfalls by identifying the additional facilities, equipment and staff that are needed to have the current winter operations be effective. All proposals under the no action alternative are within the scope of the 1990 Winter Use Plan, or other approved planning documents. These numbers will be updated and revised as the Yellowstone National Park Business Plan is completed in late 2000.

The cost of current operations for the Continental Divide Snowmobile Trail is included in alternative A for Grand Teton National Park (GTNP) and the Parkway. No other additional needs for the current winter program are identified for GTNP and the Parkway, although additional monitoring costs could be anticipated should this alternative be selected.

Initial Costs

A warming hut would be built at Norris and four existing warming huts would be replaced at Canyon, Madison, and two at Old Faithful. An additional 12 housing units would be built for the additional ranger, maintenance and interpretive staff.

Two additional groomers would be purchased to allow better snow road grooming and have replacement equipment available when current equipment breaks down. Oversnow fire engines would be placed at Madison, Canyon, Lake, Grant, East Entrance, and South Entrance. An oversnow medical transport vehicle (suburban on mat-tracks) would be placed at Lake to serve the east side of the park, and compliment the existing ambulance at Old Faithful. Administrative snowcoaches would be purchased and placed at Mammoth (2), Old Faithful, Lake, and Canyon. The administrative snowmobile fleet would be augmented with 11 additional snowmobiles (bringing the total up to 115). Wildlife and sound research would occur to augment existing wildlife work, and to understand unwanted sound concerns.

See the table at the end of this narrative titled "Enhanced Activities for the No Action Alternative."

Annual Costs

Bison and air quality monitoring would continue. Additional interpretive media and publications would be produced to enhance the visitor understanding of the winter season. The additional warming hut would be maintained, as would the 11 additional snowmobiles, 5 administrative snowcoaches, and 12 new housing units. Ten additional interpreters are needed to staff warming huts and provide outreach. Three additional rangers are needed for patrol and winter resource operations. Seven additional maintenance staff members are needed to accomplish stepped up grooming.

Cost Summary

See alternative A in the attached cost spreadsheets and graphs for YNP. For YNP, implementing the no action alternative would cost an estimated additional \$1,648,700 per year on an annualized basis as compared to the current program. The estimate includes:

- Initial costs for the additional facilities and equipment, and studies to manage Yellowstone National Park (YNP) properly in the winter.
- Replacement costs for the additional equipment.
- Annual expenses to staff and to maintain the park adequately.

The costs were developed by projecting expenses over a 25-year period and then annualized using a discount rate of seven percent. The estimated costs of all alternatives described below include these initial, replacement, and annual expenses.

See alternative A in the attached cost spreadsheets and graphs for GTNP. For GTNP, implementing the no action alternative is the nearly same as indicated in the current budget figure because no additional needs for upgrading facilities or services have been identified in the existing program. The only indicated additional need is the annualized cost of two snowmobiles for monitoring and enforcement.

Alternative B

Initial Costs

In keeping with the alternative's philosophy of providing better visitor services, new warming huts would be placed at Tower and Norris, and four existing huts would be replaced (at Canyon, Madison, and Old Faithful). Twenty new housing units would be provided for additional staff. A maintenance facility and sand storage facility would be built to support plowing the road from West to Old Faithful. One additional push plow and one additional rotary plow would be purchased to support plowing the road from West to Old Faithful (and supplement existing plows). Oversnow fire engines would be placed at Canyon, Lake, Grant, and East Entrance. The existing Old Faithful oversnow engine would be moved to South Entrance. The Old Faithful oversnow ambulance would be moved to Lake, and existing wheeled ambulances and fire trucks would serve Madison and Old Faithful. Administrative snowcoaches would be purchased and placed at Mammoth (2), Old Faithful, Lake, and Canyon.

There would be an initial cost for constructing a separate year-round pathway for the CDST. This would consist of a 12-foot wide paved pathway, 28 miles long from Moran to Flagg Ranch estimated at \$0.975 million per mile for a total of \$27.3 million. Costs may be higher than unit costs for this type of construction elsewhere in Teton County due to high slope gradients, river approaches, and river crossings that must be negotiated over the 28 miles. Design/contract and analysis costs would be in addition to construction, as would the relocation of any current overhead utilities to the new corridor. Also, two new warming hut facilities would be constructed and residential facilities would need to be winterized to house seasonal employees.

Annual Costs

Approximately 6 miles of new snow road would be groomed at Natural Bridge, Gull Point Drive, and Lake Butte. Since a narrower and less maintained standard is set for these roads, the cost of grooming was assumed to be for one lane (versus two for the balance of the snow roads). About 10 miles of additional ski trails would be groomed at Indian Creek, West Entrance, Canyon, and Madison River Drive. Plowing the road from West to Old Faithful would add the costs of plowing and sand removal, but subtract costs of grooming and spring opening. Bison and air quality monitoring would occur, as would the production of additional interpretive publications and media. The two additional warming huts would be maintained, as would the maintenance facility, sand storage facility, administrative snowcoaches, additional snowmobiles, and new housing.

An advisory committee to help with emissions and sound standards would be established that would require administrative support for 10 years (since the alternative calls for the committee's work to be done by 2008-2009).

In YNP an additional 21 interpretation and ranger staff would be used to carry out the alternative's goal of increasing interpretive opportunities in and outside the park, increasing enforcement program in the park, and managing the interim limit on visitor use. Seven additional maintenance staff would be needed for the plow operation. For GTNP, an additional six seasonal rangers would be necessary for implementing increased interpretive programs, management of interim use limits, additional maintenance and route marking, and providing a presence at the new warming huts. Concurrent with enhanced interpretive services, additional publications would need to be developed and produced.

Cost Summary

See alternative B in the attached cost spreadsheets and graphs. For YNP, implementing alternative B would cost an estimated \$2,362,000 more per year on an annualized basis than in alternative A (considering existing needed facility and service upgrades). For GTNP, implementing alternative B would cost an estimated \$3,484,000 more per year on an annualized basis than under current management.

Alternative C

Initial Costs

In keeping with the alternative's philosophy of providing a wider variety of visitor services, five new warming huts would be placed at Tower, Norris, and other locations, and four existing huts would be replaced (at Canyon, Madison, and Old Faithful). Five new restrooms would be built to provide better visitor service. Twelve new housing units would be provided for additional staff. A maintenance facility and sand storage facility would be built to support plowing the road from West to Old Faithful. One additional push plow and one additional rotary plow would be purchased to support plowing the road from West to Old Faithful (and supplement existing plows). Oversnow fire engines would be placed at Canyon, Lake, Grant, and East Entrance. The existing Old Faithful oversnow engine would be moved to South Entrance. The Old Faithful oversnow ambulance would be moved to Lake, and existing wheeled ambulances and fire trucks would serve Madison and Old Faithful. Administrative snowcoaches would be purchased and placed at Mammoth (2), Old Faithful, Lake, and Canyon.

For GTNP an initial cost would be incurred for the widened highway shoulder for the CDST. This would be the construction of a six-foot wide lane along existing shoulder for 28-mile distance from Moran to Flagg Ranch, estimated at about \$0.487 million per mile or \$13.6 million. Three new warming huts would be constructed, and additional housing would need to be winterized to accommodate a greater seasonal staff. Two new groomers would need to be purchased, as well as additional snowmobiles for administrative purposes. There would be a capital cost for improving the unpaved portion of the Moose-Wilson Road before the road could be plowed for winter access.

Annual Costs

Approximately 10 miles of new snow road would be groomed at Natural Bridge, Gull Point Drive, Lake Butte, and near Norris. Since a narrower and less maintained standard is set for these roads, the cost of grooming was assumed to be for one lane (versus two for the balance of the snow roads). Since the winter season would be extended by two weeks from South to West thumb, an additional 22 miles of grooming would occur. About 20 miles of additional ski trails would be groomed at Indian Creek, West Entrance, Norris, Madison River Drive, Fountain Flat Road, and Lower Geyser Basin. Plowing the road from West to Old Faithful would add costs of plowing and sand removal, but subtract cost of grooming and spring opening. Similarly, late season plowing from Mammoth to Madison would add the cost of plowing 35 miles for one month (along with sand removal), but subtract the cost of grooming for a similar length and time. Bison and air quality monitoring would occur, as would the production of additional interpretive publications and media. The additional facilities would be maintained.

For YNP an additional 13 interpretation and ranger staff would be used to carry out the alternative's goal of increasing partnership interpretive opportunities outside the park and

strictly enforcing sound standards in the park. Seven additional maintenance staff would assist with the road plowing.

For GTNP, an additional six seasonal rangers would be necessary for implementing increased interpretive programs, additional maintenance and route marking, and providing a presence at the new warming huts. Concurrent with enhanced interpretive services, additional publications would need to be developed and produced.

Cost Summary

See alternative C in the attached cost spreadsheets and graphs. For YNP, implementing alternative C would cost an estimated \$1,684,000 more per year on an annualized basis than in alternative A. For GTNP, implementing alternative C would cost an estimated \$1,976,000 more per year on an annualized basis than under current management.

Alternative D

Initial Costs

Alternative D calls for stepped up visitor services and clean and quiet modes of transportation with an emphasis on additional staff. Twenty housing units would be built for these staff. Existing, substandard warming huts at Madison, Canyon, and Old Faithful would be replaced. Oversnow fire engines would be placed at Canyon, Lake, Grant, Madison, South Entrance, and East Entrance. An oversnow medical transport vehicle would be placed at Lake. Administrative snowcoaches would be purchased and placed at Mammoth (2), Old Faithful, Lake, and Canyon. Wildlife and sound research would occur.

For GTNP, an initial cost would be incurred for widening the highway shoulder for the CDST. This would be the construction of a six-foot wide lane along existing shoulder for 10-mile distance from Moran to Colter Bay, estimated at about \$0.487 million per mile or \$4.87 million. One new warming hut would be constructed, and additional housing for winter seasonal employees would need to be winterized. Due to changes in grooming and plowing needs, additional road maintenance machinery would need to be acquired. The unpaved portion of the Moose-Wilson Road would need to be improved. Colter Bay facilities would need to be winterized and upgraded to accommodate staging needs at that location (vice Flagg Ranch).

Annual Costs

Approximately 15 miles of new snow road would be groomed at Mesa Road, Natural Bridge, Gull Point Drive, Fountain Flats, and Madison River Drive. Since a narrower and less maintained standard is set for these roads, the cost of grooming was assumed to be for one lane (versus two for the balance of the snow roads). The East Entrance road would be closed, eliminating grooming on 27 miles of snow road. The snow road to Washburn Hot Springs overlook and the North Canyon Rim Drive would be converted from motorized to nonmotorized travel, subtracting grooming for vehicles and substituting grooming for skiing on these six miles. Since alternative D calls for even a

higher level of maintenance on the West to Old Faithful snow road, additional funds are allocated to this operation. Bison and air quality monitoring would occur, as would the production of additional interpretive publications and media. The additional facilities would be maintained.

For YNP, an additional 21 interpretation and ranger staff will be used to carry out the alternative's goal of increasing interpretive opportunities in and outside the park, increasing the enforcement program in the park, and managing the daily limit on visitor numbers. Seven additional maintenance staff will provide increased grooming services and fleet maintenance.

For GTNP, an additional six seasonal rangers would be necessary for implementing increased interpretive programs, additional maintenance and route marking, monitoring visitor use, and providing a presence at the new warming huts. Concurrent with enhanced interpretive services, additional publications would need to be developed and produced.

Cost Summary

See alternative D in the attached cost spreadsheets and graphs. For YNP, implementing alternative D would cost an estimated \$1,916,500 more per year on an annualized basis than in alternative A. For GTNP, implementing alternative D would cost an estimated \$957,000 more per year on an annualized basis than under current management.

Alternative E

Initial Costs

Alternative E calls for an adaptive approach to winter use planning and management. The initial costs would be similar to the no action alternative, although a warming hut would not be placed at Norris. Eight housing units would be built. Existing, substandard warming huts at Madison, Canyon, and Old Faithful would be replaced. Search and rescue caches would be placed in several locations. Oversnow fire engines would be placed at Canyon, Lake, Grant, Madison, South Entrance, and East Entrance. An oversnow medical transport vehicle would be placed at Lake. Administrative snowcoaches would be purchased and placed at Mammoth (2), Old Faithful, Lake, and Canyon. Increased funding for wildlife and sound research is shown to reflect the information that would be needed under this alternative's adaptive management philosophy.

Annual Costs

No changes would occur in snow roads or ski trails, unless scientific studies indicate closures are warranted. Increased funding for bison monitoring and air quality monitoring is shown, again reflecting the adaptive management philosophy. An advisory committee to help with emissions and sound standards would be established that would require administrative support for about 10 years (since the alternative calls for the

committee's work to be done by 2008-2009). For GTNP, the discontinuance of the CDST and most snowmobiling in the park would result in a net decrease in annual costs.

Cost Summary

See alternative E in the attached cost spreadsheets and graphs. For YNP, implementing alternative E would cost an estimated \$1,735,000 more per year on an annualized basis than in alternative A. For GTNP, alternative E would cost an estimated \$291,000 less per year on an annualized basis than under current management.

Alternative F

Initial Costs

With the closure of the west and north snow roads in this alternative, a shift in emphasis would occur to the east and south sides of the park. Warming huts would be placed at Norris and replaced at Canyon, Fishing Bridge, West Thumb, and Old Faithful and restrooms added to these areas of the park. Staff would be shifted from West and Madison to other locations and fifteen existing non-winterized housing units would be replaced.

Oversnow fire engines would be placed at Canyon, Lake, Grant, and South and East Entrances. An oversnow medical transport vehicle would be placed at Lake.

Administrative snowcoaches would be purchased and placed at Mammoth (2), Old Faithful, Lake, and Canyon.

Annual Costs

Approximately 65 miles of snow road would no longer be groomed. With a 2-week shorter season, the remaining 119 miles of snow road would not be groomed after early March. Bison monitoring would occur, as would the production of additional interpretive publications and media. The new facilities would be maintained. This alternative does not reflect saving utility costs by closing the Madison developed area in the winter, which would include water and sewer plant operations as well as electricity, fuel oil, and propane. Permanent staff at Madison would be shifted to other locations in the winter.

The additional 10 interpreters would be used to carry out the alternative's goal of increasing interpretive opportunities outside the park.

This alternative for GTNP is essentially the same as alternative E. Additional annual costs for wildlife/ungulate monitoring would be incurred.

Cost Summary

See alternative F in the attached cost spreadsheets and graphs. For YNP, implementing alternative F would cost an estimated \$580,700 more per year on an annualized basis. For GTNP, alternative F would cost an estimated \$164,000 less per year on an annualized basis than under current management.

Alternative G

Initial Costs

Alternative G puts the emphasis on access to Yellowstone via snowcoach. Most of the initial costs of alternative G are similar to no action, with the exception of the purchase (and replacement program) of 30 administrative snowcoaches. The administrative snowmobile fleet would be reduced from 105 to 15, and they would be only used for emergency functions. These savings are reflected in the reduced replacement and maintenance costs.

For GTNP one new warming hut would be constructed, and additional housing for winter seasonal employees would need to be winterized. Due to changes in grooming and plowing needs, additional road maintenance machinery would need to be acquired. The unpaved portion of the Moose-Wilson Road would need to be improved. Colter Bay facilities would need to be winterized and upgraded to accommodate staging needs at that location (vice Flagg Ranch).

Annual Costs

Bison and air quality monitoring would occur, as would the production of additional interpretive publications and media. Additional facilities would be maintained. An additional 15 interpretation staff would be used to carry out the alternative's goal of increasing interpretive opportunities in and outside the park.

For GTNP an additional six seasonal rangers would be necessary for implementing increased interpretive programs, additional maintenance and route marking, and providing a presence at the new warming huts. Concurrent with enhanced interpretive services, additional publications would need to be developed and produced.

Cost Summary

See alternative G in the attached cost spreadsheets and graphs. For YNP, implementing alternative G would cost an estimated \$1,882,000 more per year on an annualized basis than in alternative A. For GTNP, implementing alternative G would cost an estimated \$338,000 more per year on an annualized basis than under current management.

UNIT COSTS FOR WINTER USE PLANS

List of units that would be applied to the alternatives to determine the incremental cost difference of action alternatives from the no action alternative. Fiscal Year 99 costs are used, unless an average is indicated.

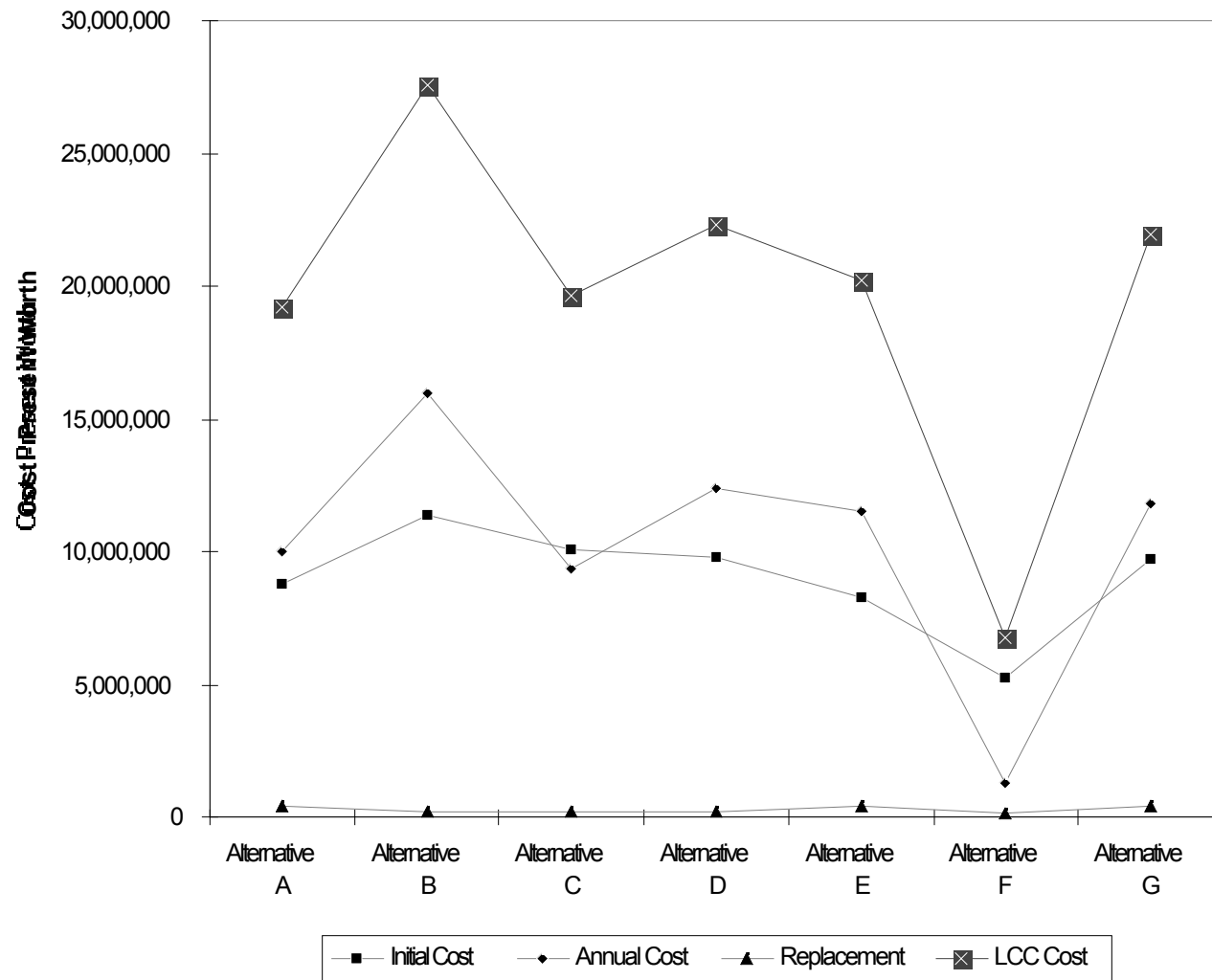
| Units | Unit Cost |
|---|--|
| Grooming Snow Road /Lane-Mile | \$15 per lane mile/day for 105 day season; includes P/M, Labor, & Fuel |
| Grooming Ski Trail/Mile | \$35/mile (labor plus equipment) |
| Plowing/ Lane-Mile | \$22 per lane mile per day for 170 day season, includes P/M, labor, fuel, & road sand (three-year average) |
| Sand Removal in Spring/Mile | \$48 Per mile per mile includes P/M, labor, & fuel, |
| Personnel/Year | \$44,000/year including benefits (based on total park payroll of \$22,068,000 divided by 500 average annual FTE in FY98) |
| Spring Opening/Mile | Three-year average \$1552 per mile includes P/M, labor, fuel, and housing. |
| Groomer Purchase Replacement Cycle (years) | Tractor and attachment with trade in. \$174,000 - \$10,000 trade-in 8 years |
| Push Plow Purchase Replacement Cycle (years) | Truck/plow/sander \$115,000 17 years |
| Rotary Plow Purchase Replacement Cycle (years) | \$375,000 25 years |
| Warming Hut Construction Annual Ops and Maintenance. | \$100 per sq. ft. \$5000 annual cyclic maintenance |
| Comfort Station Construction Annual Ops and Maintenance. | \$100 per sq. ft. \$5,000 annual cyclic maintenance |
| Snowmobile Purchase Replacement Cycle Annual Ops and Maintenance. | \$4,200 per machine (\$6,000/machine - \$1,800 resale) three years \$1,030 per machine |
| Housing Unit Construction Annual Ops and Maintenance. | \$125,000/unit to build based on recent bids for six-plex construction \$15,000/year cyclic maintenance |
| Maintenance Facility Construction Annual Ops and Maintenance. | 80x70 ft. \$160 per sq. ft. \$10,000 cyclic maintenance |
| Sand Storage Facility Construction Annual Ops and Maintenance. | 50x 100 ft. \$50 per sq. ft. \$1,000/year cyclic maintenance |
| Garbage Storage (trailers) Purchase Replacement Cycle | Trailer Replacement \$80,000 25 years |
| Bison Monitoring | \$50,000/year |
| Air Quality Monitoring | \$200,000/year |
| Wildlife Research | \$200,000 one time |
| Advisory Committee Support | \$150,000/year for 10 years |
| Sound Research | \$200,000 one time |

ENHANCED ACTIVITIES FOR THE NO ACTION ALTERNATIVE IN YNP

The following lists what additional desirable actions would need to be accomplished in order to operate more effectively in the winter under the no action alternative. These estimates are being reviewed for preparation of Yellowstone's Business Plan, which is due to be completed in late 2000.

| Unit | Unit cost |
|--|---|
| Better Avalanche mitigation | \$25,000 annually. Monitoring, training supplies and materials. Not limited to any one-road segment. \$15,000 weather (2) stations, initial purchase |
| Better Grooming | \$328,000 initial purchase of two groomers. \$25,000 annually to increase grooming frequency on some snow roads |
| Replace Snowmobiles Sooner | Replace snowmobiles on a two-year cycle \$6,000 each. |
| Provide Tracks for Administrative Snowcoaches | \$24,000 initial start-up per unit for tracks. Annual ops and maintenance. \$4,130 (12% of tracks + \$1,250 for vehicle) |
| Provide more interpretive staff | 10 more positions; 5 additional snowmobiles \$81,500/ year for improved interpretive publications and media |
| Provide more Maintenance Staff | Three more fleet maintenance positions |
| Provide more protection staff | Three more positions; six more snowmobiles |
| Replace push plows sooner | 12 years or 150,000 miles |
| Replace rotary plows sooner | 18 years or 10,000 hours |
| Purchase additional rotary plow | \$375,000 each |
| Replace Groomers sooner | Seven years or 8,000 hours |
| Provide better EMS equipment Fire Ambulance SAR | Oversnow fire engines: \$200,000 each Oversnow medical transport vehicle (Suburban): \$84,000 each \$19,000 for equipment |
| Provide better garbage storage | Replace trailer 12 years |
| Provide Recycle Centers | 20x30 ft @ \$50 per sq. ft |
| Replace substandard housing | Replace 20 housing units |
| Replace substandard warming huts | Replace 4 warming huts |
| Build Norris Warming Hut | 500 sq. ft @ \$100 per sq. ft; \$5,000 annual cyclic maintenance |

Life Cycle Cost Analysis for YNP Present Worth



LIFE CYCLE COST ANALYSIS
Presentworth Dollars

| | | | | | | | |
|--|-----------------------------------|--------|------------|--|------------------|-------------------------------------|-------------------------|
| Project/Location: YNP Final Winter Use Plan Subject: Functional Component Description: Project Life Cycle = Discount Rate = Present Time = | | | | Advisory Comm: 25 Years 10 years | | Alternative A Notes No Action | |
| | | | | 7.00% | | Jun-00 | |
| INITIAL COSTS | | | | Quantity | UM | Unit Price | Quantity Est. PW |
| Construction Costs | | | | | | | |
| A. | Add. Warming Huts | 1 | sq ft | \$100 | 1 (Norris) | 50,000 | 50,000 |
| B. | Add. Comfort Station | 1 | sq ft | \$100 | | | 0 |
| C. | Add. Housing Unit | 1 | each | \$125,000 | 12 | 1,500,000 | 1,500,000 |
| D. | Maintenance Facility | 1 | sq ft | \$160 | | | 0 |
| E. | Sand Storage Facility | 1 | sq ft | \$50 | | | 0 |
| F. | Purchase Push Plow | 1 | each | \$115,000 | | | 0 |
| G. | Purchase Rotary Plow | 1 | each | \$375,000 | 1 | 375,000 | 375,000 |
| H. | Purchase Groomer | 1 | each | \$164,000 | 2 | 328,000 | 328,000 |
| I. | Purchase SAR Equip | 1 | each | \$19,000 | 1 | 19,000 | 19,000 |
| J. | Purchase Fire Engine | 1 | each | \$200,000 | 6 | 1,200,000 | 1,200,000 |
| K. | Purchase Ambulance | 1 | each | \$84,000 | 1 | 84,000 | 84,000 |
| L. | Purchase Snowcoach Tracks | 1 | each | \$24,000 | 5 | 120,000 | 120,000 |
| M. | Purchase Snowmobile | 1 | each | \$4,200 | 11 | 46,200 | 46,200 |
| N. | Purchase Garbage Storage | 1 | each | \$80,000 | 1 | 80,000 | 80,000 |
| O. | Wildlife Research | 1 | each | \$200,000 | | 100,000 | 100,000 |
| P. | Sound Research | 1 | each | \$200,000 | | 200,000 | 200,000 |
| Q. | Provide Recycle Centers | 1 | sq ft | \$50 | 5 | 150,000 | 150,000 |
| R. | Replace Housing | 1 | each | \$125,000 | 20 | 2,500,000 | 2,500,000 |
| S. | Install Weather Stations | 1 | each | \$15,000 | 2 | 30,000 | 30,000 |
| T. | Replace Warming Huts | 1 | sq ft | \$100 | 4(Can/2OF/Mad) | 400,000 | 400,000 |
| Design/Contract/Supervision | | | | 35% | 35% | 1,620,500 | 1,620,500 |
| Total Initial Cost | | | | | | | 8,802,700 |
| Initial Cost PW Savings (Compared to Alt. A) | | | | | | | |
| REPLACEMENT COST/ SALVAGE VALUE | | | | Description | Year | PW Factor | |
| A. | Replace Groomer | 7 | | 0.62274974 | 2 groomers | 328,000 | 204,261 |
| B. | Replace Push Plow | 12 | | 0.44401196 | | | 0 |
| C. | Rotary Plow | 18 | | 0.29586392 | 1 rotary | 375,000 | 110,948 |
| D. | Snowmobile | 2 | | 0.87343873 | 11 snowmobiles | 46,200 | 40,352 |
| E. | Garbage Storage | 25 | | 0.18424918 | 1 storage trail. | 80,000 | 14,739 |
| F. | Snowcoaches | 10 | | 0.50834929 | 5 snowcoaches | 120,000 | 61,001 |
| Total Replacement/Salvage Costs | | | | 0 | 1 | | 431,301 |
| ANNUAL COSTS | | | | Description | Escl. % | PWA | |
| A. | Groom Snow roads | 0.000% | 11.6535832 | | | | 0 |
| B. | Extend Groom Season | 0.000% | 11.6535832 | | | | 0 |
| C. | Groom Ski Trail | 0.000% | 11.6535832 | | | | 0 |
| D. | Plow Road | 0.000% | 11.6535832 | | | | 0 |
| E. | Partial Season Plowing | 0.000% | 11.6535832 | | | | 0 |
| F. | Part Season groom deduct | 0.000% | 11.6535832 | | | | 0 |
| G. | Remove Sand | 0.000% | 11.6535832 | | | | 0 |
| H. | Full Season Groom Deduct | 0.000% | 11.6535832 | | | | 0 |
| I. | Spring Open Deduct | 0.000% | 11.6535832 | | | | 0 |
| J. | Bison Monitoring | 0.000% | 11.6535832 | | | 50,000 | 582,679 |
| K. | Air Quality Monitoring | 0.000% | 11.6535832 | | | 200,000 | 2,330,717 |
| L. | Add. Interp. Pubs. | 0.000% | 11.6535832 | | | 81,500 | 949,767 |
| M. | Warming Hut Maintenance | 0.000% | 11.6535832 | 1 hut | 5,000 | | 58,268 |
| N. | Comfort Station Maintenance | 0.000% | 11.6535832 | | | | 0 |
| O. | Snowmobile Maintenance | 0.000% | 11.6535832 | 11 snowmobiles | 11,341 | | 132,163 |
| P. | Advisory Committee Support | 0.000% | 7.02358154 | | | | 0 |
| Q. | Maintenance Facility Maintenance | 0.000% | 11.6535832 | | | | 0 |
| R. | Sand Storage Facility Maintenance | 0.000% | 11.6535832 | | | | 0 |
| S. | Housing Maintenance | 0.000% | 11.6535832 | 8 units | 120,000 | | 1,398,430 |
| T. | Additional Ranger Staff | 0.000% | 11.6535832 | 3 for 1/3 yr | 45,000 | | 524,411 |
| U. | Additional Interpretive Staff | 0.000% | 11.6535832 | 10 for 1/3 yr | 150,000 | | 1,748,037 |
| V. | Additional Maintenance Staff | 0.000% | 11.6535832 | 3 for 1/3 yr | 45,000 | | 524,411 |
| W. | Better Avalanche Control | 0.000% | 11.6535832 | | 25,000 | | 291,339 |
| X. | Better Grooming | 0.000% | 11.6535832 | | 25,000 | | 291,339 |
| Y. | Administrative Snowcoach Maint. | 0.000% | 11.6535832 | 5 coaches | 20,650 | | 240,646 |
| Management/Admin | | | | 0.000% | 11.6535832 | 10% mngr/admn | 907,220 |
| Total Annual Costs (Present Worth) | | | | 0.000% | 11.6535832 | | 9,979,428 |
| Total Life Cycle Costs (Present Worth) | | | | | | | 19,213,429 |
| Life Cycle Savings (Compared to Alt. A) | | | | | | | |
| Discounted Payback (Compared to Alt. A) | | | | PP Factor | | | |
| Total Life Cycle Costs (Annualized) | | | | 0.08581052 | | 1,648,714 Per Year | |

LIFE CYCLE COST ANALYSIS
Presentworth Dollars

| | | | | | | |
|--|----------------------|------------------------------|---------------------|----------------------|-------------------------------|---------------------|
| Project/Location: YNP Final Winter Use Plan Subject: Functional Component Description: Project Life Cycle = Discount Rate = Present Time = | Alternative B | | | Alternative C | | |
| | Notes | Preferred Alternative | | Notes | Maximize Opportunities | |
| INITIAL COSTS | Quantity | Est. | PW | Quantity | Est. | PW |
| Construction Costs | | | | | | |
| A. Add. Warming Huts | 2 Norris/Tower | 80,000 | 80,000 | 5 huts | 250,000 | 250,000 |
| B. Add. Comfort Station | 1(Tower) | 30,000 | 30,000 | 5 restrooms | 150,000 | 150,000 |
| C. Add. Housing Unit | 20 | 2,500,000 | 2,500,000 | 12 | 1,500,000 | 1,500,000 |
| D. Maintenance Facility | 1 | 896,000 | 896,000 | 1 | 896,000 | 896,000 |
| E. Sand Storage Facility | 1 | 250,000 | 250,000 | 1 | 250,000 | 250,000 |
| F. Purchase Push Plow | 1 | 115,000 | 115,000 | 1 | 115,000 | 115,000 |
| G. Purchase Rotary Plow | 2 | 750,000 | 750,000 | 2 | 750,000 | 750,000 |
| H. Purchase Groomer | | | 0 | | | 0 |
| I. Purchase SAR Equip | 1 | 19,000 | 19,000 | 1 | 19,000 | 19,000 |
| J. Purchase Fire Engine | 4 | 800,000 | 800,000 | 4 | 800,000 | 800,000 |
| K. Purchase Ambulance | | | 0 | | | 0 |
| L. Purchase Snowcoach Tracks | 5 | 120,000 | 120,000 | 5 | 120,000 | 120,000 |
| M. Purchase Snowmobile | | | 0 | | | 0 |
| N. Purchase Garbage Storage | | | 0 | | | 0 |
| O. Wildlife Research | | 100,000 | 100,000 | | | 0 |
| P. Sound Research | | 200,000 | 200,000 | | | 0 |
| Q. Provide Recycle Centers | 5 | 150,000 | 150,000 | 5 | 150,000 | 150,000 |
| R. Replace Housing | 20 | 2,500,000 | 2,500,000 | 20 | 2,500,000 | 2,500,000 |
| S. Install Weather Stations | 2 | 30,000 | 30,000 | 2 | 30,000 | 30,000 |
| T. Replace Warming Huts | 4(Can/2OF/Mad) | 400,000 | 400,000 | 4 huts | 400,000 | 400,000 |
| Design/Contract/Supervision | 35% | 2,392,600 | 2,392,600 | 35% | 2,144,100 | 2,144,100 |
| | | | 0 | | | 0 |
| Total Initial Cost | | | 11,332,600 | | | 10,074,100 |
| Initial Cost PW Savings (Compared to Alt. A) | | | (11,332,600) | | | (10,074,100) |
| REPLACEMENT COST/ SALVAGE VALUE | Description | | | | | |
| A. Replace Groomer | | | 0 | | | 0 |
| B. Replace Push Plow | 1 push plow | 115,000 | 51,061 | 1 push plow | 115,000 | 51,061 |
| C. Rotary Plow | 2 rotaries | 375,000 | 110,948 | 2 rotaries | 375,000 | 110,948 |
| D. Snowmobile | | | 0 | | | 0 |
| E. Garbage Storage | - 2 storage trail | -160,000 | (29,479) | - 2 storage trail | -160,000 | (29,479) |
| F. Snowcoaches | 5 snowcoaches | 120,000 | 61,001 | 5 snowcoaches | 120,000 | 61,001 |
| | | | 0 | | | 0 |
| Total Replacement/Salvage Costs | | | 193,531 | | | 193,531 |
| ANNUAL COSTS | Description | | | | | |
| A. Groom Snow roads | 6 mi add-1 lane | 9,450 | 110,126 | 10 mi add(1 In) | 15,750 | 183,544 |
| B. Extend Groom Season | | | 0 | 22 mi.add-South | 9,240 | 107,679 |
| C. Groom Ski Trail | 10 miles add. | 350 | 4,079 | 20 miles add. | 700 | 8,158 |
| D. Plow Road | 30 mi plowed | 224,300 | 2,613,899 | 30 miles plowed | 224,300 | 2,613,899 |
| E. Partial Season Plowing | | | 0 | 35 miles plowed | 46,200 | 538,396 |
| F. Part Season groom deduct | | | 0 | sub 35 mi | -31,500 | (367,088) |
| G. Remove Sand | 30 mi sand rem | 1,440 | 16,781 | 65 mi sand rem | 3,120 | 36,359 |
| H. Full Season Groom Deduct | subtract 30 mi | -94,500 | (1,101,264) | subtract 30 mi | -94,500 | (1,101,264) |
| I. Spring Open Deduct | subtract 30 mi | -46,560 | (542,591) | subtract 30 mi | -46,560 | (542,591) |
| J. Bison Monitoring | | 50,000 | 582,679 | | | 0 |
| K. Air Quality Monitoring | | 200,000 | 2,330,717 | | | 0 |
| L. Add. Interp. Pubs. | | 81,500 | 949,767 | | 81,500 | 949,767 |
| M. Warming Hut Maintenance | 2 huts | 10,000 | 116,536 | 5 huts | 25,000 | 291,340 |
| N. Comfort Station Maintenance | 1 restroom | 5,000 | 58,268 | 5 restrooms | 25,000 | 291,340 |
| O. Snowmobile Maintenance | | | 0 | | | 0 |
| P. Advisory Committee Support | 10 year life | 150,000 | 1,053,537 | | | 0 |
| Q. Maintenance Facility Maintenance | 1 facility | 10,000 | 116,536 | 1 facility | 10,000 | 116,536 |
| R. Sand Storage Facility Maintenance | 1 facility | 1,000 | 11,654 | 1 facility | 1,000 | 11,654 |
| S. Housing Maintenance | 18 units | 270,000 | 3,146,467 | 10 units | 150,000 | 1,748,037 |
| T. Additional Ranger Staff | 6 for 1/3 yr | 90,000 | 1,048,822 | 3 for 1/3 yr | 45,000 | 524,411 |
| U. Additional Interpretive Staff | 15 for 1/3 yr | 225,000 | 2,622,056 | 10 for 1/3 yr | 150,000 | 1,748,037 |
| V. Additional Maintenance Staff | 3 for 1/3 yr | 45,000 | 524,411 | 3 for 1/3 yr | 45,000 | 524,411 |
| W. Better Avalanche Control | | 25,000 | 291,340 | | 25,000 | 291,340 |
| X. Better Grooming | | 25,000 | 291,340 | | 25,000 | 291,340 |
| Y. Administrative Snowcoach Maint. | 5 coaches | 20,650 | 240,646 | 5 coaches | 20,650 | 240,646 |
| Management/Admin | 10% mngt/admn | 130,263 | 1,518,030 | 10% mngt/admn | 72,990 | 850,595 |
| | | | 0 | | | 0 |
| Total Annual Costs (Present Worth) | | | 16,003,837 | | | 9,356,545 |
| Total Life Cycle Costs (Present Worth) | | | 27,529,968 | | | 19,624,176 |
| Life Cycle Savings (Compared to Alt. A) | | | (27,529,968) | | | (19,624,176) |
| Discounted Payback (Compared to Alt. A) | | -8.15 Years | | | -12.29 Years | |
| Total Life Cycle Costs (Annualized) | | 2,362,361 Per Year | | | 1,683,961 Per Year | |

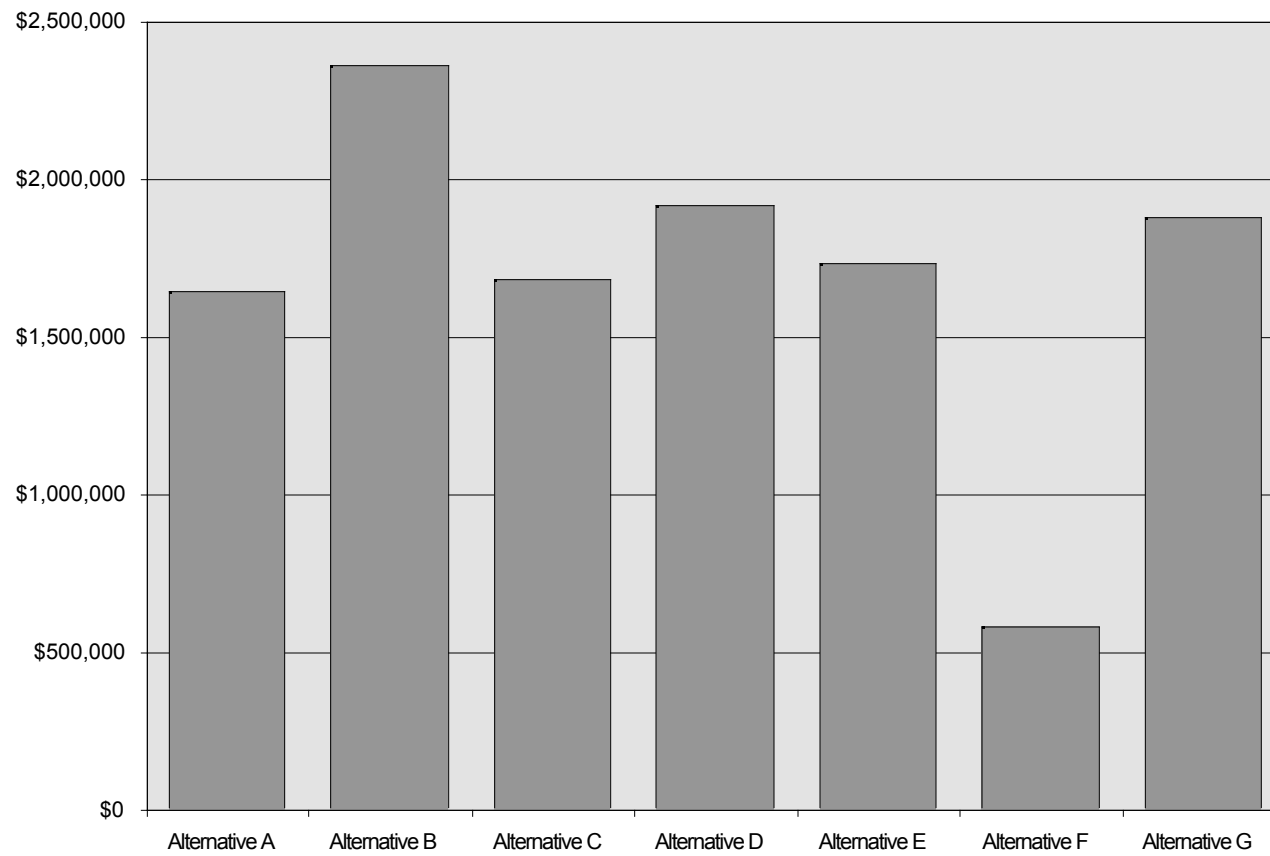
LIFE CYCLE COST ANALYSIS
Presentworth Dollars

| | | | | | | |
|--|----------------------|------------------------------------|---------------------------|----------------------|----------------------------|---------------------------|
| Project/Location: YNP Final Winter Use Plan Subject: Functional Component Description: Project Life Cycle = Discount Rate = Present Time = | | | | | | |
| | Alternative D | | | Alternative E | | |
| | Notes | Clean/Quiet Modes of Travel | | Notes | Adaptive Management | |
| INITIAL COSTS | Quantity | Est. | PW | Quantity | Est. | PW |
| Construction Costs | | | | | | |
| A. Add. Warming Huts | | | 0 | | | 0 |
| B. Add. Comfort Station | | | 0 | | | 0 |
| C. Add. Housing Unit | 20 | 2,500,000 | 2,500,000 | 8 | 1,000,000 | 1,000,000 |
| D. Maintenance Facility | | | 0 | | | 0 |
| E. Sand Storage Facility | | | 0 | | | 0 |
| F. Purchase Push Plow | | | 0 | | | 0 |
| G. Purchase Rotary Plow | 1 | 375,000 | 375,000 | 1 | 375,000 | 375,000 |
| H. Purchase Groomer | | | 0 | 2 | 328,000 | 328,000 |
| I. Purchase SAR Equip | 1 | 19,000 | 19,000 | 1 | 19,000 | 19,000 |
| J. Purchase Fire Engine | 6 | 1,200,000 | 1,200,000 | 6 | 1,200,000 | 1,200,000 |
| K. Purchase Ambulance | 1 | 84,000 | 84,000 | 1 | 84,000 | 84,000 |
| L. Purchase Snowcoach Tracks | 5 | 120,000 | 120,000 | 5 | 120,000 | 120,000 |
| M. Purchase Snowmobile | 11 | 46,200 | 46,200 | 11 | 46,200 | 46,200 |
| N. Purchase Garbage Storage | 1 | 80,000 | 80,000 | 1 | 80,000 | 80,000 |
| O. Wildlife Research | | 100,000 | 100,000 | | 200,000 | 200,000 |
| P. Sound Research | | 200,000 | 200,000 | | 300,000 | 300,000 |
| Q. Provide Recycle Centers | 5 | 150,000 | 150,000 | 5 | 150,000 | 150,000 |
| R. Replace Housing | 20 | 2,500,000 | 2,500,000 | 20 | 2,500,000 | 2,500,000 |
| S. Install Weather Stations | 2 | 30,000 | 30,000 | 2 | 30,000 | 30,000 |
| T. Replace Warming Huts | 4 huts | 400,000 | 400,000 | 4(Can/2OF/Mad) | 400,000 | 400,000 |
| Design/Contract/Supervision | 35% | 1,953,000 | 1,953,000 | 35% | 1,428,000 | 1,428,000 |
| | | | 0 | | | 0 |
| Total Initial Cost | | | 9,757,200 | | | 8,260,200 |
| Initial Cost PW Savings (Compared to Alt. A) | | | (9,757,200) | | | 3,072,400 |
| REPLACEMENT COST/ SALVAGE VALUE | | | | | | |
| Description | | | | | | |
| A. Replace Groomer | | | 0 | 2 groomers | 328,000 | 204,261 |
| B. Replace Push Plow | | | 0 | | | 0 |
| C. Rotary Plow | 1 rotary | 375,000 | 110,948 | 1 rotary | 375,000 | 110,948 |
| D. Snowmobile | 11 snowmobiles | 46,200 | 40,352 | 11 snowmobiles | 46,200 | 40,352 |
| E. Garbage Storage | 1 storage trail. | 80,000 | 14,739 | 1 storage trail. | 80,000 | 14,739 |
| F. Snowcoaches | 5 snowcoaches | 120,000 | 61,001 | 5 snowcoaches | 120,000 | 61,001 |
| | | | 0 | | | 0 |
| Total Replacement/Salvage Costs | | | 227,040 | | | 431,301 |
| ANNUAL COSTS | | | | | | |
| Description | | | | | | |
| A. Groom Snow roads | 15 mi add-1 lane | 23,625 | 275,316 | | | 0 |
| B. Extend Groom Season | | | 0 | | | 0 |
| C. Groom Ski Trail | 6 miles add. | 210 | 2,447 | | | 0 |
| D. Plow Road | | | 0 | | | 0 |
| E. Partial Season Plowing | | | 0 | | | 0 |
| F. Part Season groom deduct | | | 0 | | | 0 |
| G. Remove Sand | | | 0 | | | 0 |
| H. Full Season Groom Deduct | subtract 33 miles | -103,950 | (1,211,390) | | | 0 |
| I. Spring Open Deduct | | | 0 | | | 0 |
| J. Bison Monitoring | | 50,000 | 582,679 | | 100,000 | 1,165,358 |
| K. Air Quality Monitoring | | 200,000 | 2,330,717 | | 300,000 | 3,496,075 |
| L. Add. Interp. Pubs. | | 81,500 | 949,767 | | 81,500 | 949,767 |
| M. Warming Hut Maintenance | | | 0 | | | 0 |
| N. Comfort Station Maintenance | | | 0 | | | 0 |
| O. Snowmobile Maintenance | 11 snowmobiles | 11,341 | 132,163 | 11 snowmobiles | 11,341 | 132,163 |
| P. Advisory Committee Support | | | 0 | 10 year life | 150,000 | 1,053,537 |
| Q. Maintenance Facility Maintenance | | | 0 | | | 0 |
| R. Sand Storage Facility Maintenance | | | 0 | | | 0 |
| S. Housing Maintenance | 18 units | 270,000 | 3,146,467 | | | 0 |
| T. Additional Ranger Staff | 6 for 1/3 yr | 90,000 | 1,048,822 | 3 for 1/3 yr | 45,000 | 524,411 |
| U. Additional Interpretive Staff | 15 for 1/3 yr | 225,000 | 2,622,056 | 10 for 1/3 yr | 150,000 | 1,748,037 |
| V. Additional Maintenance Staff | 3 for 1/3 yr | 45,000 | 524,411 | 3 for 1/3 yr | 45,000 | 524,411 |
| W. Better Avalanche Control | | | 0 | | 25,000 | 291,340 |
| X. Better Grooming | grm W-OF better | 50,000 | 582,679 | | 25,000 | 291,340 |
| Y. Administrative Snowcoach Maint. | 5 coaches | 20,650 | 240,646 | 5 coaches | 20,650 | 240,646 |
| Management/Admin | 10% mngt/admn | 96,338 | 1,122,678 | 10% mngt/admn | 95,349 | 1,111,159 |
| | | | 0 | | | 0 |
| Total Annual Costs (Present Worth) | | | 12,349,460 | | | 11,528,245 |
| Total Life Cycle Costs (Present Worth) | | | 22,333,700 | | | 20,219,746 |
| Life Cycle Savings (Compared to Alt. A) | | | (22,333,700) | | | 7,310,222 |
| Discounted Payback (Compared to Alt. A) | | | -9.04 Years | | | 22.71 Years |
| Total Life Cycle Costs (Annualized) | | | 1,916,466 Per Year | | | 1,735,067 Per Year |

LIFE CYCLE COST ANALYSIS
Presentworth Dollars

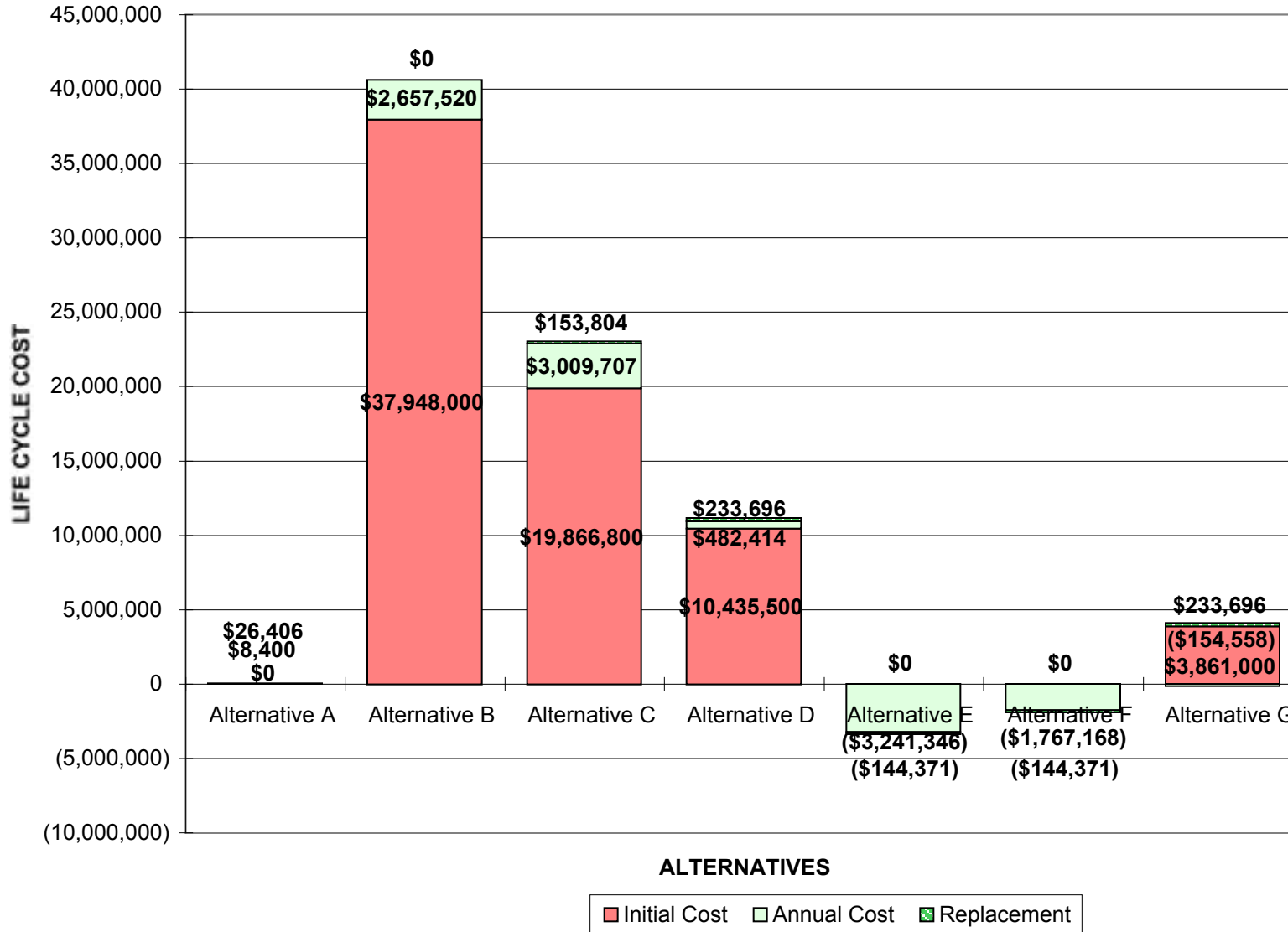
| | | | | | | |
|--|----------------------|-------------------------------------|-------------------|----------------------|---------------------------|-------------------|
| Project/Location: YNP Final Winter Use Plan Subject: Functional Component Description: Project Life Cycle = Discount Rate = Present Time = | Alternative F | | | Alternative G | | |
| | Notes | Maximize Wildlife Protection | | Notes | Snowcoach Only | |
| INITIAL COSTS | Quantity | Est. | PW | Quantity | Est. | PW |
| Construction Costs | | | | | | |
| A. Add. Warming Huts | 1 (Norris) | 50,000 | 50,000 | 1 (Norris) | 50,000 | 50,000 |
| B. Add. Comfort Station | 5 restrooms | 150,000 | 150,000 | | | 0 |
| C. Add. Housing Unit | | | 0 | 14 | 1,750,000 | 1,750,000 |
| D. Maintenance Facility | | | 0 | | | 0 |
| E. Sand Storage Facility | | | 0 | | | 0 |
| F. Purchase Push Plow | | | 0 | | | 0 |
| G. Purchase Rotary Plow | 1 | 375,000 | 375,000 | 1 | 375,000 | 375,000 |
| H. Purchase Groomer | | | 0 | 2 | 328,000 | 328,000 |
| I. Purchase SAR Equip | 1 | 19,000 | 19,000 | 1 | 19,000 | 19,000 |
| J. Purchase Fire Engine | 5 | 1,000,000 | 1,000,000 | 6 | 1,200,000 | 1,200,000 |
| K. Purchase Ambulance | 1 | 84,000 | 84,000 | 1 | 84,000 | 84,000 |
| L. Purchase Snowcoach Tracks | 5 | 120,000 | 120,000 | 30 | 720,000 | 720,000 |
| M. Purchase Snowmobile | | | 0 | | | 0 |
| N. Purchase Garbage Storage | | | 0 | 1 | 80,000 | 80,000 |
| O. Wildlife Research | | 100,000 | 100,000 | | 100,000 | 100,000 |
| P. Sound Research | | | 0 | | 200,000 | 200,000 |
| Q. Provide Recycle Centers | 5 | 150,000 | 150,000 | 5 | 150,000 | 150,000 |
| R. Replace Housing | 15 | 1,875,000 | 1,875,000 | 20 | 2,500,000 | 2,500,000 |
| S. Install Weather Stations | 2 | 30,000 | 30,000 | 2 | 30,000 | 30,000 |
| T. Replace Warming Huts | 4(Can/OF/WT/FB) | 400,000 | 400,000 | 4 huts | 400,000 | 400,000 |
| Design/Contract/Supervision | 35% | 929,250 | 929,250 | 35% | 1,708,000 | 1,708,000 |
| | | | 0 | | | 0 |
| Total Initial Cost | | | 5,282,250 | | | 9,694,000 |
| Initial Cost PW Savings (Compared to Alt. A) | | | 4,791,850 | | | 63,200 |
| REPLACEMENT COST/ SALVAGE VALUE | Description | | | | | |
| A. Replace Groomer | | | 0 | 2 groomers | 328,000 | 204,261 |
| B. Replace Push Plow | | | 0 | | | 0 |
| C. Rotary Plow | 1 rotary | 375,000 | 110,948 | 1 rotary | 375,000 | 110,948 |
| D. Snowmobile | | | 0 | -80 snowmobiles | -336,000 | (293,475) |
| E. Garbage Storage | | | 0 | 1 storage trailer | 80,000 | 14,739 |
| F. Snowcoaches | 5 snowcoaches | 120,000 | 61,001 | 30 snowcoaches | 720,000 | 366,011 |
| | | | 0 | | | 0 |
| Total Replacement/Salvage Costs | | | 171,949 | | | 402,484 |
| ANNUAL COSTS | Description | | | | | |
| A. Groom Snow roads | | | 0 | | | 0 |
| B. Extend Groom Season | | | 0 | 184 miles-2 wk | 44,940 | 523,712 |
| C. Groom Ski Trail | | | 0 | 6 miles add. | 210 | 2,447 |
| D. Plow Road | | | 0 | | | 0 |
| E. Partial Season Plowing | | | 0 | | | 0 |
| F. Part Season groom deduct | -119 mi/2 wks | -49,980 | (582,446) | | | 0 |
| G. Remove Sand | | | 0 | | | 0 |
| H. Full Season Groom Deduct | subtract 65 miles | -204,750 | (2,386,071) | | | 0 |
| I. Spring Open Deduct | | | 0 | | | 0 |
| J. Bison Monitoring | | 50,000 | 582,679 | | 50,000 | 582,679 |
| K. Air Quality Monitoring | | | 0 | | 200,000 | 2,330,717 |
| L. Add. Interp. Pubs. | | 81,500 | 949,767 | | 81,500 | 949,767 |
| M. Warming Hut Maintenance | 1 | 5,000 | 58,268 | 1 | 5,000 | 58,268 |
| N. Comfort Station Maintenance | 5 | 25,000 | 291,340 | | | 0 |
| O. Snowmobile Maintenance | | | 0 | subtract 80 | -82,480 | (961,188) |
| P. Advisory Committee Support | | | 0 | | | 0 |
| Q. Maintenance Facility Maintenance | | | 0 | | | 0 |
| R. Sand Storage Facility Maintenance | | | 0 | | | 0 |
| S. Housing Maintenance | | | 0 | 12 units | 180,000 | 2,097,645 |
| T. Additional Ranger Staff | | | 0 | | | 0 |
| U. Additional Interpretive Staff | 10 for 1/3 yr | 150,000 | 1,748,037 | 15 for 1/3 yr | 225,000 | 2,622,056 |
| V. Additional Maintenance Staff | | | 0 | 3 for 1/3 yr | 45,000 | 524,411 |
| W. Better Avalanche Control | | 25,000 | 291,340 | | 25,000 | 291,340 |
| X. Better Grooming | | | 0 | | 25,000 | 291,340 |
| Y. Administrative Snowcoach Maint. | 5 coaches | 20,650 | 240,646 | 30 coaches | 123,900 | 1,443,879 |
| | | | 0 | | | 0 |
| Management/Admin | 10% mngt/admn | 10,242 | 119,356 | 10% mngt/admn | 92,307 | 1,075,707 |
| | | | 0 | | | 0 |
| Total Annual Costs (Present Worth) | | | 1,312,916 | | | 11,832,780 |
| Total Life Cycle Costs (Present Worth) | | | 6,767,115 | | | 21,929,264 |
| Life Cycle Savings (Compared to Alt. A) | | | 12,857,061 | | | 404,436 |
| Discounted Payback (Compared to Alt. A) | | 7.63 Years | | | 331.06 Years | |
| Total Life Cycle Costs (Annualized) | | 580,690 Per Year | | | 1,881,762 Per Year | |

**Projected Annualized Cost of
Final Yellowstone Winter Plan Alternatives**



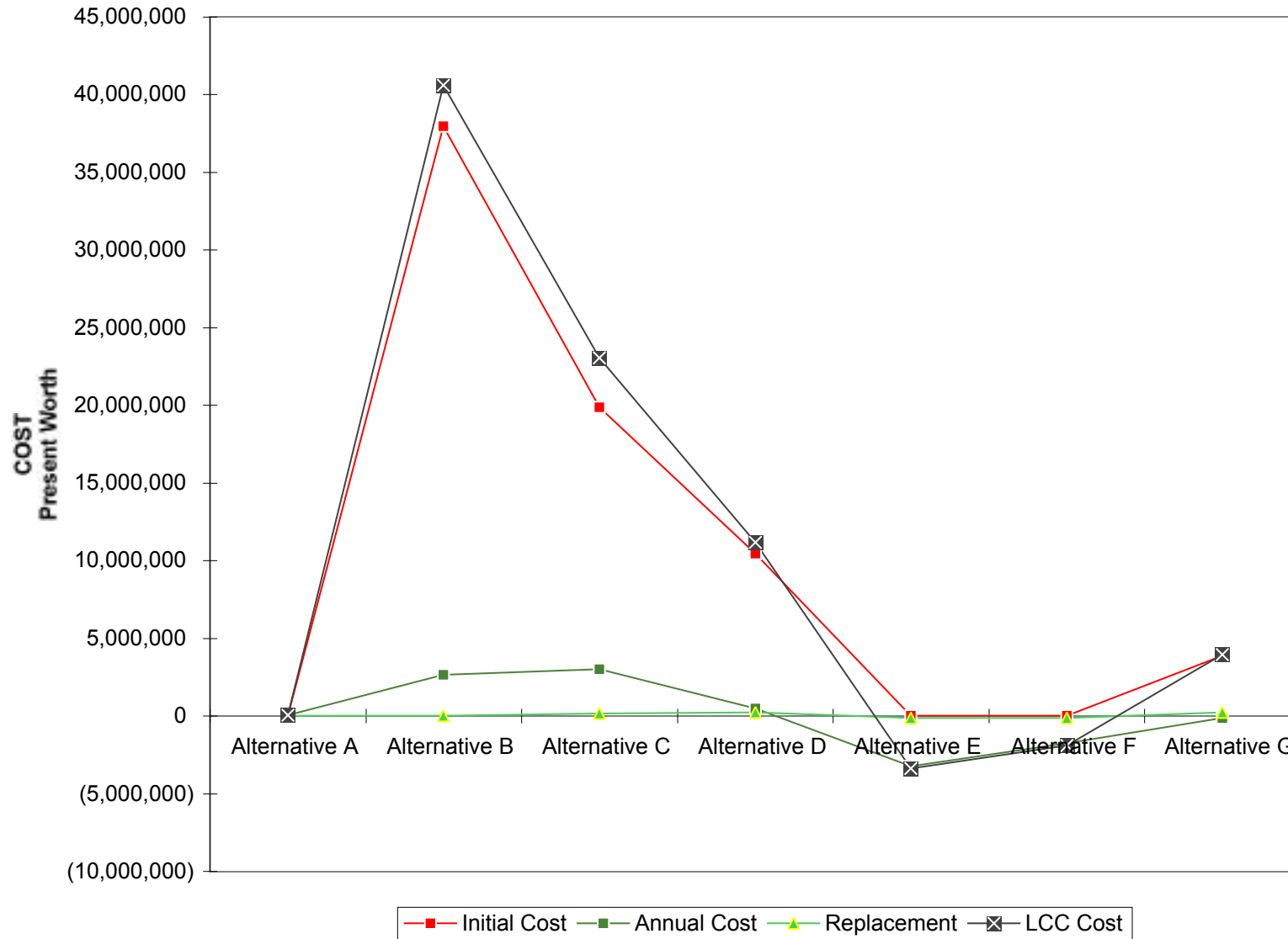
Grand Teton National Park and JDR,Jr., Memorial Parkway

LIFE CYCLE COST ANALYSIS PRESENT WORTH



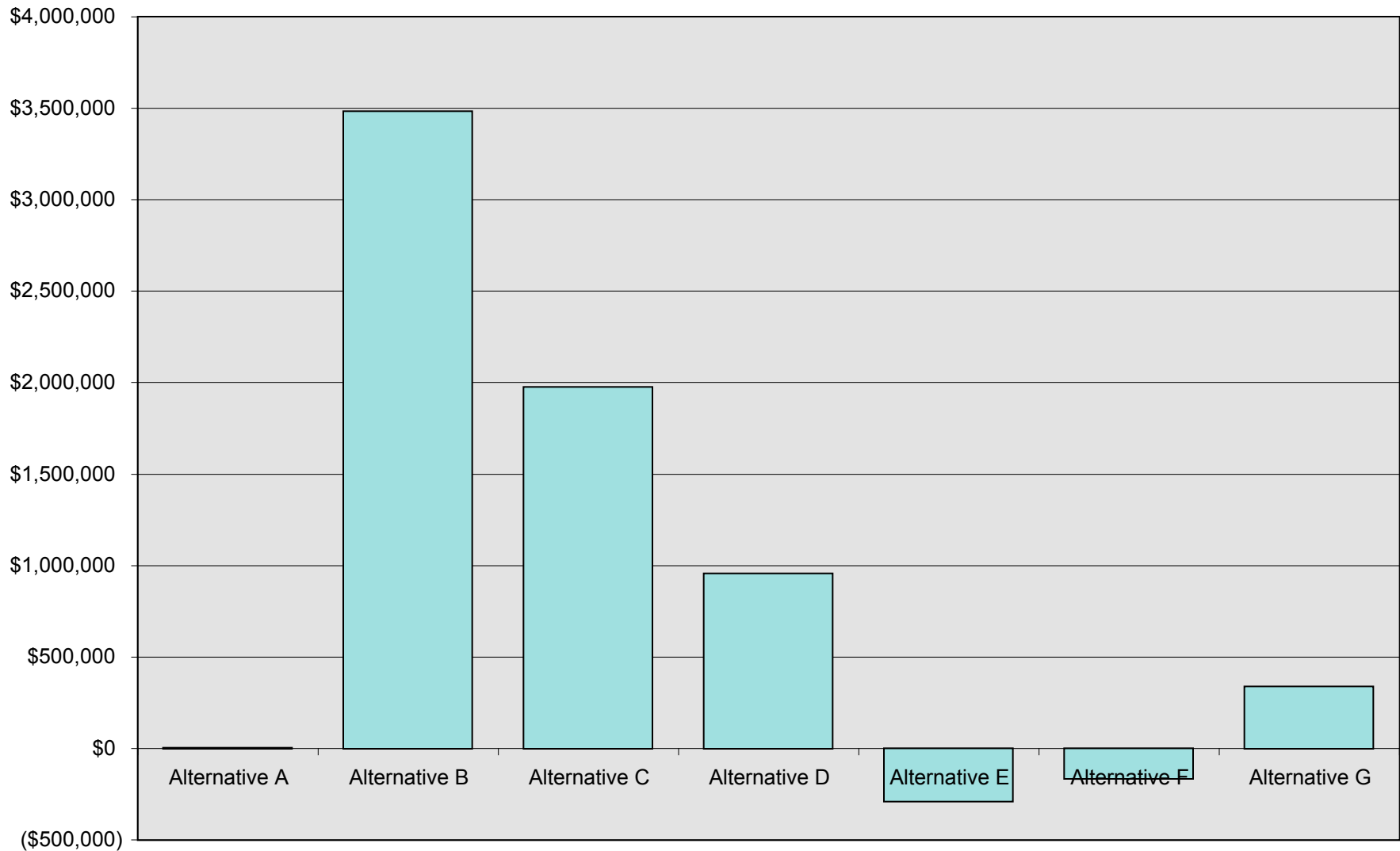
Grand Teton National Park
and
JDR, Jr. Memorial Parkway

LIFE CYCLE COST ANALYSIS
PRESENT WORTH



Grand Teton National Park
and
JDR,Jr., Memorial Parkway

Projected Annualized Cost of GTNP and JDRMP Winter Plan Alternatives



10/10/00

excel bullshit?

10/10/00

Version: 6/4/98

LIFE CYCLE COST ANALYSIS
Presentworth Dollars

| | | | | | | |
|---|----------------------|------------------------------------|---------------------|----------------------|----------------------------|--------------------|
| Project/Location: GTNP and the Parkway Subject: Functional Component Description: Project Life Cycle = Discount Rate = Present Time = | | | | | | |
| | Alternative D | | | Alternative E | | |
| | Notes | Clean/Quiet Modes of Travel | | Notes | Adaptive Management | |
| INITIAL COSTS | Quantity | Est. | PW | Quantity | Est. | PW |
| Construction Costs | | | | | | |
| A. Add. Warming Huts | 1 (Jenny) | 40,000 | 40,000 | | | 0 |
| B. Add. Comfort Station | | | 0 | | | 0 |
| C. Winterize Housing Unit | 4 winterize | 40,000 | 40,000 | | | 0 |
| F. Purchase Push Plow | | | 0 | | | 0 |
| G. Purchase Rotary Plow | | | 0 | | | 0 |
| H. Purchase D-7 Dozer | 1 new dozer | 400,000 | 400,000 | | | 0 |
| I. Purchase Grader/tractor | 1 grader/trac | 225,000 | 225,000 | | | 0 |
| J. Purchase Groomer | 1 new groomer | 142,000 | 142,000 | | | 0 |
| M. Purchase Ambulance | | | 0 | | | 0 |
| O. Purchase Snowmobile | | | 0 | | | 0 |
| S. Provide Recycle Centers | | | 0 | | | 0 |
| W. Construct Yr-Rnd Pathway | | | | | | |
| X. CDSTon widened Shoulder | 8 mi | 4,870,000 | 4,870,000 | | | |
| Y. Improve Moos-Wils Rd | Mse-Wils Impr | 1,000,000 | 1,000,000 | | | |
| Z. Winter Imprvmt @ Colter | Colter Imprvmt | 2,000,000 | 2,000,000 | | | |
| Design/Contract/Supervision | 35% | 1,718,500 | 1,718,500 | 35% | 0 | 0 |
| Total Initial Cost | | | 10,435,500 | | | 0 |
| Initial Cost PW Savings (Compared to Alt. A) | | | (10,435,500) | | | 0 |
| REPLACEMENT COST/ SALVAGE VALUE | | | | | | |
| Description | | | | | | |
| A. Replace Groomer | 1 groomer | 142,000 | 72,185 | minus 2 groom | -284,000 | (144,371) |
| B. Replace Push Plow | | | 0 | | | 0 |
| C. Rotary Plow | | | 0 | | | 0 |
| D. Snowmobile | | | 0 | | | 0 |
| G. Loader | | | 0 | | | 0 |
| H. Grader | 1 grader/trac | 225,000 | 58,144 | | | |
| I. Dozer | 1 dozer | 400,000 | 103,367 | | | |
| | | | 0 | | | 0 |
| Total Replacement/Salvage Costs | | | 233,696 | | | (144,371) |
| ANNUAL COSTS | | | | | | |
| Description | | | | | | |
| A. Groom Motor Snow routes | " +18.2 grM rt | 124,740 | 1,453,668 | same | | 0 |
| B. Groom Motor Snow trails | " - 21gr M tr | -59,535 | (693,796) | " -26 gr M tr | -73,710 | (858,986) |
| C. Mark/Admin Ungrm. Motor. trails | " -35.6 ungr M | -14,650 | (170,725) | " -35.6 ungr M | -14,650 | (170,725) |
| D. Groom Motor tr deduct | | | 0 | | | 0 |
| E. Groom Ski Trail | same | | 0 | same | | 0 |
| F. Mark/Admin Ungrm. NM. trails | " +10.7 NM tr | 4,334 | 50,507 | " +8.6 NM tr | 3,483 | 40,589 |
| G. Plow Road | " -21 pl rd | -157,080 | (1,830,545) | " -5.7 pl rd | -51,744 | (603,003) |
| J. Remove Sand | no sand rmvl | -1,008 | (11,747) | | | 0 |
| K. Full Season Groom Deduct | | | 0 | no grm CDST | -116,235 | (1,354,554) |
| L. Spring Open | 21 spring pl | 32,592 | 379,814 | | | 0 |
| M. Ungulate Monitoring | | | 0 | | | 0 |
| N. Air Quality Monitoring | | | 0 | | | 0 |
| O. Add. Interp. Pubs. | Publications | 10,000 | 116,536 | | | 0 |
| P. Warming Hut Maintenance | 1 hut | 5,000 | 58,268 | | | 0 |
| Q. Comfort Station Maintenance | | | 0 | | | 0 |
| R. Snowmobile Maintenance | | | 0 | | | 0 |
| S. Advisory Committee Support | | | 0 | | | 0 |
| W. Additional Ranger Staff | 3 for 1/3 yr | 45,000 | 524,411 | | | 0 |
| X. Additional Interpretive Staff | 3 for 1/3 yr | 45,000 | 524,411 | | | 0 |
| Y. Better Grooming | 8mi Grassy | 3,240 | 37,758 | | | 0 |
| Management/Admin | 10% mgt/adm | 3,763 | 43,855 | 10% mgt/adm | -25,286 | (294,668) |
| | | | 0 | | | 0 |
| Total Annual Costs (Present Worth) | | | 482,414 | | | (3,241,346) |
| Total Life Cycle Costs (Present Worth) | | | 11,151,610 | | | (3,385,717) |
| Life Cycle Savings (Compared to Alt. A) | | | (11,151,610) | | | 43,991,237 |
| Discounted Payback (Compared to Alt. A) | | -169.82 | Years | | 0.00 | Years |
| Total Life Cycle Costs (Annualized) | | 956,925 | Per Year | | (290,530) | Per Year |

LIFE CYCLE COST ANALYSIS
Presentworth Dollars

| | | | | | | |
|---|---------------------------|-------------------------------------|--------------------|-------------------------|-----------------------|------------------|
| Project/Location: GTNP and the Parkway Subject: Functional Component Description: Project Life Cycle = Discount Rate = Present Time = | | | | | | |
| | Alternative F | | | Alternative G | | |
| | Notes | Maximize Wildlife Protection | | Notes | Snowcoach Only | |
| INITIAL COSTS | Quantity | Est. | PW | Quantity | Est. | PW |
| Construction Costs | | | | | | |
| A. Add. Warming Huts | | | 0 | 1 (Jenny) | 40,000 | 40,000 |
| B. Add. Comfort Station | | | 0 | | | 0 |
| C. Winterize Housing Unit | | | 0 | 4 Winterize | 40,000 | 40,000 |
| F. Purchase Push Plow | | | 0 | | | 0 |
| G. Purchase Rotary Plow | | | 0 | | | 0 |
| H. Purchase D-7 Dozer | | | 0 | 1 new dozer | 400,000 | 400,000 |
| I. Purchase Grader/tractor | | | 0 | 1 grader/trac | 225,000 | 225,000 |
| J. Purchase Groomer | | | 0 | 1 new groomer | 142,000 | 142,000 |
| M. Purchase Ambulance | | | 0 | | | 0 |
| O. Purchase Snowmobile | | | 0 | | | 0 |
| S. Provide Recycle Centers | | | 0 | | | 0 |
| W. Construct Yr-Rnd Pathway | | | 0 | | | 0 |
| X. CDSTon widened Shoulder | | | 0 | | | 0 |
| Y. Improve Moos-Wils Rd | | | 0 | Mse-Wils Impr | 1,000,000 | 1,000,000 |
| Z. Winter Imprvmt @ Colter | | | 0 | Colter Imprvmt | 2,000,000 | 2,000,000 |
| Design/Contract/Supervision | 35% | 0 | 0 | 35% | 14,000 | 14,000 |
| | | | 0 | | | 0 |
| Total Initial Cost | | | 0 | | | 3,861,000 |
| Initial Cost PW Savings (Compared to Alt. A) | | | 0 | | | 6,574,500 |
| REPLACEMENT COST/ SALVAGE VALUE | | | | | | |
| Description | | | | | | |
| A. Replace Groomer | minus 2 groom | -284,000 | (144,371) | 1 groomer | 142,000 | 72,185 |
| B. Replace Push Plow | | | 0 | | | 0 |
| C. Rotary Plow | | | 0 | | | 0 |
| D. Snowmobile | | | 0 | | | 0 |
| G. Loader | | | 0 | | | 0 |
| H. Grader | | | 0 | Grader | 225,000 | 58,144 |
| I. Dozer | | | 0 | Dozer | 400,000 | 103,367 |
| | | | 0 | | | 0 |
| Total Replacement/Salvage Costs | | | (144,371) | | | 233,696 |
| ANNUAL COSTS | | | | | | |
| Description | | | | | | |
| A. Groom Motor Snow routes | same | | 0 | 18.2 grM rt2 | 124,740 | 1,453,668 |
| B. Groom Motor Snow trails | "-26 gr M tr | -73,710 | (858,986) | "-33.9 gr M tr | -96,106 | (1,119,979) |
| C. Mark/Admin Ungrm. Motor. trails | "-35.6 ungr M | -14,650 | (170,725) | "-35.6 ungr M | -14,650 | (170,725) |
| D. Groom Motor tr deduct | | | 0 | | | 0 |
| E. Groom Ski Trail | same | | 0 | same | | 0 |
| F. Mark/Admin Ungrm. NM. trails | "+8.6 NM tr | 3,483 | 40,589 | "+11 NM tr | 4,455 | 51,917 |
| G. Plow Road | "-5.7 pl rd | -51,744 | (603,003) | "-21 pl rd | -157,080 | (1,830,545) |
| J. Remove Sand | | | 0 | no sand rmvl | -1,008 | (11,747) |
| K. Full Season Groom Deduct | no grm CDST | -116,235 | (1,354,554) | | | 0 |
| L. Spring Open | | | 0 | 21 spring pl | 32,592 | 379,814 |
| M. Ungulate Monitoring | monitor wldlf | 15,000 | 174,804 | | | 0 |
| N. Air Quality Monitoring | mon Flagg | 100,000 | 1,165,358 | | | 0 |
| O. Add. Interp. Pubs. | | | 0 | | | 0 |
| P. Warming Hut Maintenance | | | 0 | 1 hut | 5,000 | 58,268 |
| Q. Comfort Station Maintenance | | | 0 | | | 0 |
| R. Snowmobile Maintenance | | | 0 | | | 0 |
| S. Advisory Committee Support | | | 0 | | | 0 |
| W. Additional Ranger Staff | | | 0 | 3 for 1/3 yr | 45,000 | 524,411 |
| X. Additional Interpretive Staff | | | 0 | 3 for 1/3 yr | 45,000 | 524,411 |
| Y. Better Grooming | | | 0 | | | 0 |
| | | | 0 | | | 0 |
| Management/Admin | 10% mgt/adm | -13,786 | (160,652) | 10% mgt/adm | -1,206 | (14,051) |
| | | | 0 | | | 0 |
| Total Annual Costs (Present Worth) | | | (1,767,168) | | | (154,558) |
| Total Life Cycle Costs (Present Worth) | | | (1,911,539) | | | 3,940,138 |
| Life Cycle Savings (Compared to Alt. A) | | | 24,941,850 | | | 7,211,472 |
| Discounted Payback (Compared to Alt. A) | 0.00 Years | | | 70.64 Years | | |
| Total Life Cycle Costs (Annualized) | (164,030) Per Year | | | 338,105 Per Year | | |

APPENDIX G

SCENARIOS OF HOW USE MIGHT CHANGE BY ALTERNATIVE WITHIN THE THREE PARK UNITS

INDEX: VEHICLE MILES TRAVELED BY ROAD SEGMENT FOR EACH SCENARIO

SCENARIOS OF HOW USE MIGHT CHANGE BY ALTERNATIVE ON ADJACENT LANDS

AND

AVAILABLE INFORMATION TO ASSESS EFFECTS OF WINTER USE ALTERNATIVES ON ADJACENT NATIONAL FOREST LANDS

WINTER MOTORIZED USE SCENARIOS FOR YELLOWSTONE AND GRAND TETON NATIONAL PARKS AND THE JOHN D. ROCKEFELLER, JR., MEMORIAL PARKWAY

Rationale

In comments on the Draft Environmental Impact Statement (DEIS) cooperating agencies and others supported the inclusion of use limitations. Specified use limits were not part of the DEIS. They expressed concern about how the alternatives (particularly alternative B – the DEIS preferred alternative) would affect economic stability or growth in local communities. They also 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. The economic analyst was unwilling to provide any such predictions, basing the impact estimates only on the loss of snowmobile business by alternative to the regional (17-county) and three-state economies.

In its comments on the DEIS, the Environmental Protection Agency (EPA) designated alternative G as its environmentally preferred alternative. EPA stated that without specifics on adaptive management and limitations on oversnow vehicle use, none of the other a it did discuss the subject qualitatively. The economic analyst was unwilling to provide any such predictions, basing the impact estimates only on the loss of snowmobile business by alternative to the regional (17-county) and three-state economies.

In its comments on the , the Environmental Protection Agency (EPA) designated alternative G as its environmentally preferred alternative. EPA stated that without specifics on adaptive management and limitations on oversnow vehicle use, none of the other a data about what people will do in response to management changes. However, Council on Environmental Quality (CEQ) regulations (40 CFR §1502.22) allow National Environmental Policy Act (NEPA) processes to be completed despite unavailable or unobtainable data. CEQ regulations allow the construction of reasonably foreseeable impact scenarios upon which to proceed. The NPS feels it is important to engage in this approach in response to the indicated comments on the DEIS.

The scenarios constructed for each alternative are based on existing motorized use data, winter use survey results, the transportation model for Yellowstone National Park (YNP) features of alternatives that eliminate use, and professional judgment. Once these scenarios' impacts are determined through modeling (e.g., air quality and sound) or risk analysis, there will be a basis for determining mitigation that responds to concerns from EPA, cooperating agencies, and others. Impacts that might result from alternative G represent target levels of post-mitigation impacts for other alternatives, in accordance with the labeling of G as environmentally preferred.

Explanation of Method

Each alternative scenario on the following pages describes the units of measure for the analysis. The units are the same for all alternatives. Numbers in the table represent vehicles using the road segment over the average day. This is not the same as “visitor-days”. The basis for redistributing use is the current average daily use on each road or motorized trail segment. Where an opportunity for use is not available under an alternative, use is considered to be displaced from

that location. Depending on the alternative, a percentage (from the winter use survey) of displaced users are assumed to continue to visit and snowmobile in the Greater Yellowstone Area (GYA) parks, and would be displaced 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 Yellowstone. 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.

Average daily use on each of the four gateway segments is consistent with average daily entrance statistics. The entrance statistics for 1992-2000 during the months of January and February are tabulated below. In each case, the amount of use reflected is not greatly different. The use shown on the road segment is a product of the transportation analysis, and it should exceed the entrance statistics. This means that more snowmobiles travel on the segment than enter the park each day at the gateway, accounting for travel from other entrances or destinations during the day. Therefore, the modeled statistics for average daily use on road segments provide a reasonable basis for redistributing use in the alternative scenarios.

Scenarios

The following three tables reflect current use figures by transportation mode. They represent a scenario for alternative A. Scenarios for alternatives B through G follow, providing tables of use that could result and narrative calculations for changed use.

After the alternative G scenario is a series of tables, one for each alternative, that present vehicle-miles traveled by road segment. These figures were used to assess risks and impacts for some resource topics.

Number of snowmobiles entering Yellowstone National Park.

| Year | Month | North Entrance | West Entrance | South Entrance | East Entrance |
|--|-------|----------------|---------------|----------------|---------------|
| 1992-93 | Jan | 291 | 15,252 | 5,115 | 1,312 |
| | Feb | 242 | 18,018 | 6,160 | 1,349 |
| 1993-94 | Jan | 171 | 15,324 | 5,346 | 1,075 |
| | Feb | 120 | 18,290 | 6,435 | 1,191 |
| 1995-96 | Jan | 655 | 14,198 | 4,395 | 837 |
| | Feb | 795 | 22,173 | 6,459 | 1,561 |
| 1996-97 | Jan | 507 | 12,369 | 4,241 | 788 |
| | Feb | 661 | 17,174 | 6,081 | 1,102 |
| 1997-98 | Jan | 605 | 13,347 | 4,393 | 801 |
| | Feb | 537 | 16,900 | 5,988 | 1,015 |
| 1998-99 | Jan | 573 | 13,794 | 4,419 | 853 |
| | Feb | 602 | 16,928 | 5,441 | 860 |
| 1999-00 | Jan | 338 | 13,290 | 4,673 | 907 |
| | Feb | 435 | 18,937 | 6,240 | 1,153 |
| Totals | Jan | 3,140 | 97,574 | 32,580 | 6,573 |
| | Feb | 3,392 | 128,420 | 75,386 | 8,231 |
| Grand Total | | 6532 | 225,994 | 75,386 | 14,804 |
| Mean average day | | 16 | 538 | 176 | 35 |
| Transportation model mean average day | | 30 | 555 | 176 | 37 |

Yellowstone, Grand Teton and The Parkway area road segments

average daily use January-February.

| ROAD SEGMENT | <i>Alternative A Current Motorized Use</i> | | | |
|----------------------------------|--|------------|-------------|-------------|
| | 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 |

Average peak day use (based on highest use day for each year).

| ROAD SEGMENT | <i>Current Condition</i> | | | |
|----------------------------------|--------------------------|------------|-------------|-------------|
| | Autos | Buses/Vans | Snowcoaches | Snowmobiles |
| Mammoth to Northeast Entrance | 107.4 | 8 | 0 | 0 |
| Mammoth to Norris | 0 | 0 | 6.9 | 40.5 |
| West Entrance to Madison | 0 | 0 | 19.0 | 975.4 |
| Madison to Norris | 0 | 0 | 10.9 | 434.7 |
| Norris to Canyon Village | 0 | 0 | 8.2 | 324.7 |
| Canyon Village to Fishing Bridge | 0 | 0 | 6.5 | 260.7 |
| Fishing Bridge to East Entrance | 0 | 0 | 0 | 64.1 |
| Fishing Bridge to West Thumb | 0 | 0 | 5.4 | 220.2 |
| Madison to Old Faithful | 0 | 0 | 21.5 | 859.9 |
| Old Faithful to West Thumb | 0 | 0 | 9.0 | 368.5 |
| West Thumb to Flagg Ranch | 0 | 0 | 9.0 | 276.8 |
| Grassy Lake Road | 0 | 0 | 0 | 42.6 |
| Flagg Ranch to Colter Bay | 151.4 | 16.7 | 0 | 42.8 |
| Colter Bay to Moran Junction | 337.9 | 17.6 | 0 | 42.8 |
| Moran Junction to East Entrance | 989.1 | 51.0 | 0 | 42.8 |
| Moran Junction to South Entrance | 1291.8 | 68.6 | 0 | 0 |
| Teton Park Road | 0 | 0 | 0 | 18.3 |
| Moose-Wilson Road | 8.8 | 0 | 0 | 5.3 |
| Antelope Flats Snowmobile Route | 0 | 0 | 0 | 0 |

Figures were derived from the following sources: Entrance Station Statistics: Visitor use statistics from Visitor Services Offices of Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway 1992-1999. Interior Road Segments in Yellowstone NP and Grand Teton NP: *Social Conditions for Winter Use in Yellowstone National Park Final Report* (Borrie et. al 1997) and *Winter Use Survey Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway* (Littlejohn 1996).

**Yellowstone and Grand Teton area road segments
Alternative B use scenario - average daily use.¹**

| ROAD SEGMENT | Average Daily Vehicle Use January-February | | | | |
|----------------------------------|--|------|-------------|-------------|-------|
| | Autos | Vans | Snowcoaches | Snowmobiles | Buses |
| Mammoth to Northeast Entrance | 60 | 4 | 0 | 0 | 0 |
| 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 | 0 | 0 | 0 | 25 | 0 |
| Flagg Ranch to Colter Bay | 100 | 10 | 0 | 25 | 1 |
| Colter Bay to Moran Junction | 200 | 10 | 0 | 25 | 1 |
| Moran Junction to East Entrance | 580 | 30 | 0 | 25 | 2 |
| Moran Junction to South Entrance | 800 | 40 | 0 | 0 | 2 |
| Teton Park Road | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 5 | 0 | 0 | 3 | 0 |
| Antelope Flats Snowmobile Route | 0 | 0 | 0 | 0 | 0 |

Figures were derived from the following sources: Entrance Station Statistics: Visitor use statistics from Visitor Services Offices of Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway 1992-1999. Interior Road Segments in Yellowstone NP and Grand Teton NP: *Social Conditions for Winter Use in Yellowstone National Park Final Report* (Borrie et al. 1997). *Winter Use Survey Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway* (Littlejohn 1996) and *Winter 1998-99 Visitor Survey in Yellowstone NP, Grand Teton NP and the GYA* (Duffield and Neher 1999).

Visitor Use Scenario

Units of Measure. Numbers in the table represent vehicles using the road segment over the average day. This is not the same as visitor days. That is, one vehicle can be on more than one segment during the day, such that it is counted more than once. Numbers for internal road segments are, therefore, higher than for the segments immediately inside a gateway.

Current Use. From current use figures given in alternative A, 555 snowmobiles on the West Yellowstone to Madison segment would no longer be able to use that segment. Auto, van and bus use from West Yellowstone to Old Faithful assumes the number of vehicles needed to transport all existing use from that gate. Snowmobile use in GTNP and the Parkway is assumed to remain at current levels, except north of Flagg Ranch.

Potentially Displaced Snowmobile Use. From the winter use survey, 36.9% of visitors stated they would not change the number of visits to the parks even if the road from West Yellowstone were plowed. Assuming these respondents would return to snowmobile, 204 snowmobiles would be displaced to the other three entrances allowing snowmobile access.

Use Distribution to other Gateway Road Segments. The displaced use of 204 units is assumed to be distributed to the three entrance road segments based on the average current distribution among the three. With this assumption, 13% (26 units) of the use would be displaced to Mammoth-Norris, 15% (31 units) to East Entrance-Fishing Bridge, and 72% (146 units) to Flagg Ranch-West Thumb. These displaced users are added to the current use for each gateway segment. Auto and van traffic through GTNP is increased from current levels to account for redistribution of snowmobile use.

Use Distribution from Gateways Road Segments to Park Destinations on Internal Road Segments. Statistics from the visitor surveys indicate that of all winter users, 76% go to Old Faithful and 48% go to Canyon. These statistics are assumed to apply to the total snowmobile use accessing the park through each of the three gateways.

**Yellowstone and Grand Teton area road segments
Alternative C scenario - average daily use.²**

¹ For the primary winter season from January 1 through February 29, 2000.

² For the primary winter season from January 1 through February 29, 2000.

| ROAD SEGMENT | Average Daily Vehicle Use January-February | | | | |
|--|--|------|-------------|-------------|-------|
| | Autos | Vans | Snowcoaches | Snowmobiles | Buses |
| Mammoth to Northeast Entrance | 60 | 4 | 0 | 0 | 0 |
| Mammoth to Norris until 2/29 ³ | 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 | 0 | 0 | 0 | 25 | 0 |
| Flagg Ranch to Colter Bay | 100 | 10 | 0 | 25 | 1 |
| Colter Bay to Moran Junction | 200 | 10 | 0 | 25 | 1 |
| Moran Junction to East Entrance | 580 | 30 | 0 | 25 | 2 |
| Moran Junction to South Entrance | 800 | 40 | 0 | 0 | 2 |
| Teton Park Road | 0 | 0 | 0 | 10 | 0 |
| Moose-Wilson Road | 10 | 0 | 0 | 0 | 0 |
| Antelope Flats Snowmobile Route | 0 | 0 | 0 | 25 | 0 |

Figures were derived from the following sources: Entrance Station Statistics: Visitor use statistics from Visitor Services Offices of Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway 1992-1999. Interior Road Segments in Yellowstone NP and Grand Teton NP: *Social Conditions for Winter Use in Yellowstone National Park Final Report* (Borrie et al. 1997). *Winter Use Survey Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway* (Littlejohn 1996) and *Winter 1998-99 Visitor Survey in Yellowstone NP, Grand Teton NP and the GYA* (Duffield and Neher 1999).

Visitor Use Scenario

Units of Measure. See alternative B.

Current Use. From current use figures given in alternative A, 555 snowmobiles on the West Yellowstone to Madison segment would no longer be able to use that segment. Auto, van and bus use from West Yellowstone to Old Faithful assumes the number of vehicles needed to transport all existing use from that gate. Snowmobile use in GTNP and the Parkway is assumed to remain at current levels, except for use north of Flagg.

Potentially Displaced Snowmobile Use. From the winter use survey, 36.9% of visitors stated they would not change the number of visits to the parks even if the road from West Yellowstone were plowed. Assuming these respondents return to snowmobile, 204 snowmobiles would be displaced to the other three entrances allowing snowmobile access.

Use Distribution to other Gateway Road Segments. The displaced use of 204 units is assumed to be distributed to the three entrance road segments based on the average current distribution among the three. With this assumption, 13% (26 units) of the use would be displaced to Mammoth-Norris, 15% (31 units) to East Entrance-Fishing Bridge, and 72% (146 units) to Flagg Ranch-West Thumb. These displaced users are added to the current use for each gateway segment. Auto and van traffic through GTNP is increased from current levels to account for redistribution of snowmobile use.

Use Distribution from Gateways Road Segments to Park Destinations on Internal Road Segments. Statistics from the visitor surveys indicate that of all winter users, 76% go to Old Faithful and 48% go to Canyon. These statistics are assumed to apply to the total snowmobile use accessing the park through each of the three gateways.

Yellowstone and Grand Teton area road segments

Alternative D scenario - average daily use.⁴

| Average Daily Vehicle Use January-February | | | | |
|--|--|--|--|--|
|--|--|--|--|--|

³ After February 29, 2000 snowcoach only from Norris to Canyon and Fishing Bridge; road plowed from Mammoth to Madison Junction.

⁴ For the primary winter season from January 1 through February 29, 2000.

| ROAD SEGMENT | Autos | Vans | Snowcoaches | Snowmobiles | Buses |
|----------------------------------|-------|------|-------------|-------------|-------|
| Mammoth to Northeast Entrance | 61 | 4 | 0 | 0 | 0 |
| Mammoth to Norris | 0 | 0 | 3 | 31 | 0 |
| West Entrance to Madison | 0 | 0 | 9 | 555 | 0 |
| Madison to Norris | 0 | 0 | 5 | 247 | 0 |
| Norris to Canyon Village | 0 | 0 | 4 | 185 | 0 |
| Canyon Village to Fishing Bridge | 0 | 0 | 3 | 148 | 0 |
| Fishing Bridge to East Entrance | 0 | 0 | 0 | 0 | 0 |
| Fishing Bridge to West Thumb | 0 | 0 | 3 | 125 | 0 |
| Madison to Old Faithful | 0 | 0 | 10 | 490 | 0 |
| Old Faithful to West Thumb | 0 | 0 | 4 | 210 | 0 |
| West Thumb to Flagg Ranch | 0 | 0 | 4 | 176 | 0 |
| Grassy Lake Road | 0 | 0 | 0 | 25 | 0 |
| Flagg Ranch to Colter Bay | 0 | 0 | 4 | 176 | 1 |
| Colter Bay to Moran Junction | 190 | 10 | 0 | 25 | 1 |
| Moran Junction to East Entrance | 560 | 30 | 0 | 25 | 2 |
| Moran Junction to South Entrance | 770 | 40 | 0 | 0 | 2 |
| Teton Park Road | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 10 | 2 | 0 | 0 | 0 |
| Antelope Flats Snowmobile Route | 0 | 0 | 0 | 0 | 0 |

Figures were derived from the following sources: Entrance Station Statistics: Visitor use statistics from Visitor Services Offices of Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway 1992-1999. Interior Road Segments in Yellowstone NP and Grand Teton NP: *Social Conditions for Winter Use in Yellowstone National Park Final Report* (Borrie et al. 1997). *Winter Use Survey Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway* (Littlejohn 1996) and *Winter 1998-99 Visitor Survey in Yellowstone NP, Grand Teton NP and the GYA* (Duffield and Neher 1999).

Visitor Use Scenario

Units of Measure. Numbers in the table represent vehicles using the road segment over the average day. This is not the same as visitor days. That is, one vehicle can be on more than one segment during the day, such that it is counted more than once. Numbers for internal road segments are therefore higher than for the segments immediately inside a gateway.

Current Use. All current use figures given in alternative A for YNP apply in this alternative, except for the average 36 snowmobiles per day on the East Entrance to Fishing Bridge segment.

Potentially Displaced Snowmobile Use. The average of 36 snowmobiles from East Entrance could be redistributed to other entrances, but is assumed not to affect the average use on other segments significantly.

**Yellowstone and Grand Teton area road segments
Alternative E scenario - average daily use.⁵**

| ROAD SEGMENT | Average Daily Vehicle Use January-February | | | | |
|----------------------------------|--|------|-------------|-------------|-------|
| | Autos | Vans | Snowcoaches | Snowmobiles | Buses |
| Mammoth to Northeast Entrance | 61 | 4 | 0 | 0 | 0 |
| Mammoth to Norris | 0 | 0 | 3 | 31 | 0 |
| West Entrance to Madison | 0 | 0 | 9 | 555 | 0 |
| Madison to Norris | 0 | 0 | 5 | 247 | 0 |
| Norris to Canyon Village | 0 | 0 | 4 | 185 | 0 |
| Canyon Village to Fishing Bridge | 0 | 0 | 3 | 148 | 0 |
| Fishing Bridge to East Entrance | 0 | 0 | 0 | 36 | 0 |
| Fishing Bridge to West Thumb | 0 | 0 | 3 | 125 | 0 |
| Madison to Old Faithful | 0 | 0 | 10 | 490 | 0 |
| Old Faithful to West Thumb | 0 | 0 | 4 | 210 | 0 |
| West Thumb to Flagg Ranch | 0 | 0 | 4 | 176 | 0 |
| Grassy Lake Road | 0 | 0 | 0 | 25 | 0 |
| 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 | 770 | 40 | 0 | 0 | 2 |
| Teton Park Road | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 5 | 0 | 0 | 0 | 0 |
| Antelope Flats Snowmobile Route | 0 | 0 | 0 | 0 | 0 |

Figures were derived from the following sources: Entrance Station Statistics; Visitor use statistics from Visitor Services Offices of Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway 1992-1999. Interior Road Segments in Yellowstone NP and Grand Teton NP: *Social Conditions for Winter Use in Yellowstone National Park Final Report* (Borrie et al. 1997). *Winter Use Survey Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway* (Littlejohn 1996) and *Winter 1998-99 Visitor Survey in Yellowstone NP, Grand Teton NP and the GYA* (Duffield and Neher 1999).

Visitor Use Scenario

Units of Measure. Numbers in the table represent vehicles using the road segment over the average day. This is not the same as visitor days. That is, one vehicle can be on more than one segment during the day, such that it is counted more than once. Numbers for internal road segments are therefore higher than for the segments immediately inside a gateway.

Current Use. All current use figures given in alternative A for YNP apply in this alternative, except for use in GTNP and the Parkway. Current use on the Continental Divide Snowmobile Trail (CDST) coming from the east would be shuttled by wheeled vehicle from the East Entrance near Moran to Flagg Ranch in this alternative.

Potentially Displaced Snowmobile Use. No use would be displaced. The number of vans is increased from the East Entrance near Moran to Flagg Ranch because of shuttle vehicles for snowmobiles on the CDST.

⁵ For the primary winter season from January 1 through February 29, 2000.

**Yellowstone and Grand Teton area road segments
Alternative F scenario - average daily use.⁶**

| ROAD SEGMENT | Average Daily Vehicle Use January-February | | | | |
|----------------------------------|--|------|-------------|-------------|-------|
| | Autos | Vans | Snowcoaches | Snowmobiles | Buses |
| Mammoth to Northeast Entrance | 60 | 4 | 0 | 0 | 0 |
| 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 | 0 | 0 | 0 | 25 | 0 |
| 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 | 800 | 40 | 0 | 0 | 2 |
| Teton Park Road | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 5 | 0 | 0 | 0 | 0 |
| Antelope Flats Snowmobile Route | 0 | 0 | 0 | 0 | 0 |

Figures were derived from the following sources: Entrance Station Statistics: Visitor use statistics from Visitor Services Offices of Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway 1992-1999. Interior Road Segments in Yellowstone NP and Grand Teton NP: *Social Conditions for Winter Use in Yellowstone National Park Final Report* (Borrie et al. 1997). *Winter Use Survey Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway* (Littlejohn 1996) and *Winter 1998-99 Visitor Survey in Yellowstone NP, Grand Teton NP and the GYA* (Duffield and Neher, 1999).

Visitor Use Scenario

Units of Measure. Numbers in the table represent vehicles using the road segment over the average day. This is not the same as visitor days. That is, one vehicle can be on more than one segment during the day, such that it is counted more than once. Numbers for internal road segments are therefore higher than for the segments immediately inside a gateway.

Current Use. From current use figures given in alternative A, 555 snowmobiles on the West Yellowstone to Madison segment would no longer be able to use that segment, and 31 would not be able to use the Mammoth to Norris segment. Snowmobile use in GTNP and the Parkway is assumed to remain at current levels, except for use north of Flagg Ranch.

Potentially Displaced Snowmobile Use. From the winter use survey, 40.6 % of visitors stated they would not change the number of visits to the parks even if these road segments were closed. Assuming these respondents return to snowmobile, 238 snowmobiles would be displaced to the other two entrances allowing snowmobile access.

Use Distribution to other Gateway Road Segments. The displaced use of 238 units is assumed to be distributed to the two entrance road segments based on the average current distribution between them. With this assumption, 17% (41 units) of the use would be displaced to East Entrance-Fishing Bridge, and 83% (198 units) to Flagg Ranch-West Thumb. These displaced users are added to the current use for each gateway segment. Auto and van traffic through GTNP is increased from current levels to account for redistribution of snowmobile use.

Use Distribution from Gateways Road Segments to Park Destinations on Internal Road Segments. Statistics from the visitor surveys indicate that of all winter users, 76% go to Old Faithful and 48% go to Canyon. These statistics are assumed to apply to the total snowmobile use accessing the park through each of the two gateways.

**Yellowstone and Grand Teton area road segments
Alternative G scenario - average daily use.⁷**

⁶ For the primary winter season from January 1 through February 29, 2000.

| ROAD SEGMENT | Average Daily Vehicle Use January-February | | | | |
|----------------------------------|--|------|-------------|-------------|-------|
| | Autos | Vans | Snowcoaches | Snowmobiles | Buses |
| Mammoth to Northeast Entrance | 60 | 4 | 0 | 0 | 0 |
| 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 | 770 | 37 | 0 | 0 | 2 |
| Teton Park Road | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 5 | 0 | 0 | 0 | 0 |
| Antelope Flats Snowmobile Route | 0 | 0 | 0 | 0 | 0 |

Figures were derived from the following sources: Entrance Station Statistics: Visitor use statistics from Visitor Services Offices of Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway 1992-1999. Interior Road Segments in Yellowstone NP and Grand Teton NP: *Social Conditions for Winter Use in Yellowstone National Park Final Report* (Borrie et al. 1997). *Winter Use Survey Yellowstone and Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway* (Littlejohn 1996) and *Winter 1998-99 Visitor Survey in Yellowstone NP, Grand Teton NP and the GYA* (Duffield and Neher, 1999).

Visitor Use Scenario

Units of Measure. Numbers in the table represent vehicles using the road segment over the average day. This is not the same as visitor days. That is, one vehicle can be on more than one segment during the day, such that it is counted more than once.

Current Use. All current use and its distribution, as shown in alternative A, is accommodated in this alternative. Snowmobile use by segment is divided by seven with the assumption of seven people per snowcoach. Current use figures indicate the average occupancy is 7.7 people per snowcoach.

⁷ For the primary winter season from January 1 through February 29, 2000, with snowcoaches accommodating all visitor days currently used by snowmobilers.

**Vehicle miles traveled by road segment
by alternative as an index to potential impacts.**

| Alternative A | | <i>Average Daily Use, Vehicle-Miles, January-February</i> | | | | | |
|----------------------------------|------------|---|-------------|--------------------|--------------------|--------------|--------------|
| ROAD SEGMENT | Mi. | Autos | Vans | Snowcoaches | Snowmobiles | Buses | Total |
| Mammoth to Northeast Entrance | 47 | 2,867 | 197 | 0 | 0 | 0 | 3,064 |
| Mammoth to Norris | 21 | 0 | 0 | 69 | 641 | 0 | 710 |
| West Entrance to Madison | 14 | 0 | 0 | 127 | 7,759 | 0 | 7,886 |
| Madison to Norris | 14 | 0 | 0 | 73 | 3,458 | 0 | 3,531 |
| Norris to Canyon Village | 12 | 0 | 0 | 47 | 2,214 | 0 | 2,261 |
| Canyon Village to Fishing Bridge | 16 | 0 | 0 | 50 | 2,370 | 0 | 2,420 |
| Fishing Bridge to East Entrance | 27 | 0 | 0 | 0 | 983 | 0 | 983 |
| Fishing Bridge to West Thumb | 21 | 0 | 0 | 55 | 2,627 | 0 | 2,682 |
| Madison to Old Faithful | 16 | 0 | 0 | 165 | 7,818 | 0 | 7,983 |
| Old Faithful to West Thumb | 17 | 0 | 0 | 73 | 3,560 | 0 | 3,633 |
| West Thumb to Flagg Ranch | 24 | 0 | 0 | 103 | 4,219 | 0 | 4,322 |
| Grassy Lake Road | 8 | 0 | 0 | 0 | 184 | 0 | 184 |
| Flagg Ranch to Colter Bay | 16 | 1,342 | 132 | 0 | 379 | 16 | 1,869 |
| Colter Bay to Moran Junction | 10 | 1,958 | 92 | 0 | 248 | 10 | 2,308 |
| Moran Junction to East Entrance | 2 | 1,124 | 54 | 0 | 49 | 4 | 1,231 |
| Moran Junction to South Entrance | 26 | 20,100 | 52 | 0 | 0 | 52 | 20,204 |
| Teton Park Road | 15 | 0 | 0 | 0 | 156 | 0 | 156 |
| Moose-Wilson Road | 2 | 10 | 0 | 0 | 6 | 0 | 16 |
| Antelope Flats Snowmobile Route | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 27,401 | 527 | 762 | 36,671 | 82 | 65,443 |

| Alternative B | | <i>Average Daily Use, Vehicle-Miles, January-February</i> | | | | | |
|----------------------------------|------------|---|-------------|--------------------|--------------------|--------------|--------------|
| ROAD SEGMENT | Mi. | Autos | Vans | Snowcoaches | Snowmobiles | Buses | Total |
| Mammoth to Northeast Entrance | 47 | 2,820 | 188 | 0 | 0 | 0 | 3,008 |
| Mammoth to Norris | 21 | 0 | 0 | 63 | 1,176 | 0 | 1,239 |
| West Entrance to Madison | 14 | 700 | 1,120 | 0 | 0 | 28 | 1,848 |
| Madison to Norris | 14 | 0 | 0 | 70 | 588 | 0 | 658 |
| Norris to Canyon Village | 12 | 0 | 0 | 48 | 672 | 0 | 720 |
| Canyon Village to Fishing Bridge | 16 | 0 | 0 | 48 | 3,872 | 0 | 3,920 |
| Fishing Bridge to East Entrance | 27 | 0 | 0 | 0 | 1,809 | 0 | 1,809 |
| Fishing Bridge to West Thumb | 21 | 0 | 0 | 63 | 5,208 | 0 | 5,271 |
| Madison to Old Faithful | 16 | 800 | 1,296 | 0 | 0 | 32 | 2,128 |
| Old Faithful to West Thumb | 17 | 0 | 0 | 68 | 5,746 | 0 | 5,814 |
| West Thumb to Flagg Ranch | 24 | 0 | 0 | 96 | 7,728 | 0 | 7,824 |
| Grassy Lake Road | 8 | 0 | 0 | 0 | 200 | 0 | 200 |
| Flagg Ranch to Colter Bay | 16 | 1,600 | 160 | 0 | 400 | 16 | 2,176 |
| Colter Bay to Moran Junction | 10 | 2,000 | 100 | 0 | 250 | 10 | 2,360 |
| Moran Junction to East Entrance | 2 | 1,160 | 60 | 0 | 50 | 4 | 1,274 |
| Moran Junction to South Entrance | 26 | 20,800 | 1,040 | 0 | 0 | 52 | 21,892 |
| Teton Park Road | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 2 | 10 | 0 | 0 | 6 | 0 | 16 |
| Antelope Flats Snowmobile Route | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 29,890 | 3,964 | 456 | 27,705 | 142 | 62,157 |

| Alternative C | | <i>Average Daily Use, Vehicle-Miles, January-February</i> | | | | | |
|----------------------|------------|---|-------------|--------------------|--------------------|--------------|--------------|
| ROAD SEGMENT | Mi. | Autos | Vans | Snowcoaches | Snowmobiles | Buses | Total |

| | | | | | | | |
|--|----|--------|-------|-----|--------|-----|--------|
| Mammoth to Northeast Entrance | 47 | 2,820 | 188 | 0 | 0 | 0 | 3,008 |
| Mammoth to Norris until 2/29 ⁸ | 21 | 0 | 0 | 63 | 1,176 | 0 | 1,239 |
| West Entrance to Madison | 14 | 840 | 140 | 0 | 0 | 28 | 1,008 |
| Madison to Norris | 14 | 0 | 0 | 56 | 588 | 0 | 644 |
| Norris to Canyon Village until 2/29 | 12 | 0 | 0 | 48 | 672 | 0 | 720 |
| Canyon Village to Fishing Bridge before 2/29 | 16 | 0 | 0 | 48 | 3,872 | 0 | 3,920 |
| Fishing Bridge to East Entrance | 27 | 0 | 0 | 0 | 1,809 | 0 | 1,809 |
| Fishing Bridge to West Thumb | 21 | 0 | 0 | 63 | 5,208 | 0 | 5,271 |
| Madison to Old Faithful | 16 | 1,456 | 224 | 0 | 0 | 32 | 1,712 |
| Old Faithful to West Thumb | 17 | 0 | 0 | 68 | 5,746 | 0 | 5,814 |
| West Thumb to Flag Ranch | 24 | 0 | 0 | 96 | 7,728 | 0 | 7,824 |
| Grassy Lake Road | 8 | 0 | 0 | 0 | 400 | 0 | 400 |
| Flag Ranch to Colter Bay | 16 | 1,600 | 160 | 0 | 800 | 16 | 2,576 |
| Colter Bay to Moran Junction | 10 | 2,000 | 100 | 0 | 250 | 10 | 2,360 |
| Moran Junction to East Entrance | 2 | 1,160 | 60 | 0 | 50 | 4 | 1,274 |
| Moran Junction to South Entrance | 26 | 20,800 | 1,040 | 0 | 0 | 52 | 21,892 |
| Teton Park Road | 15 | 0 | 0 | 0 | 150 | 0 | 150 |
| Moose-Wilson Road | 2 | 20 | 0 | 0 | 0 | 0 | 20 |
| Antelope Flats Snowmobile Route | 30 | 0 | 0 | 0 | 750 | 0 | 750 |
| Total | | 30,696 | 1,912 | 442 | 29,199 | 142 | 62,391 |

| Alternative D | | Average Daily Use, Vehicle-Miles, January-February | | | | | |
|----------------------------------|-----|--|-------|-------------|-------------|-------|--------|
| ROAD SEGMENT | Mi. | Autos | Vans | Snowcoaches | Snowmobiles | Buses | Total |
| Mammoth to Northeast Entrance | 47 | 2,867 | 197 | 0 | 0 | 0 | 3,064 |
| Mammoth to Norris | 21 | 0 | 0 | 69 | 641 | 0 | 710 |
| West Entrance to Madison | 14 | 0 | 0 | 127 | 7,759 | 0 | 7,886 |
| Madison to Norris | 14 | 0 | 0 | 73 | 3,458 | 0 | 3,531 |
| Norris to Canyon Village | 12 | 0 | 0 | 47 | 2,214 | 0 | 2,261 |
| Canyon Village to Fishing Bridge | 16 | 0 | 0 | 3 | 148 | 0 | 151 |
| Fishing Bridge to East Entrance | 27 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fishing Bridge to West Thumb | 21 | 0 | 0 | 55 | 2,627 | 0 | 2,682 |
| Madison to Old Faithful | 16 | 0 | 0 | 160 | 7,840 | 0 | 8,000 |
| Old Faithful to West Thumb | 17 | 0 | 0 | 73 | 3,560 | 0 | 3,633 |
| West Thumb to Flag Ranch | 24 | 0 | 0 | 103 | 4,219 | 0 | 4,322 |
| Grassy Lake Road | 8 | 0 | 0 | 0 | 200 | 0 | 200 |
| Flag Ranch to Colter Bay | 16 | 0 | 0 | 64 | 2,816 | 16 | 2,896 |
| Colter Bay to Moran Junction | 10 | 1,900 | 100 | 0 | 250 | 10 | 2,260 |
| Moran Junction to East Entrance | 2 | 1,120 | 60 | 0 | 50 | 4 | 1,234 |
| Moran Junction to South Entrance | 26 | 20,020 | 1,040 | 0 | 0 | 52 | 21,112 |
| Teton Park Road | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 2 | 20 | 4 | 0 | 0 | 0 | 24 |
| Antelope Flats Snowmobile Route | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 25,927 | 1,401 | 774 | 35,782 | 82 | 63,966 |

| Alternative E | | Average Daily Use, Vehicle-Miles, January-February | | | | | |
|-------------------------------|-----|--|------|-------------|-------------|-------|-------|
| ROAD SEGMENT | Mi. | Autos | Vans | Snowcoaches | Snowmobiles | Buses | Total |
| Mammoth to Northeast Entrance | 47 | 2,867 | 197 | 0 | 0 | 0 | 3,064 |
| Mammoth to Norris | 21 | 0 | 0 | 69 | 641 | 0 | 710 |

⁸ After February 29, 2000, snowcoach only from Norris to Canyon and Fishing Bridge; road plowed from Mammoth to Madison Junction.

| | | | | | | | |
|----------------------------------|----|--------|-------|-----|--------|----|--------|
| West Entrance to Madison | 14 | 0 | 0 | 127 | 7,759 | 0 | 7,886 |
| Madison to Norris | 14 | 0 | 0 | 73 | 3,458 | 0 | 3,531 |
| Norris to Canyon Village | 12 | 0 | 0 | 47 | 2,214 | 0 | 2,261 |
| Canyon Village to Fishing Bridge | 16 | 0 | 0 | 50 | 2,370 | 0 | 2,420 |
| Fishing Bridge to East Entrance | 27 | 0 | 0 | 0 | 983 | 0 | 983 |
| Fishing Bridge to West Thumb | 21 | 0 | 0 | 55 | 2,627 | 0 | 2,682 |
| Madison to Old Faithful | 16 | 0 | 0 | 165 | 7,818 | 0 | 7,983 |
| Old Faithful to West Thumb | 17 | 0 | 0 | 73 | 3,560 | 0 | 3,633 |
| West Thumb to Flagg Ranch | 24 | 0 | 0 | 103 | 4,219 | 0 | 4,322 |
| Grassy Lake Road | 8 | 0 | 0 | 0 | 200 | 0 | 200 |
| Flagg Ranch to Colter Bay | 16 | 1,376 | 240 | 0 | 0 | 16 | 1,632 |
| Colter Bay to Moran Junction | 10 | 1,920 | 150 | 0 | 0 | 10 | 2,080 |
| Moran Junction to East Entrance | 2 | 1,120 | 70 | 0 | 0 | 4 | 1,194 |
| Moran Junction to South Entrance | 26 | 20,020 | 1,040 | 0 | 0 | 52 | 21,112 |
| Teton Park Road | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 2 | 10 | 0 | 0 | 0 | 0 | 10 |
| Antelope Flats Snowmobile Route | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 27,313 | 1,697 | 762 | 35,849 | 82 | 65,703 |

| Alternative F | | Average Daily Use, Vehicle-Miles, January-February | | | | | |
|----------------------------------|-----|--|-------|-------------|-------------|-------|--------|
| ROAD SEGMENT | Mi. | Autos | Vans | Snowcoaches | Snowmobiles | Buses | Total |
| Mammoth to Northeast Entrance | 47 | 2,820 | 188 | 0 | 0 | 0 | 3,008 |
| Mammoth to Norris | 21 | 0 | 0 | 0 | 0 | 0 | 0 |
| West Entrance to Madison | 14 | 0 | 0 | 0 | 0 | 0 | 0 |
| Madison to Norris | 14 | 0 | 0 | 0 | 0 | 0 | 0 |
| Norris to Canyon Village | 12 | 0 | 0 | 36 | 1,200 | 0 | 1,236 |
| Canyon Village to Fishing Bridge | 16 | 0 | 0 | 48 | 3,472 | 0 | 3,520 |
| Fishing Bridge to East Entrance | 27 | 0 | 0 | 0 | 2,079 | 0 | 2,079 |
| Fishing Bridge to West Thumb | 21 | 0 | 0 | 63 | 5,019 | 0 | 5,082 |
| Madison to Old Faithful | 16 | 0 | 0 | 0 | 0 | 0 | 0 |
| Old Faithful to West Thumb | 17 | 0 | 0 | 68 | 5,831 | 0 | 5,899 |
| West Thumb to Flagg Ranch | 24 | 0 | 0 | 96 | 8,976 | 0 | 9,072 |
| Grassy Lake Road | 8 | 0 | 0 | 0 | 200 | 0 | 200 |
| Flagg Ranch to Colter Bay | 16 | 1,600 | 240 | 0 | 0 | 16 | 1,856 |
| Colter Bay to Moran Junction | 10 | 2,000 | 150 | 0 | 0 | 10 | 2,160 |
| Moran Junction to East Entrance | 2 | 1,160 | 60 | 0 | 0 | 4 | 1,224 |
| Moran Junction to South Entrance | 26 | 20,800 | 1,040 | 0 | 0 | 52 | 21,892 |
| Teton Park Road | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 2 | 10 | 0 | 0 | 0 | 0 | 10 |
| Antelope Flats Snowmobile Route | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 28,390 | 1,678 | 311 | 26,777 | 82 | 57,238 |

| Alternative G | | Average Daily Use, Vehicle-Miles, January-February | | | | | |
|-------------------------------|-----|--|------|-------------|-------------|-------|-------|
| ROAD SEGMENT | Mi. | Autos | Vans | Snowcoaches | Snowmobiles | Buses | Total |
| Mammoth to Northeast Entrance | 47 | 2,820 | 188 | 0 | 0 | 0 | 3,008 |
| Mammoth to Norris | 21 | 0 | 0 | 168 | 0 | 0 | 168 |
| West Entrance to Madison | 14 | 0 | 0 | 1,232 | 0 | 0 | 1,232 |
| Madison to Norris | 14 | 0 | 0 | 560 | 0 | 0 | 560 |
| Norris to Canyon Village | 12 | 0 | 0 | 360 | 0 | 0 | 360 |

| | | | | | | | |
|----------------------------------|----|--------|-------|-------|---|----|--------|
| Canyon Village to Fishing Bridge | 16 | 0 | 0 | 384 | 0 | 0 | 384 |
| Fishing Bridge to East Entrance | 27 | 0 | 0 | 135 | 0 | 0 | 135 |
| Fishing Bridge to West Thumb | 21 | 0 | 0 | 420 | 0 | 0 | 420 |
| Madison to Old Faithful | 16 | 0 | 0 | 1,280 | 0 | 0 | 1,280 |
| Old Faithful to West Thumb | 17 | 0 | 0 | 578 | 0 | 0 | 578 |
| West Thumb to Flagg Ranch | 24 | 0 | 0 | 696 | 0 | 0 | 696 |
| Grassy Lake Road | 8 | 0 | 0 | 32 | 0 | 0 | 320 |
| Flagg Ranch to Colter Bay | 16 | 0 | 0 | 464 | 0 | 0 | 464 |
| Colter Bay to Moran Junction | 10 | 1,900 | 100 | 0 | 0 | 10 | 2,010 |
| Moran Junction to East Entrance | 2 | 1,120 | 56 | 0 | 0 | 4 | 1,180 |
| Moran Junction to South Entrance | 26 | 20,020 | 962 | 0 | 0 | 52 | 21,034 |
| Teton Park Road | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 2 | 10 | 0 | 0 | 0 | 0 | 10 |
| Antelope Flats Snowmobile Route | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 25,870 | 1,306 | 6,277 | 0 | 66 | 33,551 |

Alternative comparison, total vehicle miles per day by segment

| | <i>Average Daily Use, Vehicle-Miles, January-February</i> | | | | | | |
|----------------------------------|---|--------------|--------------|--------------|--------------|--------------|--------------|
| ROAD SEGMENT | Alt A | Alt B | Alt C | Alt D | Alt E | Alt F | Alt G |
| Mammoth to Northeast Entrance | 3,064 | 3,008 | 3,008 | 3,064 | 3,064 | 3,008 | 3,008 |
| Mammoth to Norris | 710 | 1,239 | 1,239 | 710 | 710 | 0 | 168 |
| West Entrance to Madison | 7,886 | 1,848 | 1,008 | 7,886 | 7,886 | 0 | 1,232 |
| Madison to Norris | 3,531 | 658 | 644 | 3,531 | 3,531 | 0 | 560 |
| Norris to Canyon Village | 2,261 | 720 | 720 | 2,261 | 2,261 | 1,236 | 360 |
| Canyon Village to Fishing Bridge | 2,420 | 3,920 | 3,920 | 151 | 2,420 | 3,520 | 384 |
| Fishing Bridge to East Entrance | 983 | 1,809 | 1,809 | 0 | 983 | 2,079 | 135 |
| Fishing Bridge to West Thumb | 2,682 | 5,271 | 5,271 | 2,682 | 2,682 | 5,082 | 420 |
| Madison to Old Faithful | 7,983 | 2,128 | 1,712 | 8,000 | 7,983 | 0 | 1,280 |
| Old Faithful to West Thumb | 3,633 | 5,814 | 5,814 | 3,633 | 3,633 | 5,899 | 578 |
| West Thumb to Flagg Ranch | 4,322 | 7,824 | 7,824 | 4,322 | 4,322 | 9,072 | 696 |
| Grassy Lake Road | 184 | 200 | 400 | 200 | 200 | 200 | 32 |
| Flagg Ranch to Colter Bay | 1,869 | 2,176 | 2,576 | 2,896 | 1,632 | 1,856 | 464 |
| Colter Bay to Moran Junction | 2,308 | 2,360 | 2,360 | 2,260 | 2,080 | 2,160 | 2,010 |
| Moran Junction to East Entrance | 1,231 | 11,274 | 1,274 | 1,234 | 1,194 | 1,224 | 1,180 |
| Moran Junction to South Entrance | 20,204 | 21,892 | 21,892 | 21,112 | 21,112 | 21,892 | 21,034 |
| Teton Park Road | 156 | 0 | 150 | 0 | 0 | 0 | 0 |
| Moose-Wilson Road | 16 | 16 | 20 | 24 | 10 | 10 | 10 |
| Antelope Flats Snowmobile Route | 0 | 0 | 750 | 0 | 0 | 0 | 0 |
| Total | 65,443 | 62,157 | 62,391 | 63,966 | 65,703 | 57,238 | 33,551 |
| Percent Change from Alt A | -- | -5.0% | -4.7% | -2.2% | +0.4% | -12.5% | -48.8% |
| Normalize to Total Oversnow | 38,191 | 34,915 | 35,149 | 36,724 | 38,461 | 29,996 | 6,277 |
| Percent Change from Alt A | -- | -8.6% | -8.0% | -3.8% | +0.7% | -21.5% | -83.6% |

SCENARIO FOR DISPLACEMENT OF RECREATION USE FROM YELLOWSTONE AND GRAND TETON NATIONAL PARKS AND THE JOHN D. ROCKEFELLER, JR., MEMORIAL PARKWAY TO ADJACENT LANDS

Introduction

The cooperating agencies, in particular the Forest Service (USFS), requested the NPS to perform an estimate of the amount of use that would be displaced from the parks and redistributed to adjacent lands in the Greater Yellowstone Area, by alternative. This request was based on concerns about increased use by snowmobiles, primarily, on the national forests. The Forest Service wanted to perform as detailed an analysis as possible in response to these concerns, and have the analysis disclosed in the Environmental Impact Statement (EIS) as effects on adjacent lands. The NPS' view is that a prediction of what will happen on national forests, in terms of recreation and secondary or tertiary effects on resources, is speculative and remote. The NPS agreed to provide a scenario based on recreation opportunities that would be available or lost under each alternative, and the amount of known recreation use that could be displaced from each gateway. The NPS needed to construct a similar scenario for each alternative that dealt with redistribution of recreation use within the parks themselves. This analysis is also documented in this appendix. The two analyses are related by common assumptions. This is not a worst-case scenario. Rather the intent was to develop scenarios that are reasonable, and based on available information from recent surveys and visitation statistics as shown in the assumptions below. The Forest Service treated displacement figures as a range, which conveyed the possibility of a worst case. The following analysis has been updated with statistics from the final visitor survey, so they may be slightly different than those originally supplied to the Forest Service.

Assumptions

- All survey data was taken from *the Final Report 1998-99 Visitor Survey Yellowstone NP and the Greater Yellowstone Area: Analysis and Results* (Duffield and Neher 2000). Visitor use statistics are average annual winter visitation from 1992 through 1999. For Yellowstone these numbers include visitors entering from the North, East, West, and South Entrances that participated in one or all of the following activities: skiing, snowmobiling, and riding a snowcoach. For Grand Teton, visitor use numbers are the average visitor use statistics from the years 1993 through 1999 and include visitors that participated in one or all of the following activities: snowmobiling, skiing, and riding in snowplanes on Jackson Lake.
- Refer to page 19 of the *Final Report 1998-99 Visitor Survey Yellowstone NP and the Greater Yellowstone Area: Analysis and Results* for a breakdown of the percentage of visitors participating in various activities by entrance station.
- Because the displacement issue deals exclusively with those current winter park visitors that would choose another area of the GYA *instead* of the national parks (due to a change in park management) only the winter portion of the recent surveys completed by John Duffield and Chris Neher of Bioeconomics was used. Some questions from the summer survey (and telephone survey) may be useful in formulating assumptions about how visitors who do not currently use the park in winter may choose to do so under a given alternative.
- Since the question to be answered is specific to current park users that would recreate on the national forests instead of the in the parks, Chris Neher of Bioeconomics recommended using only the survey sample collected in the park to calculate displaced users. The forest sample may be helpful in determining answers to other questions
- Each of the survey questions included the response category of "unsure" (see page 21 of the draft Duffield winter survey report). Where that number represents a significant number, a

percentage of that response rate was calculated into the total number of displaced users identified under each alternative. The number used was a percentage proportionate to the percentage of visitor responses that indicated they would visit other areas of the GYA.

- The basis for visitation is the number of oversnow winter recreation trips to the parks determined in the winter survey (88,250). Percentages used to develop answers to survey questions discriminate between resident visitors and nonresidents. Residents represent 39.7% of the visitation (35,035 trips) and nonresidents 60.3% (53,215 trips). These percentages are applied to the total visitation as a basis for interpreting the answers to questions that may bear on recreation displacement.
- For each alternative the following information is provided: a brief description of the proposed changes in modes of transportation, and information from specific survey questions pertaining to that change in mode of transportation. Where specific survey data are not available, visitor use statistics for the disallowed activity or area are provided. It may be assumed (for lack of better information) that the number of displaced visitors would be somewhere between 0 and the total number of current winter visitors to that area.
- In evaluating the number of winter visitors that would be displaced to national forest lands information was not available on which specific areas of the GYA these visitors would choose to relocate to. The survey may provide additional information, upon which the reader may base assumptions on how this use would be distributed. Since these assumptions require a thorough understanding of use on the national forests, they have not been made here. (Winter visitor use statistics by park entrance were attached to the documentation for use by the Forest Service.)

Displacement Calculation by Alternative

Alternative A-No action

It may be assumed that the existing winter visitor use trends for a given area would continue.

Alternative B

Summary of Transportation Changes Proposed in Alternative B

- In YNP, the road from the West Entrance east to Madison and south to Old Faithful would be plowed throughout the winter. Visitor access would be provided on this route via a mass transit van or bus service. All other groomed routes would remain. Nonmotorized users may be restricted to designated trails in important wildlife winter range.
- In GTNP, the interior park road would be open to only nonmotorized activities. The CDST would be relocated to a trail off the highway corridor. Snowplane use only would continue on the surface of Jackson Lake, in addition to nonmotorized uses.

Estimated Change in Visitation as a Result of Alternative B

Yellowstone National Park

Survey question 16 (final survey, page 30, Table 4.15) asked respondents how they would change their visitation to the parks if the road from West Yellowstone to Madison to Old Faithful were plowed and open for car/bus travel only (Duffield and Neher 2000). Displacement could be to adjacent lands or to other park entrances.

| Average total annual oversnow winter trips to Yellowstone | Number of trips for visitors that would visit the same amount to the GYA, but would go to other destinations | Number of trips for visitors who are unsure how their visitation would change | Total trips possibly displaced from YNP to other GYA destinations |
|---|--|---|---|
| 88,250 | 6,710* | 14,670* | 21,380* |

*Calculation:

Nonresident trips x % nonresident going to other destinations + resident trips x % resident going to other destinations

$(53215 \text{ trips} \times 8.4\%) + (35035 \text{ trips} \times 6.4\%) = 4470 + 2240 = 6710 \text{ trips}$

$(53215 \text{ trips} \times 16.9\%) + (35035 \text{ trips} \times 16.2\%) = 8990 + 5680 = 14670 \text{ trips}$

Grand Teton National Park

Since no specific survey questions were asked concerning proposals to change modes of winter transportation and recreation in GTNP the following use statistics might be helpful. The NPS theorizes that users on the interior park road could either trailer to the CDST and snowmobile there, or stage from Flagg Ranch, or go to available areas on the Bridger-Teton National Forest nearby.

Average annual number of snowmobilers on the interior park road: **3,617**

Average annual number of snowplane users on Jackson Lake: **1,658**

Alternative C

Summary of Transportation Changes Proposed in Alternative C

- In YNP, the road from West Entrance east to Madison and south to Old Faithful would be plowed throughout the winter. Visitor access would be provided on this route via private vehicle. The road from Mammoth south through Norris to Madison would be plowed beginning in late February. All other groomed routes would remain.
- In GTNP, the Moose-Wilson Road and the Antelope Flats road would be plowed.

Estimated Change in Visitation as a Result of Alternative C

Yellowstone National Park

Assume displacement figures noted for alternative B, plus the following. Displacement could be to adjacent lands or to other park entrances.

Average annual use (oversnow activities only) for February via the North Entrance: **1,631**

Average annual use (oversnow activities only) for March via the North Entrance: **98**

Grand Teton National Park

No figures are available for the number of snowmobiles currently using the Moose-Wilson road. The estimated amount of snowmobile use on this road is minimal. Overall use in GTNP under this alternative would remain the same as in alternative A. Motorized opportunities are increased rather than decreased.

Alternative D

Summary of Transportation Changes Proposed in Alternative D

- In YNP, the East Entrance road would be closed to motorized uses. Nonmotorized uses would be restricted to designated trails in important winter range EXCEPT in the Mammoth and Tower areas.
- In GTNP, the road from Colter Bay to Flagg Ranch would be groomed for oversnow motorized travel. Nonmotorized travel only on the interior park road.

Estimated Change in Visitation as a Result of Alternative D
Yellowstone National Park

Average annual snowmobile visitation through the East Entrance is 3,336. These users could be displaced either to adjacent lands or other park entrances.

Grand Teton National Park

Since no specific survey questions were asked concerning proposals to change modes of winter transportation and recreation in GTNP the following use statistics might be helpful. Users on the interior park road could either trailer to the CDST and snowmobile there, or stage from Flagg Ranch, or go to available areas on the Bridger-Teton National Forest nearby.

Average annual number of snowmobilers on the interior park road: **3, 617**

Average annual number of snowplane users on Jackson Lake: **1,658**

Skiers who presently access areas by wheeled vehicle from Colter Bay to Flagg Ranch would no longer be able to do so. However, because most of GTNP off roads would be allocated to nonmotorized use only, and because oversnow access from Colter to Flagg would be possible, skiing use would not be displaced within the park.

Survey question 17 (page 34, Table 4.18) asked respondents how they would change their visitation to the parks if the road from Colter Bay to Flagg Ranch were groomed for oversnow motorized travel (Duffield and Neher 2000). The current annual number of winter automobile travelers driving from Colter Bay to Flagg Ranch, is about 23,000.

Average annual winter visitation to GTNP (DEIS use numbers): **25,312**

Number of trips for visitors that would visit the same amount to the GYA, but would go to other destinations: **1230***

Number of trips for visitors who are unsure how their visitation would change: **7262***

*Calculation:

Nonresident trips x % nonresident going to other destinations + resident trips x % resident going to other destinations

$(19490 \text{ trips} \times 4.7\%) + (5822 \text{ trips} \times 5.4\%) = 916 + 314 = 1230 \text{ trips}$

$(19490 \text{ trips} \times 31.2\%) + (5822 \text{ trips} \times 20.3\%) = 6080 + 1182 = 7262 \text{ trips}$

Total trips possibly displaced from Yellowstone to other GYA destinations: **8492**

Alternative E

Summary of Transportation Changes Proposed in Alternative E

- In YNP, there are no transportation-based changes proposed in alternative E.
- In GTNP, the CDST would be eliminated. All oversnow motorized uses are eliminated except for use on the Grassy Lake road and north of Flagg Ranch.

Estimated Change in Visitation as a Result of Alternative E

Yellowstone National Park

No changes in patterns of winter visitation are anticipated under alternative E.

Grand Teton National Park

Total average annual visitation to GTNP (excluding the Grassy Lake Road and use north of Flagg Ranch, which would still be available for motorized use.)

CDST and the Parkway Snowmobiling: **18,860**

Non-CDST Snowmobiling: **1,850**

Snowplaning: **1,660**

Skiing: **3,260**

Total: **25,300**

Other than elimination of snowmobiling on the Teton Park Road, which could displace about 3,600 snowmobile trips/visits per year (as in alternatives B and D), most of the snowmobiling that occurs is on the CDST and the Parkway going into YNP. Since the access to YNP would remain, staged from Flagg Ranch, most of the snowmobile use would not be displaced from the parks.

Alternative F

Summary of Transportation Changes Proposed in Alternative F

- In YNP, road sections from West Entrance to Madison, Madison to Norris, Mammoth to Norris and Norris to Madison would be closed to all uses from November 1 through mid-April. Nonmotorized uses would be allowed only on front country groomed trails. No backcountry use would be allowed.
- In GTNP, same as alternative E.

Estimated Change in Visitation as a Result of Alternative F

Yellowstone National Park

Survey question 18 (page 34, Table 4.18) asked respondents how they would change their visitation to the parks if the road from West Entrance to Madison, Madison to Norris, Mammoth to Norris and Norris to Madison were closed to all uses (Duffield and Neher 2000). Displaced use from the north and west YNP could be displaced to the south on both GTNP and to national forest lands.

| Average total annual oversnow winter trips to YNP | Number of trips for visitors that would visit the same amount to the GYA, but would go to other destinations | Number of trips for visitors who are unsure how their visitation would change | Total trips possibly displaced from Yellowstone to other GYA destinations |
|---|--|---|---|
| 88,250 | 3,998 * | 15,604* | 19,602 |

*Calculation:

Nonresident trips x % nonresident going to other destinations + resident trips x % residents going to other destinations

(67952 trips x 4.3%) + (20297 trips x 5.3%) = 2922 + 1076 = 3998 trips

(67952 trips x 17.5 %) + (20297 trips x 18.3%) = 11890 + 3714 = 15604 trips

Total average annual number of skiers to YNP is 844. Backcountry skiers would be displaced within the GYA to either GTNP or to adjacent forest lands.

Alternative G

Summary of Transportation Changes Proposed in Alternative G

- In YNP and GTNP, all existing groomed oversnow motorized routes would remain. Transportation would be provided by the NPS managed mass transit snowcoach.
- In GTNP no motorized uses would occur on the surface of Jackson Lake. The road from Colter Bay to Flagg Ranch would be groomed for snowcoach only travel.

Estimated Change in Visitation on National Forests as a Result of Alternative G

Under this scenario 32% of nonresident visitors and 13% of resident visitors sampled stated they would not visit GYA. Considering the use of parks as well as national forests by visitors on trips to the GYA, visitation lost to the parks would be lost to the adjacent lands as well.

Yellowstone and Grand Teton National Park

Survey question 17 (page 30, Table 4.15) asked respondents how they would change their visitation to the parks under a policy that allowed only snowcoach, skiing and snowshoe access to YNP and GTNP (Duffield and Neher 2000).

| | Average total annual oversnow winter trips to the parks | Number of trips for visitors that would visit the same amount to the GYA, but would go to other destinations | Number of trips for visitors who are unsure how their visitation would change | Total trips possibly displaced from Yellowstone to other GYA destinations |
|------|---|--|---|---|
| YNP | 88,250 | 3,998 * | 15,604 * | 19,602 |
| GTNP | 25,312 | 1,230 - | 7,262 - | 8,492 |

Nonresident trips x % nonresident going to other destinations + resident trips x % residents going to other destinations

*(67952 trips x 4.3%) + (20297 trips x 5.3%) = 2922 + 1076 = 3998 trips

*(67952 trips x 17.5 %) + (20297 trips x 18.3%) = 11890 + 3714 = 15604 trips

-(19490 trips x 4.2%) + (5822 trips x 3.8%) = 916 + 314 = 1230 trips

-(19490 trips x 31.2%) + (5822 trips x 20.3%) = 6080 + 1182 = 7262 trips

Backcountry skiers could be displaced by not plowing the road from Colter Bay to Flagg Ranch. Assume at most 5% of skier days: 160. In addition, the average annual number of winter automobile travelers driving from Colter Bay to Flagg Ranch is approximately 23,000. This traffic is mostly generated through Jackson to GTNP, and would not affect oversnow motorized use on adjacent public lands.

AVAILABLE INFORMATION TO ASSESS EFFECTS OF WINTER USE ALTERNATIVES ON ADJACENT NATIONAL FOREST LANDS

The NPS economic consultant, Bioeconomics, Inc., was requested to develop, to the extent possible, estimates of the impact of policy changes within the parks on use of adjacent national

forest lands. An examination of the detailed responses to the 1999 YNP winter visitor survey show that survey responses provide little data on alternative destinations within the GYA for those who would shift GYA use under a winter management change. Survey responses do however provide an overall picture of the impact of several possible management options on non-park winter use levels in the GYA.

The main finding related to national forest lands is that there will not be an increase in use, but rather a decrease, which makes the issue of where increases might occur somewhat moot. For example, in the context of the estimated declines in visitation to the GYA under alternative G, the estimated decline in visitation far outweighs the percentage of park visitors who would anticipate shifting their use to other non-park GYA locations. Given that the typical park winter visitor spends one day recreating in the park and several days recreating in the GYA outside of the park, the winter survey results indicate that for alternative G any shift in park use to forest lands would be outweighed by a general decline in use of forest lands under the alternative.

For the sake of completeness, Table 1 shows the percent of respondents in the YNP winter use survey park sample who said that they would shift their destinations within the GYA under four alternative management options. Clearly, only a small percentage of current winter users anticipate a shift of use within the park under these options.

Table 1. Percent of current winter YNP visitors who would shift their destinations within the GYA under alternative management options

| Management option | Park visitor sample | |
|---|---------------------|---------------|
| | Non-GYA residents | GYA residents |
| Plow road from West Yellowstone to Old Faithful | 8.4% | 6.4% |
| Allow only snowcoach, ski, or snowshoe access | 4.2% | 3.8% |
| Close west side roads to all vehicle access | 4.3% | 5.3% |
| Stop plowing road from Colter Bay to South Entrance | 4.7% | 5.4% |

Those respondents who said that they would “visit the same amount to the GYA, but I would make other destinations (GTNP, or specific sites on national forest lands) my primary destination instead of YNP” were asked to list the specific other destinations that they would be most likely to visit. The following table provides a comprehensive, *verbatim*, listing of the responses to this question by all respondents in the park sample. Since only a small percentage of respondents said that they would shift their use within the GYA, and only a subset of these listed alternative destinations within the GYA, the resulting sample sizes are quite small and no clear pattern of the impact of visitation shifts on individual forests is evident.

**Alternative GYA destinations listed by respondents
to the 1999 winter visitor survey, by management option.**

| Policy of plowing the road from West Yellowstone to Old Faithful | | |
|--|------------------|----------------|
| <i>Alternative GYA[†] Use Area</i> | Frequency | Percent |
| BTNF* - Jackson ranger district | 1 | 3.0 |
| Beaver Cr., Lion's Head | 1 | 3.0 |
| Bonneville County | 1 | 3.0 |
| Dubois, Cooke City, Big Horn NF | 1 | 3.0 |
| GTNP [‡] and the Parkway | 9 | 27.2 |
| Jackson Hole, Targhee, Snow King ski areas | 3 | 9.0 |
| Lamar Valley/Cooke City | 4 | 12.1 |
| Two Top | 1 | 3.0 |
| West Yellowstone | 1 | 3.0 |
| Continental divide trails | 1 | 3.0 |
| Don't want cars in the winter | 1 | 3.0 |
| Drive through the whole park | 1 | 3.0 |
| Forest Service Land | 2 | 6.0 |
| Island park | 1 | 3.0 |
| Lake area | 1 | 3.0 |
| Machine-free areas, if there are any left | 1 | 3.0 |
| Ski areas away from snowmobiles | 1 | 3.0 |
| The less car traffic the better | 1 | 3.0 |
| Wherever there are no snowmobiles | 1 | 3.0 |
| Policy of allowing only snowcoach, ski, or snowshoe access | | |
| <i>Alternative Use Area</i> | Frequency | Percent |
| Bridger/Teton | 1 | 8.3 |
| Cooke City/Beartooth Mountains | 2 | 16.6 |
| GTNP | 1 | 8.3 |
| Gallatin, Gravely, Beartooth Ranges | 1 | 8.3 |
| Idaho | 1 | 8.3 |
| Island Park | 2 | 16.6 |
| Shadow Mtn/Moose Island/Cache Creek | 1 | 8.3 |
| Teton Village/Kelly & Moose | 1 | 8.3 |
| Groomed trails not in the park | 1 | 8.3 |
| Snowmobile is prime way I choose to see parks | 1 | 8.3 |
| Policy of closing the west side of park to all vehicles in the winter | | |
| <i>Alternative Use Area</i> | Frequency | Percent |
| Dubois | 1 | 10.0 |
| GTNP | 3 | 30.0 |
| Idaho | 1 | 10.0 |
| Jackson | 2 | 20.0 |
| National forest | 1 | 10.0 |
| Other groomed trails not in the park | 1 | 10.0 |
| Outside park | 1 | 10.0 |
| Policy to stop plowing the road from Colter Bay to YNP South Entrance | | |
| <i>Alternative Use Area</i> | Frequency | Percent |
| GTNP | 3 | 42.9 |
| Idaho | 1 | 14.3 |
| Jackson Hole | 1 | 14.3 |
| Jackson Ranger District | 1 | 14.3 |
| Stay at south end to avoid snowmobiles | 1 | 14.3 |

[†]Greater Yellowstone Area

^{*}Bridger-Teton National Forest

[‡]Grand Teton National Park

APPENDIX H

RECREATION CARRYING CAPACITY

OVERVIEW AND FRAMEWORK FOR THE WINTER VISITOR CAPACITY ISSUE IN THE GYA

The public land resource base is limited. There is a limit to the amount of use on a finite piece of land, beyond which the values that bring people there begin to decline. Our experience in public land management is to see this decline in resource values or qualities with no consequent decrease in visitation or use. Expectations change, but what is critical is the expectation that the visitor has relative to what she or he experiences routinely at home.

The concept of capacity is filtered through this expectational or experiential sieve, and usually from our own geographic reference point. Capacity is therefore relative and dependent on a variety of factors. One determinant of capacity is infrastructure. Parking lots, trails, and lodges are built to accommodate certain numbers. When those numbers are exceeded, we begin to experience resource damage and social confusion by overuse and overflow. We then build more facilities, which over time also overflow. Within a finite land base, the inescapable conclusion is that at some point our standards need to change or we overrun the very resource that people come to enjoy. There are acknowledged examples of this in a number of national parks, including Grand Canyon, Yosemite, Arches, and perhaps even in Yellowstone during the summer. We are aware, anecdotally, of local people who no longer visit Yellowstone during the summer season because of the traffic and the crowding.

From a practical standpoint, land management agencies do not have unlimited flexibility to add infrastructure. This is both budget and resource driven. Infrastructure must be maintained, and current budgets are not sympathetic to this need. From a resource standpoint, decaying infrastructure cannot be allowed to degrade wildlife habitat or watershed integrity, for example.

There are other determinants of capacity, both technological and social. Communities and industries are to be credited when they consider means of reducing the pollution potential of snowmobiles, or making snowmobiles quieter. If pollution and noise are partial determinants of capacity, reduction measures serve to increase capacity. It is an accepted premise that capacities are greater for user groups that are educated, informed, and concerned about the impacts they might cause. These groups tend to be self-limiting. Efficient systems that passively regulate the flow of use in the national park or forest are also ways to affect capacity.

The conclusion to be made is that capacity for winter use in the GYA is limited, but actually defining the capacity is a very complex issue. It involves many different interrelated factors, with both a social and a resource orientation. In general, the factors that need to be considered include:

- Types of use opportunities and experiences to be accommodated
- Physical expectations (settings and qualities) associated with different types of opportunities
- Social expectations associated with different types of opportunities (crowding, encounters, solitude)
- Amount and suitability of lands necessary to provide different types of uses
- Proximity/accessibility of suitable lands for different uses that are incompatible

- Availability and suitability of other lands to provide similar experiences (or commercial services)
- Technological aspects of modes of recreation transport desired
- Facilities available to accommodate use effectively
- Potential for developing access and facilities
- Availability of lands for commercially provided services vs. non-outfitted or guided experiences
- Level of knowledge and expertise generally exercised by user groups
- Level of knowledge and assistance provided by commercial or administrative services
- Specific locations of lands suitable for use (settings and physical characteristics) in relation to sensitive resources – for example streams, bald eagle nesting sites, thermal areas – or hazards
- Administrative capability to regulate the amount of use effectively

The structuring of the alternatives in the Environmental Impact Statement (EIS) provides objectives, standards, and guidelines in many of these areas of consideration. The decision, in selecting an alternative, will provide a mix of recreation opportunity prescriptions (zones) that are located generally on a map. Each prescription or zone is defined by the desired resource condition or character, the desired visitor experience, and amount of development that is compatible with them. Further, each zone has a set of resource and visitor experience indicators that would guide management through monitoring and evaluation. General standards are set in a number of areas. Some alternatives allude to activities that would improve the parks' interpretive services and availability of information for visitors. Some alternatives generally prescribe changes in winter use supporting facilities. Some alternatives close areas to use because of sensitive resources. Once the final decision is made, there will be a framework with which to begin the process of recreation capacity determination.

LITERATURE REVIEW OF CARRYING CAPACITY MODELS

Central to any land management objective is the underlying element of change. Change is inevitable in any natural system. It has been well documented that even very low levels of use by animals or humans can have a marked impact on the ecological regime (Frissell and Duncan 1965). In defining land management objectives, the fundamental question to be answered is not whether to allow or eliminate change but how much change to allow.

Carrying capacity models assist natural resource managers to determine when a given land area is receiving too much use. These models were originally developed by range and wildlife managers to define the number of animals that can be maintained within a given amount of habitat (Burch 1981). Traditionally, carrying capacities were defined by three types or levels of use, minimum, maximum, and optimal. Each level of use is based on different assumptions about the ecosystem and the managed population.

In an attempt to determine appropriate human use levels, recreation managers began to use the carrying capacity model to determine how much human use or recreation a landscape can maintain. Unlike the simpler models used by range and wildlife biologists, recreational carrying capacities were forced to undertake the enormous task of not only determining physical carrying capacities, but human experiential capacities as well. Lime and Stankey (1986) have defined

recreational carrying capacity as “the character of use that can be supported over a specified time by an area developed at a certain level without causing excessive damage to either the physical environment or the experience of the visitor.” Typically, the carrying capacity framework consists of two basic components, a descriptive component and an evaluative component. The descriptive component uses objective data that describes how people behave in and affect a given recreation system. Use levels, types of use, frequency of use, and season of use are all examples of the descriptive component. The evaluative component is a value judgment, or more clearly stated, a management objective that outlines specifically how much impact (ecological or social) is too much for any given area.

Carrying capacities may be defined by four basic parameters: facilities, physical, ecological, and social. These constraints provide an opportunity for recreation managers to make decision for different management objectives or for different levels and types of impacts.

Physical and facility carrying capacities are determined simply by the amount of space that is available in a given recreation setting. The ecological parameters of carrying capacity determination are concerned with impacts to the plants, animals, soil, water, and air. Social impacts focus on the level of use beyond which the recreational experience is negatively impacted. The two main parameters of recreational carrying capacities are ecological and social.

For obvious reasons social impacts to recreation systems are the most difficult of the four parameters to determine. While management objectives may clearly state the specific management objectives for maintaining water quality, soil, and vegetation and may clearly define the number and type of facilities that may occupy a given ground area, the determination of the quality of user experience is elusive. In order to determine social impacts, human value judgments are necessary. The quality of experience may be determined by such elements as type of user, amount of use, location of encounter, number of other users encountered, and the size of group encountered. In addition, recreationists generally choose the type of setting they prefer. Users may also be “displaced”, or crowded out, by an increase in use level.¹

It is often the judgment of land managers that an increase in human use is perceived by recreational users as a negative impact. This is not always an accurate assumption. In a study of Wisconsin deer hunters, two distinctly different groups of hunters were surveyed. Group one indicated that a low level of contact with other hunters was preferable, with zero encounters optimal. Group two indicated that encounters with other groups will increase their chances of hunting success (by moving deer around) and so be perceived as favorable (Stankey 1973).

The quality of the user’s experience may be more directly related to the type and behavior of other users encountered than by the level of use encountered. Recreationists are typically bothered less by encounters with similar types of users. For example backpackers have been

¹ In the context of winter use, large issues surround the concept that increasing motorized use within the Greater Yellowstone Area has largely displaced skiing and other nonmotorized visitors who have a different set of preferences. The situation is difficult in that efforts or allocations to provide for nonmotorized uses could at this point displace motorized users who feel that they have already lost too much available area to wilderness or wildlife “closures.”

found to be less bothered by multiple encounters with other backpackers than they are with multiple encounters with horseback riders (Stankey 1980).

Because of the many social variables in any recreational social carrying capacity model the framework is most useful as an ideological tool for land managers. Several problems exist in recreational carrying capacity models that make them difficult to use in real world situations.

For example, of real world importance to recreation managers is the disparity between demand and supply. With a dramatic increase in demand for a “motorized oversnow experience” and little increase in land area with the ability to provide “opportunities for free and unconfined motorized recreation” is not just difficult but, in some areas like national parks, impossible.

Inherent in any capacity model is the idea that there is a “magic number” that may be determined. This idea suggests that somehow the landscape has the ability to withstand use (Stankey 1980). The fact that there is often no linear relationship between quality of experience and level of use further complicates the matter. Stankey (1984) agrees stating “carrying capacity models are a management system directed towards maintenance and restoration of ecological and social conditions defined as acceptable and appropriate in area management objectives it is not a system directed toward manipulation of use levels per se.” Because of the elusive nature of defining a level of use appropriate for a recreation experience, land managers often concentrate solely on the impacts of recreation use on the ecological system and entirely avoid the experiential nature of the use. Perhaps even more unfortunate are those managers, who rather than avoid the social aspect of recreation management, spend an enormous amount of time and money trying to pin down a finite capacity value. This approach as Grafe et al. (1986) pointed out that carrying capacities are “meaningless unless it is expressed conditionally in relation to objectives that specify capacity for what.”

LIMITS OF ACCEPTABLE CHANGE MODEL

An alternative model that is appropriate for specifically identifying land management objectives is the Limits of Acceptable Change model (LAC) (Stankey et al. 1984). Unlike traditional carrying capacity models the LAC accepts that change will inevitably occur. LAC is a broad framework which uses problem identification and management solutions based on comparison of site conditions and selected standards and guidelines. The LAC model removes itself from the pursuit of the “magic number” or capacity value and focuses land management objectives on the identification of problems through the use of public input, ecological assessment, external influences, and administrative processes. Although there is some value judgment inherent in any decision making process the LAC model allows land managers to make decisions based on existing and desired future conditions (both ecological and social) of a specified land area. This model has been put into practice by the Forest Service (USFS) in dealing with problems of wilderness overuse.

VISITOR EXPERIENCE AND RESOURCE PROTECTION (VERP) FRAMEWORK

In 1992 the Park Service began developing the VERP framework to address visitor use management and carrying capacity issues in the units of the national park system. VERP is based on the LAC model and is one of the adaptations of it. A working definition of VERP is: “a planning and management framework that focuses on visitor use impacts on the visitor experiences and the park resources. These impacts are primarily attributable to visitor behavior, use levels, types of use, timing of use, and location of use. There are nine elements that are integral to the VERP framework:

1. Assemble an interdisciplinary project team.
2. Develop a public involvement strategy.
3. Develop statements of park purpose, significance, and primary interpretive themes; identify planning constraints.
4. Analyze park resources and existing visitor use.
5. Describe a potential range of visitor experiences and resource conditions (potential prescriptive zones).
6. Allocate the zones to specific locations in the park (prescriptive management zoning).
7. Select indicators and specify standards for each zone; develop a monitoring plan.
8. Monitor resource and social indicators.
9. Take management action.

The Winter Use EIS is structured to facilitate this process. When a final alternative is selected and implemented as a plan, steps one through seven will essentially have been accomplished. Indicators and standards will need to be validated through monitoring for specific areas within the parks.

APPENDIX I

MONITORING STANDARDS, METHODS, AND INTENSITY BY MANAGEMENT ZONE

MONITORING AND ADAPTIVE MANAGEMENT

The Winter Use Plan and Final Environmental Impact Statement (FEIS) for Yellowstone National Park (YNP), Grand Teton National Park (GTNP) and the John D. Rockefeller, Jr., Memorial Parkway (the Parkway) examines two approaches to assess the long term effects of management actions on identified park values: general resource inventory and monitoring and adaptive management. General resource inventory and monitoring in accordance with the National Park Service (NPS) 77 Resource Management Guidelines (the NPS 1991) is common to all alternatives. Adaptive management is a component of alternatives B and E. Alternative G also includes the use of an adaptive approach in managing park resources. The two approaches are distinguished by the degree of uncertainty regarding the impacts to park values. Adaptive management is an appropriate approach when important information pertaining to natural resource and visitor use management is lacking, and there is a need to take immediate management action rather than to wait for additional information to be collected. It is a process of implementing management decisions as scientifically driven experiments that test predictions and assumptions in management plans, and using the resulting information to improve the plans (Walters 1986).

The essential first step when formulating an adaptive management strategy for the affected environment is to articulate the critical uncertainties, particularly where some information is known about a specific resource but conclusive evidence is currently unavailable. Based on current knowledge, a management scenario is then designed to test specific hypotheses relating to the critical uncertainties or unknowns. Monitoring and evaluation strategies are then employed to evaluate management outcomes relative to acceptable thresholds, and assist in the development of management alternatives. Monitoring within the framework of adaptive management is critical because of the uncertainty of predictions based on limited information. It provides for systematic feedback for management, and allows adjustment of activities to mitigate unplanned or undesirable outcomes.

Based on public scoping and the analysis presented in the DEIS, critical information needs related to winter use were identified for several park values: air quality, natural quiet, wildlife, and aspects of visitor experience. Adaptive management therefore will be issue-driven and based on the direction provided by Executive Orders 11644 and 11989 as amended (see Appendix C) and will focus primarily on the impact of winter visitor use on the values listed above. Both adaptive management and monitoring require standards, or thresholds, to establish baselines upon which to assess degradation to monitored park values. Thresholds generally pertain to state and federal standards, inherent park values, or experiential values. Although Executive Orders 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. Monitoring may help to determine appropriate thresholds where little information exists upon which to make decisions related to degradation.

A critical step in adaptive management involves the National Environmental Policy Act (NEPA). Each time a new management proposal is evaluated the analysis must be documented by

performing the appropriate level of NEPA compliance. Many of the adaptive management provisions that are suggested in alternatives B, G, and E would not require that an additional environmental assessment be completed. However, some actions, such as permanent road closures to protect wildlife or the construction of new facilities may require an additional site-specific NEPA analysis, which includes public scoping.

In contrast to the adaptive management provisions, general resource monitoring is a feature common to all alternatives. General resource monitoring is used when adequate information exists to make informed management decisions, and is the process of collecting information to evaluate if the objectives of a management plan are being realized. General monitoring techniques (as opposed to monitoring conducted within the adaptive management framework) will be employed under all alternatives to assess impacts to public health and safety; geothermal features; water quality; threatened and endangered species; trumpeter swans and some aspects of visitor experience, including access and circulation. Ongoing monitoring programs will continue and others will be implemented.

The adaptive management process is shown schematically in Figure 1. A series of tables follow showing monitoring standards and methods for critical resources in each winter management zone. Another series of tables conveys the same information as applied in an adaptive management approach. With 11 management zones, there are 22 tables in all.

Figure 1. The Adaptive Management Process.

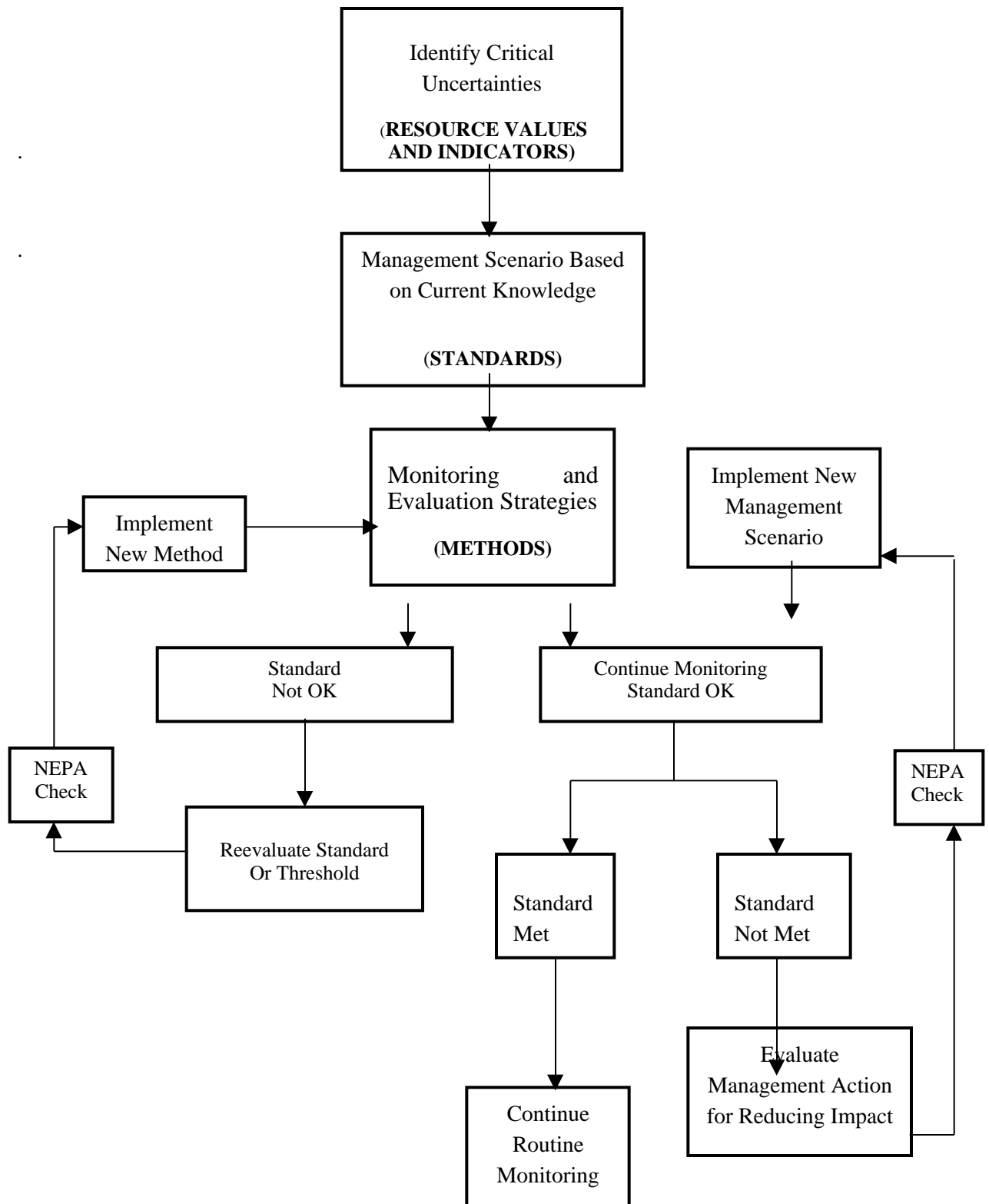


Table 1. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 1 Destination or Support Area | | | | |
|--------------------------------------|--|--|---|-----------------------|---|
| | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality and Public Health | Visibility | State and federal air quality standards | Time lapse video Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) | High | Establish vehicle carrying capacity reduce vehicle numbers Review annually |
| | Park workers and visitors exposure to CO, particulate matter, aldehydes, and VOCs | State and federal air quality standards | Fixed site sampling of PM and carbon monoxide, and VOCs | High | Establish vehicle carrying capacity reduce vehicle numbers Review annually |
| | | | Personal samples for exposure to aldehydes, VOCs, carbon monoxide, and particulate matter | High | Reduce exposure to emissions Reduce emissions Review annually |
| Wildlife | Bird and mammal habituation re; effectiveness of garbage facilities | Garbage unavailable to wildlife | Photo surveys, and observation | High | Increase or improve garbage security Increase garbage storage Review annually |
| Water/ Snowpack | Water quality: pH, hydrogen, ammonium, calcium, sulfate, nitrate, and VOCs | State and federal water quality standards | Surface water sampling Snowpack sampling | Moderate | Determination and application of best management practices Reduce emissions and vehicle numbers Review annually |
| Safety | Vehicle accidents and incidents | Continual improvement three-year sliding average | Incident descriptions and GIS mapping | High | Sign and reduce speed limits in areas of recurring incidents Increase law enforcement and information programs in areas of concern Review monthly |
| Geothermal Features | Human-caused damage to geothermal areas | No degradation of geothermal resources | Remote sensing and visual observation | High | Increase enforcement and monitoring Implement additional information programs Restrict travel Review monthly |
| Visitor Experience | Waiting lines | Visitors wait no more than 5 minutes to access restrooms and park information | Observation | Moderate | Increase facilities where possible Increase information programs Review annually |
| | Perceptions of crowding at attraction sites | Visitors are able to see, smell, and hear the natural environment at popular attraction sites such as Old Faithful or Jackson lake | Visitor survey | High | Establish carrying capacities Review Every other year |
| | Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery, and clean air), affordable services, and access to information | Visitors are highly satisfied with their park experience | Visitor survey | High | Establish carrying capacities Review Every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 2. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 2 Plowed Road | | | | |
|------------------------------------|---|--|--|-----------------------|--|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. State and Federal air Quality standards | Photo survey Fixed site sampling of PM | Moderate | Establish vehicle carrying capacity Review annually |
| | Park workers and visitors exposure to CO, particulate matter, aldehydes, and VOCs | State air quality standards | Fixed site sampling of PM, Carbon Monoxide | Moderate | Establish vehicle carrying capacity Review annually |
| | | | Personal samples for exposure to aldehydes, VOCs, and particulate matter | | |
| Wildlife | Vehicle caused wildlife mortality | No effect to population | Incident reports, roadside surveys, and visual observations | High | Sign and reduce speed limits in areas of recurring incidents Review monthly |
| | Wildlife trapped by snow berms in road corridor | No effect on population | | | Increase number of exit berms – reevaluate location of existing exits Review weekly |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | High | Increase enforcement Review annually |
| Water/ Snowpack | Water quality: pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate and VOCs | State and Federal water quality standards | surface water sampling Snowpack sampling | Moderate | Establish vehicle carrying capacity Determination and application of best management practices Review annually |
| Safety | Motor vehicle accidents Motorized vs. nonmotorized visitor conflict | Continuous improvement three-year sliding average | Incident reports and GIS | High | Sign and reduce speed limits in areas of recurring incidents Increase law enforcement in areas of concern Review monthly |
| Visitor Experience | Encounter rates | Not to exceed 250 vehicles per hour for more than 1 hour per day. Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey | High | Establish carrying capacities/reduce visitor numbers Review every other year |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish carrying capacities/ reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 3. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | <p align="center">3 Groomed Motorized Route Clean and Quiet</p> | | | | |
|------------------------------------|--|--|---|-----------------------|---|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants at least 95% of each 24-hour period | Photo survey Fixed site sampling of PM, | Moderate | Establish vehicle carrying capacity/ reduce vehicle numbers Review annually |
| | Park workers and visitors exposure to CO, particulate matter, aldehydes, and VOCs | State and federal air quality standards | Fixed site sampling of PM and carbon monoxide | Moderate | Establish vehicle carrying capacities reduce vehicle numbers Review annually |
| | | | Personal samples for exposure to aldehydes, VOCs, and particulate matter | | |
| | | | Establish exposure measurements for snowcoaches | | |
| Wildlife | Wildlife mortalities caused by oversnow vehicles | No effect on population | Incident reports and roadside surveys, photo surveys, and visual observations | Low | Sign and reduce speed limits in areas of recurring incidents Review annually |
| | Wildlife harassment or displacement due to vehicle sound or movements | No effect on population | Incident reports and photo surveys | High | Increase law enforcement Review monthly |
| | Bison use of groomed surfaces | No effect on population | Photo surveys, air surveys, and telemetry | High | Close roads Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | | |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | Moderate | Increase enforcement Review annually |
| Water/ Snowpack | Water quality: pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards Snowpack sampling | Spring runoff surface water sampling Snowpack sampling | High | Establish vehicle carrying capacity Determination and application of best management practices Review annually |
| Safety | Oversnow vehicle accidents | Continuous improvement three-year sliding average | Incident reports and GIS | High | Sign and reduce speed limits in areas of recurring incidents. Increase law enforcement in areas of concern Review monthly |
| Visitor Experience | Encounter rates | Not to exceed 250 vehicles per hour for more than 1 hour per day. Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey | High | Establish carrying capacities reduce visitor numbers Review every other year |
| | Smoothness of groomed surface | No worse than fair 20% of a 24-hour period | Visual observation | | |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude. | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish carrying capacities/reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

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

| Management Zone → | 4 Groomed Motorized Route | | | | |
|------------------------------------|--|--|--|-----------------------|--|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants at least 95% of each 24-hour period | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀) | High | Establish vehicle carrying capacities/reduce vehicle numbers Implement new technologies Review annually |
| | Park workers and visitors exposure to CO, particulate matter, aldehydes, and VOCs | State air quality standards | Fixed site sampling of PM, Carbon Monoxide | High | Establish vehicle carrying capacities/reduce vehicle numbers Implement new technologies Review annually |
| | | | Personal samples for exposure to aldehydes, VOCs, and particulate matter | | |
| | | | Establish exposure measurements for snowcoaches | | |
| Wildlife | Wildlife mortalities caused by oversnow vehicles | No effect on population | Incident reports and roadside surveys, photo surveys, and visual observations | Low | Sign and reduce speed limits in areas of recurring incidents Review monthly |
| | Wildlife harassment | No effect on population | Incident reports and photo surveys | High | Increase law enforcement Review annually |
| | Bison use of groomed surfaces | No effect on population | Photo and air surveys | High | Mitigate effects or close roads to grooming Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | High | |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | High | Increase enforcement Review annually |
| Water/Snowpack | Water quality: pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards | Spring runoff surface water sampling Snowpack sampling | High | Determination and application of best management practices Reduce emissions Implement or require new technologies Review annually |
| Safety | Oversnow vehicle accidents | Continuous improvement three-year sliding scale | Incident reports and GIS | High | Sign and reduce speed limits in areas of recurring incidents. Increase law enforcement in areas of concern. |
| Visitor Experience | Encounter rates | Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey | High | Establish carrying capacities/reduce visitor numbers Review every other year |
| | Smoothness of groomed surface | No worse than fair 20% of a 24-hour period | Visual observation | | Improve or increase grooming Reduce visitor numbers Review annually |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude. | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish carrying capacities/reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 5. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 5 Groomed Motorized Trail Clean and Quiet | | | | |
|------------------------------------|--|---|--|-----------------------|--|
| | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey | Low | Establish vehicle carrying capacity/reduce vehicle numbers Review annually |
| | Park workers and visitors exposure to CO, particulate matter, aldehydes, and VOCs | State air quality standards | Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) carbon monoxide | Low | Establish vehicle carrying capacity/reduce vehicle numbers Review annually |
| | | | Personal samples for exposure to aldehydes, VOCs, and particulate matter | | |
| Wildlife | Wildlife mortalities caused by oversnow vehicles | No effect on population | Incident reports and roadside surveys, photo surveys, and visual observations | Low | Sign and reduce speed limits in areas of recurring incidents Review monthly |
| | Wildlife harassment | No effect on population | Incident reports and photo surveys | High | Increase law enforcement Review annually |
| | Bison use of groomed surfaces | No effect on population | Photo and air surveys | Low | Close trail Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | High | |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | High | Increase law enforcement Review annually |
| Water/Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards | Spring runoff surface water sampling | High | Determination and application of best management practices Reduce vehicle numbers Implement or require new technologies Review annually |
| Safety | Oversnow vehicle accidents | Continuous improvement three-year sliding scale | Incident reports and GIS | High | Sign and reduce speed limits in areas of recurring incidents. Increase law enforcement in areas of concern. Review monthly |
| | Conflicts between motorized and nonmotorized use | | | | |
| Visitor Experience | Encounter rates | Not to exceed 16 to 20 parties per day 80% of the time. Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey | High | Establish carrying capacity/reduce visitor numbers Review every other year |
| | Smoothness of groomed surface | No worse than fair 30% of the winter season | Visual observation | Low | Improve or increase grooming Reduce vehicle numbers Review annually |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude. | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 6. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 6 Groomed Motorized Trail | | | | |
|------------------------------------|--|---|--|-----------------------|--|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey | Low | Establish vehicle carrying capacity/reduce vehicle numbers Review annually |
| | Park workers and visitors exposure to CO, particulate matter, aldehydes, and VOCs | State air quality standards | Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) Carbon Monoxide | Low | Establish vehicle carrying capacity/reduce vehicle numbers Review annually |
| | | | Personal samples for exposure to aldehydes, VOCs, and particulate matter | | |
| Wildlife | Wildlife mortalities caused by oversnow vehicles | No effect on population | Incident reports and roadside surveys, photo surveys, and visual observations | Low | Sign and reduce speed limits in areas of recurring incidents Review monthly |
| | Wildlife harassment | No effect on population | Incident reports and photo surveys | Low | Increase law enforcement Review annually |
| | Bison use of groomed surfaces | No effect on population | Photo and air surveys | Low | Close trail Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | High | |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | High | Increase law enforcement Review annually |
| Water/Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards | Spring runoff surface water sampling | Low | Determination and application of best management practices Reduce vehicle numbers Implement or require new technologies Review annually |
| Safety | Oversnow vehicle accidents | Continuous improvement three-year sliding scale | Incident reports and GIS | High | Sign and reduce speed limits in areas of recurring incidents. Increase law enforcement in areas of concern. Review monthly |
| | Conflicts between motorized and nonmotorized use | | | | |
| Visitor Experience | Encounter rates | Not to exceed 16 to 20 parties per day 80% of the time. Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey | High | Establish carrying capacity/reduce visitor numbers Review every other year |
| | Smoothness of groomed surface | No worse than fair 30% of the winter season | Visual observation | Low | Improve or increase grooming Reduce vehicle numbers Review annually |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude. | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 7. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 7 Ungroomed Motorized Trail | | | | |
|------------------------------------|---|---|--|-----------------------|--|
| | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) | Low | Establish vehicle carrying capacity /reduce vehicle numbers Review annually |
| | Park workers and visitors exposure to CO, particulate matter, aldehydes, and VOCs | State air quality standards | Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) Carbon Monoxide | Low | Establish vehicle carrying capacity /reduce vehicle numbers Review annually |
| | | | Personal samples for exposure to aldehydes, VOCs, and particulate matter | | |
| Wildlife | Wildlife mortalities caused by oversnow vehicles | No effect on population | Incident reports and roadside surveys, photo surveys, and visual observations | Low | Sign and reduce speed limits in areas of recurring incidents Review monthly |
| | Wildlife harassment | No effect on population | Incident reports and photo surveys | Low | Increase law enforcement Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | High | Close trail Review annually |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | High | Increase law enforcement Review annually |
| Water/ Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards | Spring runoff surface water sampling | Low | Determination and application of best management practices Reduce vehicle numbers Implement or require new technologies Review annually |
| Safety | Oversnow vehicle accidents | Continuous improvement three-year sliding scale | Incident reports and GIS | Low | Sign and reduce speed limits in areas of recurring incidents. Increase law enforcement in areas of concern Review monthly |
| | Conflicts between motorized and nonmotorized use | | | | |
| Visitor Experience | Encounter rates | Not to exceed 16 to 20 parties per day 80% of the time. Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey | Low | Establish carrying capacity/reduce visitor numbers Review every other year |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | Low | Establish carrying capacities/ reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 8. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 8 Groomed Nonmotorized Trail | | | | |
|------------------------------------|--|--|--|-----------------------|--|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey | Low | Establish vehicle carrying capacity/ reduce vehicle numbers Review annually |
| | Park workers and visitors exposure to CO, particulate matter, aldehydes, and VOCs | State air quality standards | Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) Carbon Monoxide | Low | Establish vehicle carrying capacity/ reduce vehicle numbers Review annually |
| | | | Personal samples for exposure to aldehydes, VOCs, and particulate matter | | |
| Wildlife | Wildlife harassment | No effect on population | Incident reports and photo surveys | Low | Increase law enforcement and information programs Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | High | Close trail Review annually |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | High | Increase law enforcement Review annually |
| Water/Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards | Spring runoff surface water sampling | Low | Determination and application of best management practices Reduce vehicle numbers Implement or require new technologies Review annually |
| Safety | Conflicts between motorized and nonmotorized use Search and rescue Human and wildlife conflicts | Continuous improvement three-year sliding scale | Incident reports and GIS | Low | Increase law enforcement and information programs in areas of concern Review monthly |
| Visitor Experience | Encounter rates | Not to exceed 10 to 15 parties per day over 70% of the use season. Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey | Low | Establish carrying capacity/ reduce visitor numbers Review every other year |
| | Smoothness of groomed surface | No worse than fair 30% of the winter season | Visual observation | Low | Improve or increase grooming Reduce vehicle numbers Review annually |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude. | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | Low | Establish carrying capacities/ reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 9. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 9 Ungroomed Nonmotorized Trail or Area | | | | |
|------------------------------------|---|--|--|-----------------------|---|
| | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) | Moderate | Establish vehicle carrying capacity/ reduce vehicle numbers Review annually |
| Wildlife | Wildlife harassment | No effect on population | Incident reports and photo surveys | Moderate | Increase law enforcement and information programs Review annually |
| | Human and grizzly bear conflicts during pre- or post denning period | No incidents | Mapping of denning areas | High | Increase law enforcement and information programs Close denning areas to human use in fall and spring Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | High | Close trail Review annually |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | High | Increase law enforcement Review annually |
| Water/ Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards | Spring runoff surface water sampling | Low | Determination and application of best management practices Review annually |
| Safety | Conflicts between motorized and nonmotorized use Search and rescue Human and wildlife conflicts | Continuous improvement three-year sliding scale | Incident reports and GIS | High | Increase law enforcement and information programs in areas of concern Review monthly |
| Visitor Experience | Encounter rates | Not to exceed 10 to 15 parties per day over 70% of the use season. Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey | Low | Establish carrying capacity/ reduce visitor numbers Review every other year |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | Low | Establish carrying capacities/ reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 10. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 10 Backcountry Nonmotorized Trail or Area | | | | |
|------------------------------------|---|--|--|-----------------------|---|
| | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) | Moderate | Establish vehicle carrying capacity/ reduce vehicle numbers Review annually |
| Wildlife | Wildlife harassment | No effect on population | Incident reports and photo surveys, and observation | Moderate | Increase law enforcement and information programs Review annually |
| | Human and grizzly bear conflicts during pre- or post denning period | No incidents | Mapping of denning areas Incident reports | High | Increase law enforcement and information programs Close denning areas to human use in fall and spring Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | High | Close trail Review annually |
| Sound | Distance and time human-caused sound is audible | CFR for vehicle sound | Audibility logging | High | Increase law enforcement Review annually |
| Water/ Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards | Spring runoff surface water sampling Snowpack sampling | Moderate | Determination and application of best management practices Implement or require new technologies Review annually |
| Safety | Search and rescue Human and wildlife conflicts | Continuous improvement three-year sliding scale | Incident reports and GIS | High | Increase law enforcement and information programs in areas of concern Review monthly |
| Visitor Experience | Encounter rates | Not to exceed 5 to 10 parties per day over 80% of the use season. Visitors are able to see, smell, and hear the natural environment and experience quiet and solitude | Visitor survey | Low | Establish carrying capacity/reduce visitor numbers Review every other year |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | Low | Establish carrying capacities/reduce visitor numbers Review every other year |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 11. Monitoring Standards, Methods, Intensity by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 11 Sensitive Resource Area | | | | |
|------------------------------------|---|---|--|-----------------------|--|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility/Success of closure | No degradation | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) | Moderate | Evaluate success of closure Review annually |
| Wildlife | Wildlife harassment | No incidents | Incident reports and photo surveys, and observation | Moderate | Evaluate success of closure Review annually |
| | Human and grizzly bear conflicts during pre- or post denning period/ closure | No incidents | Mapping of denning areas Incident reports | High | Evaluate success of closure Review annually |
| | Lynx habitat effectiveness | No effect on population | Carnivore and snowshoe hare track surveys | High | Evaluate success of closure Review annually |
| Water/ Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and Federal water quality standards | Spring runoff surface water sampling Snowpack sampling | Moderate | Evaluate success of closure Review annually |
| Safety | Search and rescue Human and wildlife conflicts | No incidents | Incident reports and GIS | High | Evaluate success of closure Review annually |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 12. Adaptive Management Indicators, Standards, and Methods 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 | | | | |
|----------------------------|--|---|---|-----------------------|--|
| | Indicator | Standard | Preliminary Method | Monitoring Intensity* | Management Actions |
| Air Quality | Odor | Area free of odor of human-caused pollutants not less than 90% of a given 24-hour period | Park visitor survey | High | Implement or require new technologies Reduce vehicle numbers/ reduce carrying capacity |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants not less than 95% of a each 24-hour period Particulate matter not to exceed | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀). | High | Implement or require new technologies Reduce vehicle numbers/ reduce carrying capacity |
| Sound | Distance and time human-caused sound is audible | % time vehicles audible at attraction sites not to exceed 50% | Audibility logging | High | Implement or require new technologies Reduce vehicle numbers/ reduce carrying capacity |
| Water/ Snowpack | Water quality: pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and federal water quality standards | Spring runoff surface water sampling Snowpack sampling | Moderate | Determination and application of best management practices Implement or require new technologies Reduce vehicle numbers/ reduce carrying capacity |
| Visitor Experience | Perceptions of crowding at attraction sites | Visitors are able to see, smell, and hear the natural environment at popular attraction sites such as Old Faithful or Jackson lake | Visitor survey and Encounter rates | High | Establish carrying capacity Reduce visitor numbers |
| | Visitor satisfaction with opportunities to experience park values (wildlife viewing, scenery and clean air) affordable services and access to information. | Visitors are highly satisfied with their park experience | Visitor survey | High | Establish carrying capacity Reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 13. Adaptive Management Indicators, Standards, and Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 2 Plowed Road | | | | |
|------------------------------------|--|--|---|-----------------------|--|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Odor | Area free of any noticeable odor of human-caused pollutants at least 90% of each 24-hour period | Park visitor survey | Moderate | Implement or require new technologies Reduce emissions and carrying capacity |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants at least 95% of each 24-hour period | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀). | Moderate | Implement or require new technologies Reduce emissions and carrying capacity |
| Wildlife | Vehicle caused wildlife mortality | No significant adverse effects | Incident reports, roadside surveys, GIS, and visual observations | High | Sign and reduce speed limits in areas of recurring incidents |
| | Bison movements on plowed roads | No significant adverse effects | Continue bison monitoring flights and photo surveys | High | Evaluate alternate transportation system Close roads |
| | Wildlife harassment or displacement due to vehicle sound or movements | No significant adverse effects | Incident reports and photo surveys | High | Increase law enforcement and information programs Close areas to use |
| | Wildlife trapped by snow berms in road corridor | No significant adverse effects | Incident reports, roadside surveys, and visual observations | High | Increase number of exit berms – reevaluate location of existing exits Evaluate alternate transportation system |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 100' distance not to exceed 50 % | Audibility logging | High | Implement or require new technologies Reduce sound emissions and vehicle numbers |
| Water/Snowpack | Water quality: pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and federal water quality standards | Spring runoff surface water sampling Snowpack sampling | Moderate | Determination and application of best management practices Implement or require new technologies Establish vehicle carrying capacity |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey Encounter rates | High | Establish visitor carrying capacity/reduce visitor numbers |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude. | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish visitor carrying capacity/reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 14. Adaptive Management Indicators, Standards and Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | <p align="center">3 Groomed Motorized Route Clean and Quiet</p> | | | | |
|------------------------------------|--|--|---|-----------------------|---|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Odor | Area free of any noticeable odor of human-caused pollutants at least 90% of each 24-hour period | Park visitor survey | Moderate | Implement or require new technologies Reduce emissions and carrying capacity |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants at least 95% of each 24-hour period | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀). | Moderate | Implement or require new technologies Reduce emissions and carrying capacity |
| Wildlife | Wildlife mortalities caused by oversnow vehicles | No significant adverse effects | Incident reports, roadside surveys, photo surveys, and visual observations | Low | Sign and reduce speed limits in areas of recurring incidents Increase law enforcement and information programs Close areas to use |
| | Wildlife harassment or displacement due to vehicle sound or movements | No significant adverse effects | Incident reports, photo surveys, and visual observation | High | |
| | Bison use of groomed surfaces | No significant adverse effects | Photo surveys, air surveys, and telemetry | High | Eliminate grooming operations Close roads |
| | Lynx habitat effectiveness | No significant adverse effects | Carnivore and snowshoe hare track surveys | | |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 100' distance not to exceed 50 % | Audibility logging | Moderate | Implement new technologies Reduce sound emissions or reduce vehicle numbers |
| Water/ Snowpack | Water quality: pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and federal water quality standards | Spring runoff surface water sampling Snowpack sampling | High | Determination and application of best management practices Implement or require new technologies Reduce vehicle emissions and carrying capacity |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey Encounter rates | High | Establish visitor carrying capacities Reduce visitor numbers |
| | Smoothness of groomed surface | No worse than fair 20% of a 24-hour period | Visual observation | | Increase grooming ¹ Reduce vehicle numbers when threshold temperature is reached |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude. | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish visitor carrying capacities Reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

¹Mogul study to determine temperature and vehicle numbers for this management action is ongoing (Alger and Gwaltney 2000).

Table 15. Adaptive Management Indicators, Standards and Methods and by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 4 Groomed Motorized Route | | | | |
|------------------------------------|---|--|---|-----------------------|---|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. Area free of any visible sign of human-caused pollutants at least 95% of each 24-hour period | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀). | High | Implement or require new technologies Reduce emissions and carrying capacity |
| | Odor | Area free of any noticeable odor of human-caused pollutants at least 95% of each 24-hour period | Visitor survey | Moderate | Implement or require new technologies Reduce emissions and carrying capacity |
| Wildlife | Wildlife mortalities caused by oversnow vehicles | No significant adverse effects | Incident reports and roadside surveys, photo surveys, and visual observations | Low | Sign and reduce speed limits in areas of recurring incidents Increase law enforcement and information programs Close areas to use Increase law enforcement |
| | Wildlife harassment or displacement due to vehicle sound or movements | No significant adverse effects | Incident reports and photo surveys | High | |
| | Bison use of groomed surfaces | No significant adverse effects | Photo and air surveys | High | Eliminate road grooming operations Close roads |
| | Lynx habitat effectiveness | No significant adverse effects | Carnivore and snowshoe hare track surveys | High | |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 100' distance not to exceed 50 % | Audibility logging | High | Require or implement new technologies Reduce vehicle emissions or reduce vehicle numbers |
| Water/ Snowpack | Water quality: pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and federal water quality standards | Spring runoff surface water sampling Snowpack sampling | High | Determination and application of best management Require or implement new technologies Reduce vehicle emissions or reduce vehicle numbers |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails | Visitor survey Encounter rates | High | Establish visitor carrying capacities/ reduce visitor numbers |
| | Smoothness of groomed surface | No worse than fair 20% of a 24-hour period | Visual observation | | Groom more frequently Reduce vehicle numbers when threshold temperature is reached ¹ |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish visitor carrying capacities/reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

¹Mogul study to determine temperature and vehicle numbers for this management action is ongoing (Alger and Gwaltney 2000).

Table 16. Adaptive Management Indicators, Standards and Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | <div>5</div> Groomed Motorized Trail Clean and Quiet | | | | |
|------------------------------------|--|---|---|-----------------------|---|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Action |
| Air Quality (Public Health) | Odor | Area free of any noticeable odor of human-caused pollutants | Park visitor survey | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀). | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| Wildlife | Wildlife harassment or displacement from habitat as a result of vehicle sound or movements | No significant adverse effects | Incident reports and photo surveys, and visual observations | High | Sign and reduce speed limits in areas of recurring incidents Increase law enforcement and information programs Close areas to use |
| | Bison use of groomed surfaces | No significant adverse effects | Photo and air surveys | Low | Eliminate grooming operations Mitigate effects or close trail |
| | Lynx habitat effectiveness | No significant adverse effects | Carnivore and snowshoe hare track surveys | High | |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 100' distance not to exceed 25 % | Audibility logging | High | Implement or require new technologies Reduce vehicle emissions and carrying capacity |
| Water Quality/ Snowpack | Water quality: pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and federal water quality standards | Spring runoff surface water sampling Snowpack sampling | High | Determination and application of best management practices Implement or require new technologies Reduce vehicle emissions and carrying capacity |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails. Moderate levels of solitude and quiet available | Visitor survey Encounter rates | High | Establish visitor carrying capacities Reduce visitor numbers |
| | Smoothness of groomed surface | No worse than fair 30% of the winter season | Visual observation | Low | Increase grooming Reduce vehicle numbers when threshold temperature is reached ¹ |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude. | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish visitor carrying capacities Reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

¹Mogul study to determine temperature and vehicle numbers for this management action is ongoing (Alger and Gwaltney 2000).

Table 17. Adaptive Management Indicators, Standards and Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 6 Groomed Motorized Trail | | | | |
|------------------------------------|---|---|---|-----------------------|---|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Action |
| Air Quality (Public Health) | Odor | Area free of any noticeable odor of human-caused pollutants | Park visitor survey | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀). | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| Wildlife | Wildlife harassment or displacement from habitat as a result of vehicle sound or movements | No significant adverse effects | Incident reports and photo surveys, and visual observation | Moderate | Sign and reduce speed limits in areas of recurring incidents Increase law enforcement and information programs Close areas to use |
| | Bison use of groomed surfaces | No significant adverse effects | Photo and air surveys | Low | Eliminate grooming operations |
| | Lynx habitat effectiveness | No significant adverse effects | Carnivore and snowshoe hare track surveys | High | Mitigate effects or close trail |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 100' distance not to exceed 25 % | Audibility logging | High | Implement new technologies Reduce sound emissions or reduce vehicle numbers |
| Water/Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and federal water quality standards | Spring runoff surface water sampling Snowpack sampling | Low | Determination and application of best management practices Implement or require new technologies Reduce vehicle emissions and carrying capacity |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails. Moderate levels of solitude and quiet available | Visitor survey Encounter rates | High | Establish visitor carrying capacities Reduce visitor numbers |
| | Smoothness of groomed surface | No worse than fair 30% of the winter season | Visual observation | Low | Increase grooming Reduce vehicle numbers when threshold temperature is reached ¹ |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish visitor carrying capacities Reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

¹Mogul study to determine temperature and vehicle numbers for this management action is ongoing (Alger and Gwaltney 2000).

Table 18. Adaptive Management Indicators, Standards and Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 7 Ungroomed Motorized Trail | | | | |
|------------------------------------|---|---|---|-----------------------|--|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Action |
| Air Quality (Public Health) | Odor | Area free of any noticeable odor of human-caused pollutants | Park visitor survey | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀). | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| Wildlife | Wildlife harassment or displacement from habitat as a result of vehicle sound or movements | No significant adverse effects | Incident reports and photo surveys, and visual observation | Moderate | Sign and reduce speed limits in areas of recurring incidents Increase law enforcement and information programs Close areas to use Mitigate effects or close trail |
| | Lynx habitat effectiveness | No significant adverse effects | Carnivore and snowshoe hare track surveys | High | |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 100' distance not to exceed 25 % | Audibility logging | High | Implement new technologies Reduce sound emissions or reduce vehicle numbers |
| Water/Snowpack | Surface water sampling of pH, Hydrogen, Ammonium, Calcium, Sulfate, Nitrate, and VOCs | State and federal water quality standards | Spring runoff surface water sampling Snowpack sampling | Low | Determination and application of best management practices Implement or require new technologies Reduce vehicle emissions and carrying capacity |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment at roadside pullouts and interpretive trails. Moderate levels of solitude and quiet available | Visitor survey Encounter rates | High | Establish visitor carrying capacities Reduce visitor numbers |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish visitor carrying capacities Reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 19. Adaptive Management Indicators, Standards, and Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 8 Groomed Nonmotorized Trail | | | | |
|------------------------------------|---|---|--|-----------------------|---|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Odor | Area free of any noticeable odor of human-caused pollutants | Park visitor survey | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| Wildlife | Wildlife harassment or displacement from habitat as a result of visitor activity or movements | No significant adverse effects | Incident reports and photo surveys | High | Increase law enforcement and visitor information Use of designated trails only Close areas to use |
| | Lynx habitat effectiveness | No significant adverse effects | Carnivore and snowshoe hare track surveys | High | Eliminate grooming operations Mitigate effects or close trail |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 500' distant from trailhead or motorized route not to exceed 10 % during daylight hours (8AM-4PM). | Audibility logging | High | Implement new technologies Reduce sound emissions or reduce vehicle numbers |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment and to experience quiet and solitude | Visitor survey Encounter rates | High | Establish visitor carrying capacities Reduce visitor numbers |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish visitor carrying capacities Reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 20. Adaptive Management Indicators, Standards and Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 9 Ungroomed Nonmotorized Trail or Area | | | | |
|------------------------------------|---|--|--|-----------------------|---|
| | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Odor | Area free of any noticeable odor of human-caused pollutants | Park visitor survey | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) | Low | Implement or require new technologies Reduce emissions and carrying capacity |
| Wildlife | Human bear conflicts during pre- and post denning periods | No significant adverse effects | Mapping of denning areas | Moderate | Increase law enforcement and visitor information Use of designated trails only Close areas to use |
| | Wildlife harassment or displacement from habitat as a result of visitor activity or movements | No significant adverse effects | Incident reports and photo surveys | High | Increase law enforcement and visitor information Use of designated trails only Close areas to use |
| | Lynx habitat effectiveness | No significant adverse effects | Carnivore and snowshoe hare track surveys | High | Mitigate effects or close trail |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 500' distant from trailhead or motorized route not to exceed 10 % during daylight hours (8AM-4PM). | Audibility logging | High | Implement new technologies Reduce sound emissions or reduce vehicle numbers |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment. Frequent opportunities to experience quiet and solitude are available | Visitor survey Encounter rates | High | Establish visitor carrying capacities Reduce visitor numbers |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | High | Establish visitor carrying capacities Reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 21. Adaptive Management Indicators, Standards, and Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway Winter Use Plan.

| Management Zone → | 10 Backcountry Nonmotorized Trail or Area | | | | |
|------------------------------------|---|--|--|-----------------------|---|
| | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Odor | Area free of any noticeable odor of human-caused pollutants | Park visitor survey | Low | Reduce emissions and carrying capacity Implement or require new technologies |
| | Visibility | No degradation. Area free of any visible sign of human-caused pollutants | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} and PM ₁₀) | Moderate | Reduce emissions and carrying capacity Implement or require new technologies |
| Wildlife | Human bear conflicts during pre- and post denning periods | No significant adverse effects | Mapping of denning areas | High | Increase law enforcement and visitor information Use of designated trails only Close areas to use |
| | Wildlife harassment or displacement from habitat as a result of visitor activity or movements | No significant adverse effects | Incident reports and photo surveys | High | Increase law enforcement and visitor information Use of designated trails only Close areas to use |
| | Lynx habitat effectiveness | No significant adverse effects | Carnivore and snowshoe hare track surveys | High | Mitigate effects or close trail to use |
| Water Quality/ Snowpack | Water quality: pH, hydrogen, ammonium, calcium, sulfate, nitrate, and VOCs | State and federal water quality standards | Spring runoff surface water sampling Snowpack sampling | Moderate | Determination and application of best management practices Implement or require new technologies Reduce vehicle emissions and carrying capacity |
| Sound | Distance and time human-caused sound is audible | Time vehicles audible at 500' distant from trailhead or motorized route not to exceed 10 % during daylight hours (8AM-4PM). Vehicles not audible beyond 1000' from TH or motorized route. | Audibility logging | Moderate | Implement new technologies Reduce sound emissions or reduce vehicle numbers |
| Visitor Experience | Perceptions of crowding | Visitors are able to see, smell, and hear the natural environment. Frequent opportunities to experience quiet and solitude are available | Visitor survey Encounter rates | Moderate | Establish visitor carrying capacities Reduce visitor numbers |
| | Visitor satisfaction levels with opportunities to experience park values and opportunities to view wildlife, scenery, and experience clean air and solitude | Visitors are highly satisfied (+90%) with their park experience | Visitor survey | Moderate | Establish visitor carrying capacities Reduce visitor numbers |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods; Low = Annually during peak use periods or at the end of the season.

Table 22. Adaptive Management Indicators, Standards, Methods by Management Zone, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Parkway Winter Use Plan.

| Management Zone → | 11 Sensitive Resource Area | | | | |
|------------------------------------|---|----------------------|--|-----------------------|-----------------------------|
| Resource Value | Indicator | Preliminary Standard | Method | Monitoring Intensity* | Management Actions |
| Air Quality (Public Health) | Visibility | No degradation. | Photo survey and time lapse video Fixed site sampling of particulate matter (PM _{2.5} , and PM ₁₀) | Moderate | Evaluate success of closure |
| | | | | | |
| Wildlife | Wildlife harassment or displacement from habitat as a result of visitor activity or movements | No incidents | Incident reports and photo surveys | High | Evaluate success of closure |
| | Human / grizzly bear conflicts during pre or post denning periods | No incidents | Mapping of denning areas | High | Evaluate success of closure |
| | Lynx habitat effectiveness | No adverse effects | Carnivore and snowshoe hare track surveys | High | Evaluate success of closure |

*High = Daily to weekly or in accordance with standard protocol for parameter; Moderate = Monthly to seasonally and during peak days or use periods;
Low = Annually during peak use periods or at the end of the season

APPENDIX J

SOUND

INTRODUCTION

This appendix presents the analysis approach for determining noise impacts on the natural soundscape. It also contains tables of distance to audibility by road segment for each Environmental Impact Statement (EIS) alternative. These distances were used to develop the tables of affected acres or parkland that are in Chapter IV of the Final Environmental Impact Statement (FEIS). This appendix also includes summary tables and figures comparing the total affected parkland areas for each alternative.

ANALYSIS APPROACH FOR DETERMINING NOISE IMPACT ON THE NATURAL SOUNDSCAPE

Two different metrics criteria, audibility and sound level, were used to assist in evaluating the potential impacts of noise on the natural soundscape. Audibility of wheeled and oversnow vehicles 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 parkland affected by audible vehicle traffic, and the percentages of time vehicles are audible in sections of parkland. Sound level is used to convey the loudness of vehicular sound at distances from park roads.

To compare the audibility of different vehicle types, the greatest distance that an individual vehicle pass-by could be heard was computed. 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 of parkland affected by audible vehicle traffic, and the percentages of time vehicles are audible

in sections of parkland. Sound level is used to convey the loudness of vehicular sound at distances from park roads.

To compare the audibility of different vehicle types, the greatest distance that an individual vehicle pass-by could be heard was computed. 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, how much of the time vehicles can be heard at different distances from the road.

BACKGROUND SOUND CONDITIONS AND TERRAIN CHARACTERISTICS

Sound-level measurements were conducted at several locations throughout Yellowstone National Park (YNP) and Grand Teton National Park (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, as described in Chapter III.

Based on the logging and observations made during site visits, hours during the day (8:00 A.M. to 6:00 P.M.) at each site were selected when intruding sound sources were likely to be present less than 50% of the time. These hours became the set of hourly statistical sound level data from which the background sound conditions were derived.

Levels were determined for two background conditions: 1) “average,” which included times when the wind blowing through vegetation or over terrain increased the levels, and 2) “quiet,”

characterized by periods with little or no wind. The measured background data appeared to fall into two categories - sites in mostly open areas and 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 being due to the sound of wind in the trees.

The levels used in the audibility analysis were: “average:” 20 dBA in open areas and 22 dBA in forested areas; “quiet:” 15 dBA in open areas and 18 dBA in forested areas.

Audibility of a sound depends upon the frequency content or spectrum of that sound and of the background sound. Sound spectra for each of the background conditions were 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.

Vehicle Sound Levels

As shown in the Assumptions and Methodologies section of Chapter IV, reference vehicle noise *emission levels*, the maximum pass-by sound level at a distance of 50 feet, were determined for oversnow vehicles by measurement in YNP and GTNP. Controlled reference pass-by measurements of many vehicles at various speeds were conducted at Yellowstone during the February-March 2000 noise measurement program. The measured data were combined by vehicle type and regressed to determine average emission levels as a function of speed.

The emission levels for wheeled vehicles were taken from the database created for the Federal Highway Administration’s recently released Traffic Noise Model (TNM) (Menge 1998).

The audibility and sound propagation models require an analysis by frequency, so the spectral values corresponding to the A-weighted vehicle emission levels were obtained and incorporated in the model.

Vehicle Sound Level Drop-Off With Distance

The rate at which sound drops off with distance by frequency was taken from the TNM’s sound-propagation algorithms. The TNM includes snow as a ground-cover type, the propagation constants having been based on carefully controlled acoustical measurements by Embleton et al. (1983). The TNM also includes Tree Zones as an input type (based on the ISO standard [ISO 9613-2] for dense foliage), and moderately forested to heavily forested areas were modeled with Tree Zones. The effect of trees is to reduce propagating sound levels by 5 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 effort assumed flat terrain.

Audibility Analysis - Single Events

Audibility is computed 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-prime or d'). A threshold for audibility derived from field observations occurs where $10 \log = 7 \text{ dB}$ (Fidell 1994). That threshold is used in this analysis.

Distances were computed to the limits of audibility of a single pass-by of each vehicle type in the two vegetative terrain conditions described above and in the “average” and “quiet” background conditions. The results are shown in the Assumptions and Methodologies section of Chapter IV.

Audibility Analysis - Cumulative Effects of all Vehicles

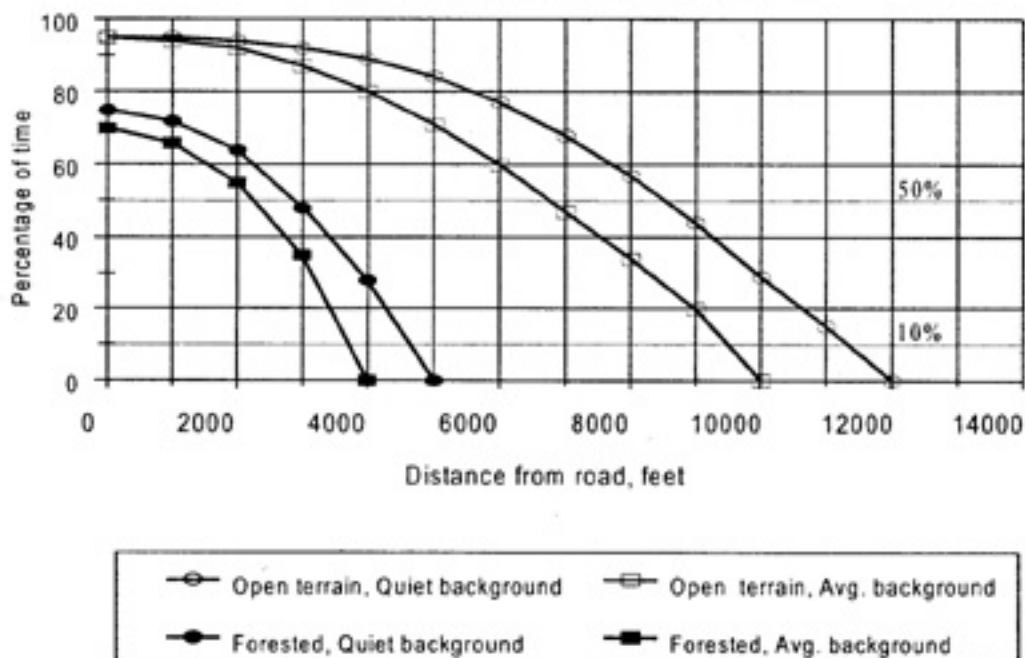
The next level of analysis combined all vehicles on each roadway segment, and performed combined audibility calculations for each study alternative. All types of vehicles to use each roadway segment on an average day were modeled individually using a complex spreadsheet calculation. The vehicles were randomly distributed along each roadway segment. The vehicles were “moved” along the road for the full day, each at its assigned speed, creating day-long time histories of both 10 log values and A-weighted sound levels. These time histories were created for several distances from the roadway. From these time histories, many different calculations and conclusions could be and were made.

One result that was determined relates to the distance to the limit of audibility for each segment for the two background conditions and two terrain types. Another result relates to the percentages of time vehicles are audible at each distance. Composite summaries of total area (acreage) of parkland affected were computed by multiplying the distance to audibility by the segment length. However, each road segment traverses its own unique proportion of open and forested terrain, so the appropriate audibility distances are assigned to the appropriate segment lengths.

The first calculated value for each alternative was the acres of park land by road segment where any vehicular noise is audible for any amount of time (“audible at all”) under the two background conditions, average and quiet. The total affected acreage was then summed over all road segments. To give perspective on the number of acres of affected parkland, two additional sets of values were calculated. The following paragraphs describe the development of those values.

For each road segment, under each terrain and background condition, and at each distance, the calculated time histories were used to develop percentiles of the distributions of 10 log d'. The percentage of time vehicles are audible, where 10 log d' is 7 dB or greater, is selected from the distribution at each distance. These values can then be plotted at each distance. Figure 1 shows the conceptual relationship for a hypothetical set of vehicles on a hypothetical road segment for the two terrain and two background conditions.

Figure 1. Percentage of time vehicles are audible, hypothetical road segment



From plots like Figure 1, distances to nearly any percentage time audible can be estimated (interpolated between points). For purposes of this analysis, two percentages of time audible were chosen: 10% and 50%. As an example, from Figure 1, for forested areas with average background conditions (filled rectangular symbols), the distances to the 50% and 10% time audible conditions are approximately 2,200 feet and 3,700 feet, respectively. For open areas under average background conditions (unfilled rectangular symbols), the distances are about 6,800 feet and 9,500 feet. The actual distances for each of the twenty modeled road segments (including Jackson Lake) for each alternative are shown in the tables in the next section of this appendix.

In a similar approach to that described for the “audible at all” category, composites of the total area of affected parkland were developed by multiplying the lengths of road in each segment with open and forested terrain by the corresponding distances to the 10% and 50% time audible points. It is those areas that are shown in the audibility tables for each alternative in Chapter IV.

“DISTANCE TO AUDIBILITY” TABLES

The following tables show, by road segment, the calculated distance to audibility for the three audibility categories. Distances are shown for Average and Quiet background sound level conditions over both open and forested terrain. There is one table for each alternative, with the road segments carrying the wheeled and/or oversnow vehicle types and volumes relevant to that alternative. The appropriate lengths of open and forested terrain along each road segment (not shown) were then factored into the determination of affected acres shown in the tables in Chapter IV of the FEIS.

The following is a key to the road segment abbreviations used in the tables on pages J-6 to J-9.

1. Mam-NeE: Mammoth to Northeast Entrance of YNP
2. Mam-Norr: Mammoth to Norris
3. WeE-Mad: West Entrance of YNP to Madison
4. Mad-Norr: Madison to Norris
5. Norr-Cany: Norris to Canyon Village
6. Cany-Fish: Canyon Village to Fishing Bridge
7. Fish-EaE: Fishing Bridge to East Entrance of YNP
8. Fish-WT: Fishing Bridge to West Thumb
9. Mad-OldF: Madison to Old Faithful
10. Old-F-WT: Old Faithful to West Thumb
11. WT-Flag: West Thumb to Flagg Ranch
12. Grassy: Grassy Lake Road
13. Flag-Colt: Flagg Ranch to Colter Bay
14. Colt-Mor: Colter Bay to Moran Junction
15. Mor-EaE: Moran Junction to East Entrance of GTNP
16. Mor-SoE: Moran Junction to South Entrance of GTNP
17. Teton PR: Teton Park Road
18. MoosWil: Moose-Wilson Road
19. Antl Flat: Antelope Flats Snowmobile Route
20. JackLake: Jackson Lake

Table 1. Distances to audibility by roadway segment, in feet, for alternative A (feet).

| Roadway Segment | Avg. Background Open | | | Avg. Background Forested | | | Quiet Background Open | | | Quiet Background Forest | | |
|-----------------|----------------------|------------------|------------------|--------------------------|------------------|------------------|-----------------------|------------------|------------------|-------------------------|------------------|------------------|
| | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud at all | Aud. 10% or more | Aud. 50% or more |
| 1. Mam-NeE | 3,276 | 1,406 | | 1,884 | | | 3,398 | 1,637 | | 2,007 | | |
| 2. Mam-Norr | 8,420 | 1,869 | | 3,728 | | | 9,956 | 2,560 | | 3,890 | | |
| 3. WeE-Mad | 13,938 | 11,522 | 9,412 | 4,449 | 3,582 | 2,918 | 15,117 | 12,825 | 10,836 | 5,662 | 3,892 | 3,330 |
| 4. Mad-Norr | 9,535 | 7,221 | 4,091 | 3,749 | 3,035 | | 11,044 | 7,963 | 4,939 | 3,915 | 3,320 | |
| 5. Norr-Cany | 9,460 | 6,345 | 2,396 | 3,742 | 2,719 | | 10,817 | 7,106 | 3,176 | 3,907 | 3,039 | |
| 6. Cany-Fish | 8,645 | 5,515 | | 3,731 | 2,511 | | 10,335 | 6,255 | 296 | 3,893 | 2,838 | |
| 7. Fish-EaE | 5,285 | 2,483 | | 2,879 | | | 5,847 | 2,844 | | 3,132 | | |
| 8. Fish-WT | 8,562 | 5,020 | | 3,730 | 2,436 | | 10,081 | 5,798 | | 3,893 | 2,753 | |
| 9. Mad-OldF | 12,933 | 10,688 | 8,342 | 3,991 | 3,477 | 2,510 | 14,040 | 12,033 | 9,713 | 5,173 | 3,798 | 3,002 |
| 10. OldF-WT | 9,460 | 6,609 | 3,420 | 3,743 | 2,939 | | 10,834 | 7,336 | 3,990 | 3,908 | 3,224 | |
| 11. WT-Flag | 9,460 | 6,159 | 2,096 | 3,742 | 2,630 | | 10,817 | 6,897 | 2,950 | 3,907 | 2,965 | |
| 12. Grassy | 5,054 | | | 2,879 | | | 5,515 | | | 3,132 | | |
| 13. Flag-Colt | 5,553 | 2,992 | | 3,091 | 848 | | 6,085 | 3,185 | | 3,298 | 1,027 | |
| 14. Colt-Mor | 5,685 | 3,367 | | 3,099 | 1,503 | | 6,317 | 3,530 | | 3,307 | 1,702 | |
| 15. Mor-EaE | 6,856 | 4,153 | 3,237 | 3,249 | 2,077 | 801 | 7,428 | 4,873 | 3,460 | 3,453 | 2,272 | 946 |
| 16. Mor-SoE | 6,965 | 4,663 | 3,580 | 3,232 | 2,150 | 1,031 | 7,650 | 5,432 | 3,803 | 3,393 | 2,322 | 1,258 |
| 17. Teton PR | 5,054 | | | 2,879 | | | 5,515 | | | 3,132 | | |
| 18. MoosWil | 3,780 | | | 2,546 | | | 3,892 | | | 2,767 | | |
| 19. Antl Flat | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 20. JackLake | 10,590 | 6,947 | | 3,985 | 1,850 | | 11,709 | 7,864 | | 4,445 | 2,187 | |

Table 2. Distances to audibility by roadway segment, in feet, for alternative B.

| Roadway Segment | Avg. Background Open | | | Avg. Background Forested | | | Quiet Background Open | | | Quiet Background Forested | | |
|-----------------|----------------------|------------------|------------------|--------------------------|------------------|------------------|-----------------------|------------------|------------------|---------------------------|------------------|------------------|
| | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more |
| 1. Mam-NeE | 3,275 | 1,404 | | 1,883 | | | 3,397 | 1,636 | | 2,007 | | |
| 2. Mam-Norr | 5,099 | 2,268 | | 2,949 | | | 5,933 | 2,491 | | 3,111 | | |
| 3. WeE-Mad | 5,551 | 2,690 | | 3,049 | 765 | | 6,179 | 2,865 | | 3,210 | 903 | |
| 4. Mad-Norr | 5,158 | 1,705 | | 2,956 | | | 5,999 | 2,052 | | 3,119 | | |
| 5. Norr-Cany | 5,173 | 2,293 | | 2,957 | | | 6,016 | 2,517 | | 3,121 | | |
| 6. Cany-Fish | 5,421 | 3,757 | 878 | 2,971 | 2,154 | | 6,205 | 3,905 | 1,435 | 3,178 | 2,442 | |
| 7. Fish-EaE | 3,914 | 2,325 | | 2,425 | | | 4,212 | 2,546 | | 2,692 | | |
| 8. Fish-WT | 5,421 | 3,774 | 1,083 | 2,971 | 2,168 | | 6,205 | 3,921 | 1,587 | 3,178 | 2,451 | |
| 9. Mad-OldF | 5,551 | 2,690 | | 3,049 | 765 | | 6,179 | 2,865 | | 3,210 | 903 | |
| 10. OldF-WT | 6,505 | 4,021 | 2,902 | 3,154 | 2,284 | | 7,104 | 4,767 | 3,203 | 3,385 | 2,584 | |
| 11. WT-Flag | 6,505 | 3,948 | 2,820 | 3,154 | 2,256 | | 7,104 | 4,487 | 3,118 | 3,385 | 2,550 | |
| 12. Grassy | 3,537 | | | 2,122 | | | 3,666 | | | 2,376 | | |
| 13. Flag-Colt | 5,564 | 2,754 | | 3,051 | 793 | | 6,193 | 2,931 | | 3,212 | 936 | |
| 14. Colt-Mor | 5,719 | 3,185 | | 3,065 | 1,452 | | 6,365 | 3,338 | | 3,226 | 1,621 | |
| 15. Mor-EaE | 6,707 | 3,954 | 3,235 | 3,199 | 2,022 | 807 | 7,381 | 4,549 | 3,456 | 3,361 | 2,205 | 952 |
| 16. Mor-SoE | 6,965 | 4,751 | 3,634 | 3,232 | 2,183 | 1,086 | 7,650 | 5,523 | 3,857 | 3,393 | 2,355 | 1,313 |
| 17. Teton PR | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 18. MoosWil | 3,120 | | | 1,886 | | | 3,233 | | | 2,107 | | |
| 19. Antl Flat | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 20. JackLake | 6,629 | 2,458 | | 3,234 | | | 7,234 | 3,444 | | 3,369 | | |

Aud = Audible

Table 3. Distances to audibility by roadway segment, in feet, for alternative C.

| Roadway Segment | Avg. Background Open | | | Avg. Background Forested | | | Quiet Background Open | | | Quiet Background Forested | | |
|-----------------|----------------------|------------------|------------------|--------------------------|------------------|------------------|-----------------------|------------------|------------------|---------------------------|------------------|------------------|
| | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more |
| 1. Mam-NeE | 3,276 | 1,406 | | 1,884 | | | 3,398 | 1,637 | | 2,007 | | |
| 2. Mam-Norr | 8,420 | 1,869 | | 3,728 | | | 9,956 | 2,560 | | 3,890 | | |
| 3. WeE-Mad | 5,379 | 1,537 | | 3,029 | | | 5,993 | 1,781 | | 3,189 | | |
| 4. Mad-Norr | 8,579 | 3,159 | | 3,734 | | | 10,126 | 3,487 | | 3,897 | | |
| 5. Norr-Cany | 8,637 | 3,601 | | 3,736 | 1,153 | | 10,192 | 3,826 | | 3,899 | 1,594 | |
| 6. Cany-Fish | 9,535 | 7,023 | 3,912 | 3,734 | 3,008 | | 10,785 | 7,749 | 4,689 | 3,897 | 3,296 | |
| 7. Fish-EaE | 7,086 | 3,624 | | 3,221 | 1,197 | | 7,674 | 3,845 | | 3,488 | 1,638 | |
| 8. Fish-WT | 9,535 | 7,100 | 4,049 | 3,734 | 3,024 | | 10,785 | 7,831 | 4,910 | 3,897 | 3,313 | |
| 9. Mad-OldF | 5,411 | 2,590 | | 3,032 | 745 | | 6,031 | 2,757 | | 3,192 | 881 | |
| 10. OldF-WT | 11,642 | 8,538 | 5,938 | 3,888 | 3,201 | 1,365 | 12,715 | 9,891 | 6,810 | 4,617 | 3,510 | 1,955 |
| 11. WT-Flag | 11,631 | 8,106 | 5,634 | 3,888 | 3,157 | 1,286 | 12,701 | 9,462 | 6,484 | 4,617 | 3,461 | 1,876 |
| 12. Grassy | 5,054 | | | 2,879 | | | 5,515 | | | 3,132 | | |
| 13. Flag-Colt | 5,585 | 3,097 | | 3,091 | 979 | | 6,214 | 3,280 | | 3,299 | 1,215 | |
| 14. Colt-Mor | 5,738 | 3,408 | | 3,099 | 1,517 | | 6,386 | 3,575 | | 3,307 | 1,713 | |
| 15. Mor-EaE | 6,864 | 4,216 | 3,288 | 3,249 | 2,094 | 816 | 7,440 | 4,937 | 3,512 | 3,453 | 2,290 | 962 |
| 16. Mor-SoE | 6,965 | 4,751 | 3,634 | 3,232 | 2,183 | 1,086 | 7,650 | 5,523 | 3,857 | 3,393 | 2,355 | 1,313 |
| 17. Teton PR | 5,054 | | | 2,879 | | | 5,515 | | | 3,132 | | |
| 18. MoosWil | 2,726 | | | 1,349 | | | 2,847 | | | 1,472 | | |
| 19. Antl Flat | 5,054 | | | 2,879 | | | 5,515 | | | 3,132 | | |
| 20. JackLake | 6,637 | 3,839 | | 3,235 | 1,165 | | 7,243 | 4,317 | | 3,370 | 1,605 | |

Table 4. Distances to audibility by roadway segment, in feet, for alternative D.

| Roadway Segment | Avg. Background Open | | | Avg. Background Forested | | | Quiet Background Open | | | Quiet Background Forested | | |
|-----------------|----------------------|------------------|------------------|--------------------------|------------------|------------------|-----------------------|------------------|------------------|---------------------------|------------------|------------------|
| | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more |
| 1. Mam-NeE | 3,276 | 1,406 | | 1,884 | | | 3,398 | 1,637 | | 2,007 | | |
| 2. Mam-Norr | 3,588 | | | 2,264 | | | 3,795 | | | 2,426 | | |
| 3. WeE-Mad | 4,721 | 3,634 | 3,006 | 2,647 | 1,886 | 814 | 5,336 | 3,799 | 3,217 | 2,897 | 2,198 | 1,119 |
| 4. Mad-Norr | 3,680 | 3,092 | | 2,351 | 1,480 | | 3,820 | 3,242 | | 2,557 | 1,769 | |
| 5. Norr-Cany | 3,679 | 2,785 | | 2,351 | 988 | | 3,812 | 2,951 | | 2,556 | 1,309 | |
| 6. Cany-Fish | 3,591 | 2,582 | | 2,296 | 803 | | 3,798 | 2,750 | | 2,492 | 1,079 | |
| 7. Fish-EaE | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 8. Fish-WT | 3,591 | 2,506 | | 2,266 | 783 | | 3,798 | 2,668 | | 2,433 | 1,049 | |
| 9. Mad-OldF | 4,228 | 3,535 | 2,624 | 2,588 | 1,736 | | 4,845 | 3,705 | 2,875 | 2,828 | 2,058 | 125 |
| 10. OldF-WT | 3,679 | 3,000 | | 2,351 | 1,357 | | 3,813 | 3,146 | | 2,557 | 1,612 | |
| 11. WT-Flag | 3,679 | 2,701 | | 2,351 | 859 | | 3,812 | 2,874 | | 2,556 | 1,160 | |
| 12. Grassy | 2,936 | | | 1,521 | | | 3,064 | | | 1,774 | | |
| 13. Flag-Colt | 3,679 | 2,701 | | 2,351 | 859 | | 3,812 | 2,874 | | 2,556 | 1,160 | |
| 14. Colt-Mor | 5,649 | 3,100 | | 3,058 | 1,378 | | 6,288 | 3,253 | | 3,219 | 1,537 | |
| 15. Mor-EaE | 6,648 | 3,889 | 3,130 | 3,194 | 1,946 | 779 | 7,317 | 4,264 | 3,346 | 3,356 | 2,120 | 919 |
| 16. Mor-SoE | 6,965 | 4,639 | 3,579 | 3,232 | 2,149 | 1,028 | 7,650 | 5,401 | 3,803 | 3,393 | 2,321 | 1,257 |
| 17. Teton PR | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 18. MoosWil | 2,726 | | | 1,349 | | | 2,847 | | | 1,472 | | |
| 19. Antl Flat | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 20. JackLake | 6,629 | 2,458 | | 3,234 | | | 7,234 | 3,444 | | 3,369 | | |

Aud = Audible

Table 5. Distances to audibility by roadway segment, in feet, for alternative E.

| Roadway Segment | Avg. Background Open | | | Avg. Background Forested | | | Quiet Background Open | | | Quiet Background Forested | | |
|-----------------|----------------------|------------------|------------------|--------------------------|------------------|------------------|-----------------------|------------------|------------------|---------------------------|------------------|------------------|
| | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more |
| 1. Mam-NeE | 3,276 | 1,406 | | 1,884 | | | 3,398 | 1,637 | | 2,007 | | |
| 2. Mam-Norr | 8,420 | 1,869 | | 3,728 | | | 9,956 | 2,560 | | 3,890 | | |
| 3. WeE-Mad | 13,938 | 11,522 | 9,412 | 4,449 | 3,582 | 2,918 | 15,117 | 12,825 | 10,836 | 5,662 | 3,892 | 3,330 |
| 4. Mad-Norr | 9,535 | 7,221 | 4,091 | 3,749 | 3,035 | | 11,044 | 7,963 | 4,939 | 3,915 | 3,320 | |
| 5. Norr-Cany | 9,460 | 6,345 | 2,396 | 3,742 | 2,719 | | 10,817 | 7,106 | 3,176 | 3,907 | 3,039 | |
| 6. Cany-Fish | 8,645 | 5,515 | | 3,731 | 2,511 | | 10,335 | 6,255 | 296 | 3,893 | 2,838 | |
| 7. Fish-EaE | 5,285 | 2,483 | | 2,879 | | | 5,847 | 2,844 | | 3,132 | | |
| 8. Fish-WT | 8,562 | 5,020 | | 3,730 | 2,436 | | 10,081 | 5,798 | | 3,893 | 2,753 | |
| 9. Mad-OldF | 12,933 | 10,688 | 8,342 | 3,991 | 3,477 | 2,510 | 14,040 | 12,033 | 9,713 | 5,173 | 3,798 | 3,002 |
| 10. OldF-WT | 9,460 | 6,624 | 3,440 | 3,743 | 2,940 | | 10,834 | 7,355 | 3,996 | 3,908 | 3,226 | |
| 11. WT-Flag | 9,460 | 6,157 | 2,075 | 3,742 | 2,630 | | 10,817 | 6,896 | 2,915 | 3,907 | 2,965 | |
| 12. Grassy | 5,054 | | | 2,879 | | | 5,515 | | | 3,132 | | |
| 13. Flag-Colt | 5,411 | 2,535 | | 3,032 | 743 | | 6,031 | 2,697 | | 3,192 | 879 | |
| 14. Colt-Mor | 5,706 | 2,984 | | 3,064 | 1,037 | | 6,352 | 3,155 | | 3,225 | 1,211 | |
| 15. Mor-EaE | 6,648 | 3,899 | 3,143 | 3,194 | 1,951 | 784 | 7,317 | 4,320 | 3,359 | 3,356 | 2,125 | 926 |
| 16. Mor-SoE | 6,965 | 4,639 | 3,579 | 3,232 | 2,149 | 1,028 | 7,650 | 5,401 | 3,803 | 3,393 | 2,321 | 1,257 |
| 17. Teton PR | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 18. MoosWil | 2,669 | | | 1,336 | | | 2,785 | | | 1,454 | | |
| 19. Antl Flat | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 20. JackLake | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |

Table 6. Distances to audibility by roadway segment, in feet, for alternative F.

| Roadway Segment | Avg. Background Open | | | Avg. Background Forested | | | Quiet Background Open | | | Quiet Background Forested | | |
|-----------------|----------------------|------------------|------------------|--------------------------|------------------|------------------|-----------------------|------------------|------------------|---------------------------|------------------|------------------|
| | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more |
| 1. Mam-NeE | 3,276 | 1,406 | | 1,884 | | | 3,398 | 1,637 | | 2,007 | | |
| 2. Mam-Norr | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 3. WeE-Mad | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 4. Mad-Norr | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 5. Norr-Cany | 8,484 | 4,031 | | 3,730 | 2,344 | | 10,025 | 4,751 | | 3,892 | 2,632 | |
| 6. Cany-Fish | 9,460 | 6,554 | 3,525 | 3,734 | 2,934 | | 10,688 | 7,278 | 4,092 | 3,897 | 3,219 | |
| 7. Fish-EaE | 7,153 | 3,715 | | 3,226 | 1,394 | | 7,748 | 3,926 | | 3,493 | 1,807 | |
| 8. Fish-WT | 9,535 | 6,955 | 3,885 | 3,734 | 2,996 | | 10,785 | 7,687 | 4,642 | 3,897 | 3,282 | |
| 9. Mad-OldF | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 10. OldF-WT | 11,642 | 8,681 | 6,069 | 3,888 | 3,211 | 1,386 | 12,715 | 10,011 | 6,947 | 4,617 | 3,519 | 1,981 |
| 11. WT-Flag | 11,772 | 9,016 | 6,550 | 3,890 | 3,263 | 1,572 | 12,868 | 10,379 | 7,416 | 4,630 | 3,574 | 2,168 |
| 12. Grassy | 5,054 | | | 2,879 | | | 5,515 | | | 3,132 | | |
| 13. Flag-Colt | 5,551 | 2,607 | | 3,049 | 749 | | 6,179 | 2,775 | | 3,210 | 885 | |
| 14. Colt-Mor | 5,712 | 3,113 | | 3,064 | 1,377 | | 6,358 | 3,268 | | 3,225 | 1,532 | |
| 15. Mor-EaE | 6,695 | 3,922 | 3,178 | 3,198 | 1,967 | 794 | 7,368 | 4,419 | 3,396 | 3,359 | 2,142 | 936 |
| 16. Mor-SoE | 6,965 | 4,751 | 3,634 | 3,232 | 2,183 | 1,086 | 7,650 | 5,523 | 3,857 | 3,393 | 2,355 | 1,313 |
| 17. Teton PR | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 18. MoosWil | 2,669 | | | 1,336 | | | 2,785 | | | 1,454 | | |
| 19. Antl Flat | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 20. JackLake | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |

Aud. = Audible

Table 7. Distances to audibility by roadway segment, in feet, for alternative G.

| Roadway Segment | Avg. Background Open | | | Avg. Background Forested | | | Quiet Background Open | | | Quiet Background Forested | | |
|-----------------|----------------------|------------------|------------------|--------------------------|------------------|------------------|-----------------------|------------------|------------------|---------------------------|------------------|------------------|
| | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more | Aud. at all | Aud. 10% or more | Aud. 50% or more |
| 1. Mam-NeE | 3,276 | 1,406 | | 1,884 | | | 3,398 | 1,637 | | 2,007 | | |
| 2. Mam-Norr | 9,003 | 1,593 | | 3,744 | | | 10,757 | 3,008 | | 3,906 | | |
| 3. WeE-Mad | 17,810 | 14,213 | 8,501 | 6,210 | 3,843 | | 21,138 | 17,244 | 10,929 | 6,933 | 4,404 | |
| 4. Mad-Norr | 12,839 | 9,354 | | 4,953 | 2,555 | | 14,612 | 11,603 | | 5,605 | 3,112 | |
| 5. Norr-Cany | 11,846 | 8,296 | | 3,947 | 709 | | 13,523 | 10,389 | | 4,563 | 1,731 | |
| 6. Cany-Fish | 10,110 | 7,882 | | 3,774 | | | 12,108 | 9,817 | | 3,939 | | |
| 7. Fish-EaE | 8,413 | | | 3,727 | | | 9,949 | | | 3,889 | | |
| 8. Fish-WT | 10,110 | 7,882 | | 3,774 | | | 12,108 | 9,817 | | 3,939 | | |
| 9. Mad-OldF | 17,810 | 14,079 | 7,473 | 6,210 | 3,804 | | 21,138 | 17,067 | 10,057 | 6,933 | 4,257 | |
| 10. OldF-WT | 12,197 | 8,688 | | 4,953 | 2,340 | | 13,735 | 10,807 | | 5,605 | 2,872 | |
| 11. WT-Flag | 11,846 | 8,258 | | 3,947 | 496 | | 13,523 | 10,362 | | 4,563 | 1,662 | |
| 12. Grassy | 3537 | | | 2122 | | | 3666 | | | 2376 | | |
| 13. Flag-Colt | 11,846 | 8,258 | | 3,947 | 496 | | 13,523 | 10,362 | | 4,563 | 1,662 | |
| 14. Colt-Mor | 5,642 | 2,949 | | 3,058 | 985 | | 6,281 | 3,121 | | 3,219 | 1,159 | |
| 15. Mor-EaE | 6,856 | 4,132 | 3,245 | 3,249 | 2,079 | 801 | 7,428 | 4,843 | 3,466 | 3,453 | 2,274 | 947 |
| 16. Mor-SoE | 6,965 | 4,663 | 3,580 | 3,232 | 2,150 | 1,031 | 7,650 | 5,432 | 3,803 | 3,393 | 2,322 | 1,258 |
| 17. Teton PR | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 18. MoosWil | 2,669 | | | 1,336 | | | 2,785 | | | 1,454 | | |
| 19. Antl Flat | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |
| 20. JackLake | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed | Closed |

Aud = Audible

SUMMARY OF SOUNDSCAPE IMPACTS

Table 8 and Figure 2 of parkland acreage where wheeled or oversnow vehicular noise is audible for any amount of time (labeled “audible at all”), for 10% of the time or more, and for 50% of the time or more, under the two background conditions, Average and Quiet. Computations are based on wheeled and oversnow vehicle traffic for an average day in January or February.

Table 9 and Figure 3 present the information in terms of the *percentage* difference in affected acres relative to alternative A. These percentages are used in the discussions of effects for each alternative in Chapter IV.

Large areas of impact are evident under the “audible at all” criterion, since the single loudest wheeled or oversnow vehicle or group of vehicles during the day determines this criterion, even if the number of wheeled or oversnow vehicles is small. Larger percentage differences in impacted area are evident in the “audible 50% or more” case, since that category most strongly accounts for the volume of traffic on the road segments. In the “audible 50% or more” case, alternatives B, D, and G show significant decreases relative to the other alternatives. These decreases are due to the substantially reduced wheeled or oversnow vehicle volumes in the case of alternatives B and G, and to the reduced oversnow vehicle noise emission levels in the case of alternatives B and D.

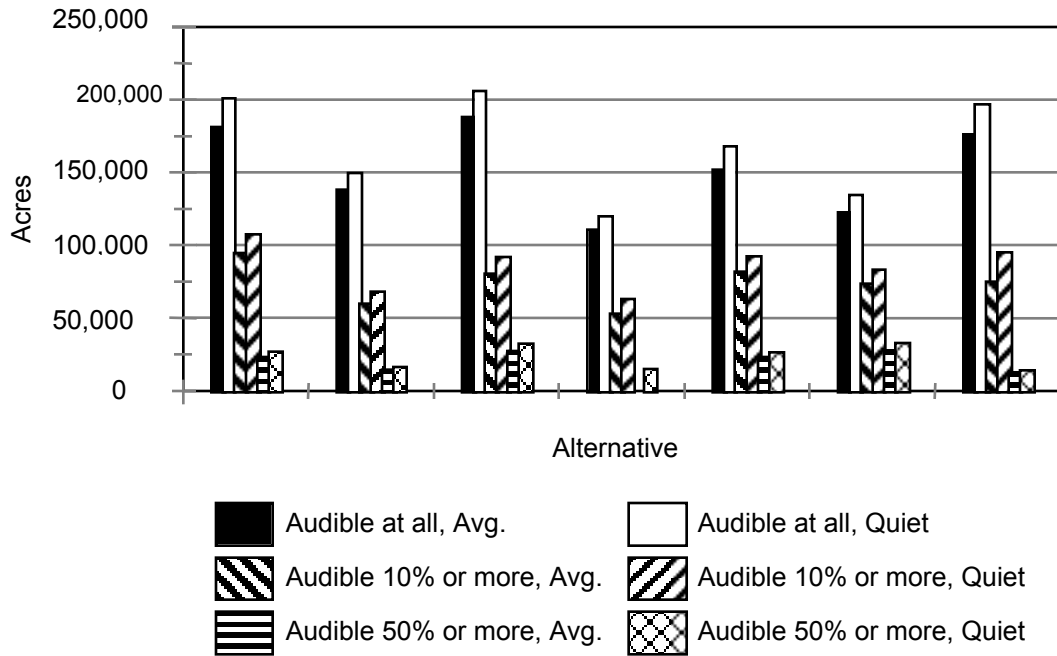
**Table 8. Summary of affected acres of parkland by alternative
for each category of impact.**

| Audibility Criterion | Background Condition | Affected acres of parkland by alternative | | | | | | |
|------------------------------------|-------------------------|---|---------|---------|---------|---------|---------|---------|
| | | A | B | C | D | E | F | G |
| Audible at all | Average | 181,127 | 138,018 | 188,245 | 110,723 | 152,203 | 122,364 | 176,323 |
| Audible 10% of the time or more | Average | 94,599 | 59,534 | 80,564 | 52,772 | 81,815 | 73,636 | 74,795 |
| Audible 50% of the time or more | Average | 23,459 | 14,558 | 27,091 | 13,392 | 23,436 | 27,722 | 12,916 |
| Audible at all | Quiet | 200,676 | 149,589 | 205,961 | 119,781 | 167,899 | 134,377 | 196,687 |
| Audible 10% of the time or more | Quiet | 107,373 | 68,331 | 91,959 | 62,803 | 92,382 | 83,110 | 95,060 |
| Audible 50% of the time or more | Quiet | 26,525 | 16,355 | 32,385 | 14,910 | 26,497 | 32,799 | 14,087 |

**Table 9. Percentage of affected acres of parkland for each alternative
relative to alternative A.**

| Audibility Criterion | Background Condition | Percentage of affected acres of parkland relative to alternative A | | | | | | |
|------------------------------------|-------------------------|--|-----|------|-----|------|------|-----|
| | | A | B | C | D | E | F | G |
| Audible at all | Average | 100% | 76% | 104% | 61% | 84% | 68% | 97% |
| Audible 10% of the time or more | Average | 100% | 63% | 85% | 56% | 86% | 78% | 79% |
| Audible 50% of the time or more | Average | 100% | 62% | 115% | 57% | 100% | 118% | 55% |
| Audible at all | Quiet | 100% | 75% | 103% | 60% | 84% | 67% | 98% |
| Audible 10% of the time or more | Quiet | 100% | 64% | 86% | 58% | 86% | 77% | 89% |
| | Quiet | 100% | 62% | 122% | 56% | 100% | 124% | 53% |

**Figure 2. Affected area by alternative
for each category of impact.**



**Figure 3. Percentages of affected area
of parkland relative to alternative A.**

